Tonya N. Davis
Jessica S. Akers

A Behavior Analyst's Guide to Supervising Fieldwork

Springer

A Behavior Analyst's Guide to Supervising Fieldwork

Tonya N. Davis • Jessica S. Akers

A Behavior Analyst's Guide to Supervising Fieldwork

Springer

Tonya N. Davis
Baylor University
Waco, TX, USA

Jessica S. Akers
Baylor University
Waco, TX, USA

ISBN 978-3-031-09931-1 ISBN 978-3-031-09932-8 (eBook)
https://doi.org/10.1007/978-3-031-09932-8

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Tonya Davis dedicates this book to:

Ross Caraway and Atticus Caraway for your endless encouragement and support;

Shelley Davis, Phyllis Davis, and Ronnie Davis for loving and liking me;

And the many students and supervisees who have trusted me to supervise, mentor, or guide them in any way. I have learned so much from you.

Jessica Akers dedicates this book to:

My parents who support my every endeavor and love me unconditionally;

My nieces and nephews who inspire me to be the best version of myself;

My past supervisors and many supervisees who have shaped my supervisory behavior; thank you for your grace and patience.

Contents

About the Authors

Tonya Davis is a professor at Baylor University where she teaches undergraduate and graduate courses in applied behavior analysis. In 2010, she founded the applied behavior analysis graduate program at Baylor University as well as the university-affiliated applied behavior analysis clinic, Baylor CARE, where students complete a portion of their supervised fieldwork. Dr. Davis' research revolves around her primary goal of ensuring children with intellectual and developmental disabilities have access to the most effective interventions across a variety of settings. This includes two lines of research, first developing approaches support pre- and in-service professionals to implement evidence-based practices. The second is evaluating interventions to reduce challenging behavior, focusing on approaches to address barriers of implementing interventions in homes and schools.

Jessica Akers is an assistant professor at Baylor University where she teaches graduate courses in applied behavior analysis. She serves as the coordinator for the university-affiliated behavior analysis clinic Baylor CARE and as the practicum coordinator for the applied behavior analysis program. Dr. Akers' research interests include strategies for promoting appropriate social and play skills and verbal behavior in individuals with developmental disabilities. She is primarily interested in targeting play between children with developmental disabilities and their peers and siblings.

Chapter 1
Introduction

Welcome to our book on supervision! This book is meant to serve as guide for supervising individuals accruing hours to become a board-certified behavior analyst (BCBA). We acknowledge that providing ethical supervision to trainees is another required task on top of the many other tasks you are balancing as a behavior analyst. Therefore, we wrote this book to serve as a tool to aide you in your provision of supervision for future BCBAs.

In response to criticism regarding the enthusiasm of behavior analysts, Skinner said, "There is a more obvious explanation [for this optimism]: the analysis works" (Skinner, 1966, pg. 218). Our analysis works, but only when we adequately understand the principles of behavior analysis. Therefore, you have been entrusted with shaping the behavior of the next generation of behavior analysts. This great responsibility can begin to seem like a burden rather than an opportunity to impact the future of our field. Our hope in writing this book is that these materials will aide you as a supervisor and decrease the overall response effort required to provide appropriate supervision. We are all a product of the environmental contingencies under which we are behaving. Despite our best efforts to arrange contingencies to promote effective behavior, we all fail sometimes. Be encouraged by Skinner's words, "A failure is not always a mistake, it may simply be the best one can do under the circumstances. The real mistake is to stop trying" (Skinner, 1971). Always continue behaving, as you shape the behavior of your supervisees, they will also shape your behavior. Whether you have been supervising for years or days, we can all improve the way we do things and should continue striving to do better.

In the next chapter, we provide materials for tracking supervisee progress as you work through the remaining chapters. These data can be used to assess the impact of your supervision and the overall readiness for your supervisee to take the BCBA exam. The next chapters of this book provide a framework for providing feedback to supervisees and recruiting feedback on your own supervision. As behavior analysts, we recognize the importance of feedback, but we can all acknowledge that providing feedback and receiving feedback may not be the most pleasant of

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_1

interactions. Therefore, we have compiled behavior analytic resources to provide suggestions on the most effective ways to navigate these interactions. The main chapters in this book cover topics from the 5th Edition BACB task list (BACB, 2022a). Each of these chapters includes an introduction to the topic, and sections dedicated to group supervision, individual supervision without a client, and individual supervision with a client. Each of the supervision sections includes an agenda with activities and homework to be assigned to supervisees. We recognize that there is a great deal of variability across clinical settings. Thus, we have attempted to include activities that can easily be modified to fit the population with whom your supervisees work.

We wish you the best as you embark on your journey of supervising future behavior analysts. This book is just one tool to aide you on this journey. In addition to attending relevant continuing education events and reading the current behavior analytic literature, we encourage you to reference the Ethics Code for Behavior Analysts often and stay up to date on the BACB guidelines for supervision (BACB, 2022b). Use all the tools in your arsenal to ensure your supervision is high quality and effective. We look forward seeing how you enhance the field of behavior analysis with your superior supervision.

References

Behavior Analysis Certification Board. (2022a). *Task lists for BACB certificants*. Behavior Analysis Certification Board. https://www.bacb.com/task-lists/

Behavior Analysis Certification Board. (2022b). *Supervisor training curriculum outline*. https://www.bacb.com/wp-content/Supervision-Training-Curriculum/

Skinner, B. F. (1966). What is the experimental analysis of behavior? *Journal of the Experimental Analysis of Behavior, 9*, 213–218. https://doi-org.ezproxy.baylor.edu/10.1901/jeab.1966.9-213

Skinner, B. F. (1971). *Beyond freedom and dignity*. Knopf/Random House.

Chapter 2
Tracking Field Experience Progress

The field of behavior analysis is growing rapidly. In 2000, there were fewer than 400 board-certified behavior analysts (BCBAs). In 2022, there are over 55,000 (Behavior Analyst Certification Board; BACB, 2022a). Applied behavior analytic interventions produce positive and meaningful improvements for clients (Eikeseth, 2009; Eldevik et al., 2009). The increase in BCBAs breeds optimism that more individuals will be able benefit from behavior analytic interventions and services. However, interventions can only have a positive impact if they are implemented with fidelity. Therefore, it is our responsibility as supervisors to ensure that that future BCBAs have the knowledge and skills necessary to implement interventions with fidelity to ultimately improve the well-being of the clients which they will serve (Granpeesheh et al., 2010; Sellers et al., 2016).

Supervising fieldwork experience is rewarding, but can also be daunting. The BACB task list identifies the skills (i.e., competencies) that supervisees must develop (BACB, 2022b). However, it is up to the supervisor to plan and deliver the activities to teach and evaluate these competencies (Sellers et al., 2016). We have developed this book in hopes of relieving some of the burden of planning the scope and sequence of learning activities and assessments to guide your supervisees' professional development. We hope that this enables you to provide a well-rounded and thorough experience for your supervisees. We anticipate that prior to beginning the activities in this book, you would have built a solid foundation for excellent supervision by completing a number of activities. These include, but are not limited to reviewing and signing a supervision contract; learning your supervisee's strengths, weaknesses, and needs; learning about your supervisee's goals for supervision; and explicitly describing your expectations during the supervision process.

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_2

Needless to say, excellent supervision requires much more than a thorough set of learning activities and assessment protocols. Supervision requires a complex set of skills and behaviors that are beyond the scope of this book. There are a number of resources available to support your professional growth as a supervisor. Some that we recommend include Luiselli (2018), Turner et al. (2016), Turner (2017), Sellers et al. (2016), and Valentine et al. (2016). We encourage you to continue to develop the numerous additional skills necessary to be an effective supervisor through additional resources and continued professional development.

Arranging Supervision Activities

This book has been developed to teach and evaluate the competencies associated with the BACB's 5th edition task list (BACB, 2022b). You will find 29 topics aligning with the task list. We have incorporated a number of research-validated training approaches including, but not limited to instructions, lecture, discussion, modeling, role-play, and performance feedback (Kirkpatrick et al., 2021; Sarokoff & Sturmey, 2008; Thomson et al., 2009).

Each chapter contains an agenda for (a) a group supervision meeting, (b) an individual supervision meeting without a client, and (c) an individual supervision meeting with a client. In some chapters, additional individual supervision meetings are scheduled due to a specific need for additional practice and feedback. Each chapter includes activities that will involve your supervisee planning and implementing techniques with their clients. However, we do not specifically outline procedures for regular case presentations because we expect the appropriate format for case presentations to vary greatly based on supervisee and client needs. We recommend that you schedule standing case presentations because they are an integral activity to promote your supervisee's professional development. They allow your supervisee to receive feedback from multiple listeners as well as observe and participate in the problem-solving and decision-making process many times throughout their supervision experience. Additionally, case presentations provide supervisees the opportunity to practice presentation and professional communication in a safe, nonthreatening space. Most importantly, supervisee case presentations will provide them the guidance necessary to improve therapeutic services for their client, which will, in turn, improve their client's outcomes.

As you will see throughout the chapters, the three meetings are designed to take place in the order in which they are presented. The activities across the meetings build upon one another. For example, your supervisees may brainstorm how to develop a specific intervention in the group supervision meeting, develop the procedural fidelity checklist in the individual supervision meeting without a client, and then implement that intervention in the supervision meeting with a client. As a result, it is important that the meetings occur in this order; however, the amount of time that passes between each meeting should be based upon your supervisees' strengths and needs. Figure 2.1 is an example of how you may consider scheduling your supervision meetings.

Week One	Group Supervision Meeting
Week Two	Group Case Presentations
	Individual Supervision Meeting without a Client
Week Three	Individual Supervision Meeting with a Client

Fig. 2.1 Sample structure for group and supervision meetings

The three meetings each play a critical role in your supervisee's development. Group supervision meetings begin with a brief refresher of foundational content and concepts followed by group learning activities. Group activities give your supervisees opportunities to learn by observing their peers, honing communication skills, and developing collaboration skills. Moreover, we hope that this group supervision meeting structure serves as professional community of support for one another both throughout their supervision and well into their careers.

Individual supervision meetings, on the other hand, provide opportunities for you and your supervisee to work collaboratively. We encourage you to take advantage of this one-on-one time to build a positive relationship by getting to know your supervisee, their strengths, weaknesses, career aspirations, and preferred methods for learning. All of this information will allow you to better tailor this experience to their needs. It also gives you the opportunity to build rapport, praise their accomplishments, and correct their mistakes. See Chaps. 3 and 4 for a lengthier discussion of performance feedback.

All group and individual supervision meetings include an agenda with a recommended amount of time to dedicate to each activity. These timelines are merely suggestions and may not reflect the amount of time or instruction your supervisee needs on a particular topic. You should be responsive to your supervisee's strengths, weaknesses, and career goals. For example, be prepared to adjust the agenda to offer more time on topics in which your supervisees have little experience and/or will be central to their responsibilities in their upcoming career.

Evaluating Supervisee Competencies

As supervisors, we take on great responsibility. We will teach, supervise, and shape a myriad of behaviors in an effort to establish a comprehensive repertoire among your supervisees that will enable them to affect positive change among their clients.

Supervisees must develop content and conceptual knowledge as well as the ability to implement interventions (i.e., procedural knowledge; Granpeesheh et al., 2010; Sellers et al., 2016).

First, supervisees must demonstrate their conceptual knowledge. As Baer et al. (1968) so aptly describe, all behavior analytic interventions must be conceptually systematic. That is, all interventions must relate to principles of behavior analysis. Your supervisees must be able to demonstrate their conceptual knowledge by describing what behavior principles account for the effectiveness of an intervention. To build this skillset, they must have a solid foundation of content knowledge in which they have a firm grasp of behavioral principles, theories, and terminology (Sellers et al., 2016). This content and conceptual knowledge will be crucial in developing their abilities to select an intervention, problem-solve when interventions do not produce the desired outcome, make programmatic decisions, and many more of the complex skills behavior analysts must perform daily (Granpeesheh et al., 2010). Second, supervisees must also acquire procedural knowledge. They must demonstrate the ability to conduct behavioral assessments, implement behavioral interventions, and apply behavioral techniques with proficiency (Granpeesheh et al., 2010).

Facilitating the development of the necessary content, conceptual, and procedural knowledge to be an effective behavior analyst is no small feat. Your supervisees will require a great deal of well-planned instruction and supervised fieldwork experiences to do just this. In each chapter, we have designed lectures and activities to develop and assess content, conceptual, and procedural knowledge. At the end of each group supervision meeting is a set of questions titled *Knowledge Check*. Their responses to these questions will allow you gauge their mastery of content and conceptual knowledge. Feel free to administer these in any format you feel is best suited for your supervisees, ranging from oral questioning and answering among the group of supervisees to written, individual responses. Supervisees who are unable to correctly respond to the questions presented in the *Knowledge Check* will likely require additional instruction and support.

In addition to content and conceptual knowledge, your supervisees must also demonstrate proficiency in implementing a number of behavior analytic assessments and interventions. The development of procedural knowledge is the main focus of this book. The primary focus of individual meetings is to develop and assess procedural knowledge. At the end of each individual supervision meeting with a client, you will find a section titled *Mastery Criteria*. The mastery criteria describe exactly what behaviors your supervisee should demonstrate and at what level of proficiency. The purpose of the mastery criteria is to thoroughly evaluate procedural knowledge. Supervisees who are unable to meet the mastery criteria at the end of each chapter should receive additional instruction on that topic until they can do so. We recommend they meet each mastery criteria within a chapter before continuing to the next topic. It is critical to confirm that your supervisee can perform all of the skills assessed in this book.

Needless to say, your supervisees need for guidance and supervision will not immediately end contingent upon their meeting the mastery criteria. Therefore, at the end of each chapter is a section titled *Future Growth*. In *Future Growth*, we provide you with suggestions for future learning activities that will ensure your supervisees' behaviors generalize and maintain. We highly encourage you to take advantage of these supplemental learning activities and suggest you continue to evaluate their performance during the future growth activities.

Cohort Model

We designed this book to be compatible with a cohort model of instruction. In other words, you would have many supervisees completing the instructional and evaluation activities at roughly the same time. The cohort model approach to education is popular in baccalaureate and graduate programs and involves a group of students who enter and complete and educational experience together (Pemberton & Akkary, 2010). The cohort model fosters a sense of community and deep personal bonds between its members. This in turns increases motivation for learning, improves persistence in the educational process, and increases program completion. Members of a cohort express an enhanced feeling of support and connection and reduced loneliness. Moreover, a cohort allows members to share ideas, obtain feedback, and build professional networks that can benefit them for the duration of their careers (Beer & Darkenwald, 1989; Dorn et al., 1997; Lawrence, 2002; Maher, 2005; Miller, 2007; Milstein & Henry, 2008; Pemberton & Akkary, 2010; Saltiel & Russo, 2010).

Because of these many benefits, we recommend the cohort model. However, we want to caution you that this book is not necessarily a one-size-fits-all approach. Your supervisees will have different strengths, weaknesses, and career goals. An excellent supervisor is responsive to this. You can use a cohort model and still individualize to meet your supervisee's needs. For example, one supervisee in your cohort may have a great deal of experience conducting preference assessments, but another has never administered a preference assessment. As a result, you may shorten the recommend duration of time in individual supervision meetings related to preference assessment for the supervisee with a great deal of experience and use that time to practice and discuss topics in which that supervisee has less experience. Simultaneously, you may extend the recommended duration of time in individual supervision meetings related to preference assessments for the supervisee with no prior experience on the topic.

To determine how you can individualize the supervision experiences, conduct a baseline evaluation at the onset of supervision activities. Baseline assessments can take many forms, ranging from interviewing your supervisee, reviewing the BACB task list together to discuss their self-evaluation of competencies, and reviewing their course syllabi (Turner et al., 2016). You may also conduct observational assessments. For example, ask your supervisee to answer the questions provided in the *Knowledge Check* located in the group supervision sections of each chapter or observe your supervisee performing the skills in the *Mastery Criteria* located in the individual supervision sections of each chapter. We do caution you to first use the aforementioned informal baseline assessments prior to allowing your supervisee perform the skills found in the *Mastery Criteria* section for baseline assessment purposes. For the most part, these evaluations involve observing your supervisee working with a client. You would need to be confident of your supervisee's success in completing these tasks so that you do not risk the client being exposed to poor assessment or intervention procedures.

Despite your use of baseline assessments, you must begin supervision with a mutual understanding of the goals. This workbook provides you with 29 sets of Knowledge Check questions to evaluate your supervisees content and conceptual knowledge and 29 sets of Mastery Criteria in which you supervisee must perform a specific skill at a predetermined level of accuracy. Share with you supervisee these evaluations and expectations at the onset of supervision. Inform your supervisee that you will be tracking their participation in supervision activities and performance on evaluations. In *Supervisee Field Experience Tracking*, found in Appendix A, you will find a document that allows you to track each supervisee's progress through the supervision activities in this book. We encourage you and your supervisee to frequently reference this document to discuss their progress through supervision. We hope that this helps you track each of your supervisee's needs, providing clear communication and enabling you to be an organized and efficient supervisor.

Appendix A: Supervisee Field Experience Tracking

Supervisee: _____ Supervisor: _____

Supervised Field Experience Began on: _____

Supervised Field Experience was Completed on: _____

Expectation	Date Completed	Notes
Operational Definitions & Measurement		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data on two different client behaviors with at least 80% agreement.		
Graphs & Experimental Designs		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Complete the visual analysis practice for ABAB designs at www.singlecase.org with at least 80% of ratings as an exact match (green) or within +/- 1 (yellow).		
Complete the visual analysis practice for alternating treatment (i.e., multielement) designs at www.singlecase.org with at least 80% of ratings an exact match (green) or within +/- 1 (yellow).		
Descriptive Assessment of Challenging Behavior		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect ABC continuous recording data for 25 or more minutes using a supervisee-developed data sheet with at least 80% agreement		
Direct Assessment		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during a preference assessment with at least 80% agreement.		
Implement a preference assessment with at least 80% fidelity.		
Functional Analysis, Part 1		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during a traditional functional analysis with at least 80% agreement.		
Conduct all conditions of a traditional functional analysis with at least 80% fidelity.		
Functional Analysis, Part 2		
Complete group supervision.		

Strengths and Deficits Assessment		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the administration of a commercially-available assessment (e.g., VB-MAPP, ABLLS-R) with at least 80% agreement.		
Conduct a commercially-available assessment (e.g., VB-MAPP, ABLLS-R) with at least 80% fidelity.		
Reinforcement		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of a compound schedule of reinforcement with at least 80% agreement.		
Implement a compound schedule of reinforcement with at least 80% fidelity.		
Motivating Operations		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Create an instructional video that contains accurate descriptions of an establishing operation, abolishing operation, evocative effect, and abolishing effect		
Implement a deprivation preference assessment condition with at least 80% fidelity.		
Implement a habituation preference assessment condition with at least 80% fidelity.		
Discrete Trial Training		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of DTT with at least 80% agreement.		
Implement DTT with at least 80% fidelity.		
Naturalistic Instruction		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of naturalistic instruction with at least 80% agreement.		
Implement naturalistic instruction with at least 80% fidelity.		
Stimulus and Response Prompts		
Complete group supervision.		
Complete individual supervision without a client.		

Complete individual supervision with a client.		
Accurately collect data during the implementation of DTT with a prompt fading technique with at least 80% agreement.		
Implement DTT with a prompt fading approach with at least 80% fidelity.		
Modeling		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of BST with at least 80% agreement.		
Implement BST with at least 80% fidelity.		
Shaping		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of shaping with at least 80% agreement.		
Implement shaping with at least 80% fidelity.		
Chaining		
Complete group supervision.		
Complete individual supervision without a client, part 1.		
Complete individual supervision with a client.		
Complete individual supervision without a client, part 2.		
Accurately collect data during the implementation of chaining with at least 80% agreement.		
Implement chaining with at least 80% fidelity.		
Stimulus Control		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during conditional discrimination instruction with at least 80% agreement.		
Implement a conditional discrimination instruction protocol using a with at least 80% fidelity.		
Equivalence-based Instruction		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client, part 1.		
Complete individual supervision with a client, part 2.		
Accurately collect data during the equivalence-based instruction with at least 80% agreement.		
Implement equivalence-based instruction with at least 80% fidelity.		
High-p Instructional Sequence		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of a high-p instructional sequence with at least 80% agreement.		

Implement a high-p instructional sequence with at least 80% fidelity.		
Extinction and Noncontingent Reinforcement		
Complete group supervision.		
Complete individual supervision without a client, part 1.		
Complete individual supervision with a client, part 1.		
Complete individual supervision without a client, part 2.		
Complete individual supervision with a client, part 2.		
Accurately collect data during the implementation of noncontingent reinforcement with at least 80% agreement.		
Implement noncontingent reinforcement with at least 80% fidelity.		
Differential Reinforcement		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of a differential reinforcement procedure (DRA, DRO, or DRL) with at least 80% agreement.		
Implement a differential reinforcement procedure (DRA, DRO, or DRL) with at least 80% fidelity.		
Functional Communication Training		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of FCT		
with at least 80% agreement.		
Implement FCT with at least 80% fidelity.		
Punishment		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of response cost or RIRD with at least 80% agreement.		
Implement response cost or RIRD with at least 80% fidelity.		
Token Economies		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of a token economy with at least 80% agreement.		
Implement a token economy with at least 80% fidelity.		
Group Contingencies		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Develop a group contingency protocol that follows 80% of guidelines.		
Implement a group contingency with at least 80% fidelity.		
Contingency Contracting		

Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client, part 1.		
Complete individual supervision with a client, part 2.		
Accurately collect data during the implementation of a contingency contract with at least 80% agreement.		
Implement a contingency contract with at least 80% fidelity.		
Self-Management		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client, part 1.		
Complete individual supervision with a client, part 2.		
Teach a client or client's caregiver a self-management program in which the client of caregiver implements with at least 80% fidelity.		
Generalization and Maintenance		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Accurately collect data during the implementation of a generalization procedure with at least 80% agreement.		
Implement a generalization procedure with at least 80% fidelity.		
Selecting and Implementing Interventions		
Complete group supervision.		
Complete individual supervision without a client, part 1.		
Complete individual supervision with a client.		
Complete individual supervision without a client, part 2 (optional).		
Accurately collect data during the implementation of assessment-based instruction with at least 80% agreement.		
Implement assessment-based instruction with at least 80% fidelity.		
Ethics		
Complete group supervision.		
Complete individual supervision without a client.		
Complete individual supervision with a client.		
Complete the Compassionate Collaboration Tool and receive at least 68 out of 84 points (80%).		

Note: VB-MAPP = Verbal Behavior-Milestones Assessment and Placement Program, ABLLS-R = Assessment of Basic Language and Learning Skills, Revised, DTT = discrete trial training, DRA = differential reinforcement of alternative behavior, DRO = differential reinforcement of other behavior, DRL = differential reinforcement of low rates of behavior, FCT = functional communication training, RIRD = response interruption and redirection.

References

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*(1), 91.

Beer, C. T., & Darkenwald, G. G. (1989). Gender differences in adult student perceptions of college classroom social environments. *Adult Education Quarterly, 40*(1), 33–42.

Behavior Analysis Certification Board. (2022a, April 1). *BACB certificant data*. Behavior Analysis Certification Board. https://www.bacb.com/bacb-certificant-data/

Behavior Analysis Certification Board. (2022b, January 1). *Task lists for BACB certificants*. Behavior Analysis Certification Board. https://www.bacb.com/task-lists/

Dorn, S. M., Papalewis, R., & Brown, R. (1997). Educators earning their doctorates: Doctoral student perceptions regarding cohesiveness and persistence. *Education, 116*(2), 305–313.

Eikeseth, S. (2009). Outcome of comprehensive psycho-educational interventions for young children with autism. *Research in Developmental Disabilities, 30*, 158–178.

Eldevik, S., Hastings, R. P., Hughes, J. C., Jahr, E., Eikeseth, S., & Cross, S. (2009). Meta-analysis of early intensive behavioral intervention for children with autism. *Journal of Clinical Child & Adolescent Psychology, 38*, 439–450.

Granpeesheh, D., Tarbox, J., Dixon, D. R., Peters, C. A., Thompson, K., & Kenzer, A. (2010). Evaluation of an eLearning tool for training behavioral therapists in academic knowledge of applied behavior analysis. *Research in Autism Spectrum Disorders, 4*(1), 11–17.

Kirkpatrick, M., Rehfeld, D. M., Akers, J. S., Rivera, G., & Sulak, T. N. (2021). Using behavioral skills training with preservice teachers in the university classroom. *Behavioral Interventions, 36*(1), 145–158.

Lawrence, R. L. (2002). A small circle of friends: Cohort groups as learning communities. *New Directions for Adult and Continuing Education, 95*, 83–92.

Luiselli, J. K. (2018). *Conducting behavioral consultation in educational and treatment settings*. Elsevier/Academic Press.

Maher, M. A. (2005). The evolving meaning and influence of cohort membership. *Higher Education, 30*(3), 195–211.

Miller, A. S. (2007). Students that persist: Caring relationships that make a difference in higher education. Online submission. (ERIC Document Reproduction Service No. ED497500).

Milstein, M. M., & Henry, D. A. (2008). *Leadership for resilient schools and communities* (2nd ed.). Corwin Press, Inc.

Pemberton, C. L. A., & Akkary, R. K. (2010). A cohort, is a cohort, is a cohort… or is it? *Journal of Research on Leadership Education, 5*(5), 179–208.

Saltiel, I. M., & Russo, C. (2010). *Cohort programming and learning: Improving educational experience for adult learners (Professional practices in adult education and human resource development series)*. Krieger Publication Company.

Sarokoff, R. A., & Sturmey, P. (2008). The effects of instructions, rehearsal, modeling, and feedback on acquisition and generalization of staff use of discrete trial teaching and student correct responses. *Research in Autism Spectrum Disorders, 2*(1), 125–136.

Sellers, T. P., Valentino, A. L., & LeBlanc, L. A. (2016). Recommended practices for individual supervision of aspiring behavior analysts. *Behavior Analysis in Practice, 9*(4), 274–286.

Thomson, K., Martin, G. L., Arnal, L., Fazzio, D., & Yu, C. T. (2009). Instructing individuals to deliver discrete-trials teaching to children with autism spectrum disorders: A review. *Research in Autism Spectrum Disorders, 3*(3), 590–606.

Turner, L. B. (2017). Behavior analytic supervision. In *Applied behavior analysis advanced guidebook* (pp. 3–20). Academic Press.

Turner, L. B., Fischer, A. J., & Luiselli, J. K. (2016). Towards a competency-based, ethical, and socially valid approach to the supervision of applied behavior analytic trainees. *Behavior Analysis in Practice, 9*(4), 287–298.

Valentino, A. L., LeBlanc, L. A., & Sellers, T. P. (2016). The benefits of group supervision and a recommended structure for implementation. *Behavior Analysis in Practice, 9*(4), 320–332.

Chapter 3
Delivering Performance Feedback

As supervisors, we have an incredible opportunity to not only influence our supervisees' professional development but also the clients that they serve. The quality of the behavior program a client receives is a direct result of the quality of the training and supervision we provide to our supervisee (DiGennaro Reed & Henley, 2015). Implementation of an intervention with poor fidelity diminishes the client's positive outcomes (Carroll et al., 2013; Pence & St Peter, 2015; Wilder et al., 2006). It is our responsibility as supervisors to proactively prepare supervisees to implement interventions with fidelity and immediately intervene when we observe supervisees implementing an intervention with poor fidelity.

Preparing a supervisee to implement an effective behavior program is complex and involves a number of instructional and supervisory approaches. The Behavior Analysis Certification Board (BACB, 2022) Supervisor Training Curriculum specifies a number of behaviors that supervisors should engage in to prepare their supervisees. These include setting performance expectations, delivering clear instructions, modeling desired behavior, rehearsing or role-playing, and delivering feedback. Among the many instructional approaches you use, the delivery of performance feedback may be one of the most valuable. Verbal and written instructions alone simply do not change performance (Fixsen et al., 2005). Performance feedback is critical in preparing supervisees to become competent behavior analysts (Carroll et al., 2022; DiGennaro Reed & Henley, 2015).

Many studies have demonstrated that performance feedback can improve the fidelity with which a variety of service providers implement skill acquisition and behavior reduction interventions (Codding et al., 2005; Coogle et al., 2018; Leblanc et al., 2005; Pantermuehl & Lechago, 2015). The BACB (2022) Supervisor Training Curriculum states that supervisors must deliver timely and effective feedback to supervisees. Moreover, the BACB (2020) Ethics Code for Behavior Analysts describes performance monitoring and feedback as one of several responsibilities supervisors have to supervisees. Despite the clear value of performance feedback, employers rarely prepare supervisors on how to effectively deliver performance

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_3

feedback (DiGennaro Reed & Henley, 2015). In a survey of supervisor practices, Sellers et al. (2019) found that while supervisors reported frequently providing performance feedback, there was much room for growth in this particular skill. In fact, they identified the top five supervision areas in need of improvement. Among those included two improvements related to the delivery of performance feedback: setting clear expectations for receiving feedback and using competency-based evaluations and tracking outcomes.

Daniels and Bailey (2014) define performance feedback as "information about performance that allows a person to change his/her behavior" (p. 157). Performance feedback is typically delivered for the purpose of improving the fidelity of implementation of an intervention (Solomon et al., 2012). Performance feedback can serve many functions. The praise delivered in feedback may function as a reinforcer, and the corrective feedback may punish a behavior. Additionally, performance feedback can serve as a prompt for a specific response in the next implementation of the intervention or function as a rule that governs behavior (Mangiapanello & Hemmes, 2015). Every chapter within this book will instruct you to deliver performance feedback to your supervisees. In this chapter, we review what constitutes performance feedback, best practices in implementing performance feedback, and provide you with some additional tools to provide performance feedback with ease.

Performance feedback most often occurs after the supervisor has directly observed the supervisee implementing a behavior analytic approach. It includes the following components (BACB, 2022; Carroll et al., 2022; Parsons & Reid, 1995; Reid et al., 2012; Shuler & Carroll, 2019):

1. Review performance data
2. Praise correct responses
3. Correct errors using empathy statements
4. Provide a rationale for changing incorrect performance
5. Provide instruction on how to correct performance
6. Model or demonstrate correct performance
7. Provide an opportunity for your supervisee to role-play correct performance
8. Provide an opportunity for your supervisee to ask questions

We frequently envision performance feedback as a conversation between a supervisor and supervisee. However, research supports a variety of formats of performance feedback. In this book, a great deal of performance feedback will be delivered in one-on-one fashion; however, performance feedback may also be delivered in a group setting (Solomon et al., 2012). Similarly, performance feedback can be delivered in writing or verbally. We do encourage you to deliver as much feedback as possible verbally because this facilitates many of the crucial steps in the performance feedback process (e.g., model, role-play, questions); however, when needed, written performance feedback can be an effective tool (Barton et al., 2016; Sleiman et al., 2020). Additionally, a supervisor can use videoconference technology to deliver effective performance feedback (Akers et al., 2022).

Effective Performance Feedback

There are several guidelines to follow to get the most from performance feedback (Scheeler et al., 2004; Sleiman et al., 2020; Solomon et al., 2012). First, feedback is most effective when it is objective and competency-based. For example, rather than reporting to your supervisee, "*your session was negative and uninviting,*" record the frequency of praise and correction statements they made toward their client and discuss how to improve this ratio. To ensure your performance feedback is objective and competency-based, use procedural fidelity checklists that contain observable behaviors to monitor. We have provided several throughout this book to facilitate this process that is specific to an assessment or intervention methodology. We have also included a *Supervision Observation Procedural Fidelity Checklist* that is meant to provide feedback about general expectations of supervisees working with clients (e.g., be on time, prepare materials prior to the start of the session) in Appendix A. You can use this checklist at any time throughout supervision to supplement the methodology-specific feedback. Moreover, consider graphing procedural fidelity across time to objectively report to your supervisee how their performance is continuing to improve.

Second, performance feedback should be specific. Rather than telling a supervisee, "*you did a good job,*" specify exactly what behaviors were correct: "*You immediately corrected your client's error exactly as we had discussed. Great job!"* Corrective feedback must also be specific. It is not enough to tell a supervisee they made an error in implementing an intervention, but rather specify exactly what needs to be corrected. For example, rather than, "*You did not provide the consequence correctly during the functional analysis*," a supervisor should say, "*the protocol states that you should deliver the preferred tangible for 30 seconds contingent upon challenging behavior, but I recorded that you provided it for only 15 seconds*."

Third, performance feedback should be positive. All of us have experienced a situation in which we wanted to avoid a superior, whether it be your parent, teacher, coach, or boss because we quickly learned that any feedback that superior delivered would consist only of corrective feedback. As a supervisor, it is critical that you avoid this mistake because doing so will cause your supervisee to engage in supervisor-avoidant behavior. Our ultimate goal is that supervisees seek us out for feedback. The only way this will happen is to ensure we deliver a sufficient amount of praise and positive feedback so that the experience of receiving feedback is not aversive.

Fourth, supervisor should always deliver a rationale for changing an error in performance. Informing your supervisee of their mistakes can certainly feel awkward for the both of you. Most people do not like to hear an account of their shortcomings. However, errors must be identified so that they can be corrected. You can make this process more pleasant by providing a rationale for correcting errors. For example, avoid simply noting, "*Your reports contain too much technical language. You need to revise to parent-friendly language*." Instead, when correcting the error, justify why this must be corrected like this, "*Your reports contain a lot of technical language. I am concerned that [client's] parents will not be able to understand the report. You have created such an effective behavior reduction program; I really think his parents would enjoy implementing this at home. If we use more parent-friendly language and less technical language, it will be much easier for them to follow the protocol correctly. This will have great benefit for the parents and [client]. Moreover, we communicate respect for our clients and their caregivers when we take the time to ensure they can read and comprehend our reports*." As you can see from these examples, the rationale helps point out that there is a reason we correct errors and may motivate your supervisees to correct them immediately.

Fifth, to guarantee that supervisees will find performance feedback a positive experience to be sought out rather than avoided, tailor the delivery of performance feedback to your supervisee's preferences. We encourage you to conduct the *Performance Feedback Preferences Survey* (Appendix B) at the onset of supervision and again at regular intervals throughout the supervisory relationship. It is important that you make an effort to deliver feedback in a way that aligns with your supervisee's preferences; however, be clear to your supervisee that not all preferences can be honored. For example, a supervisee who finds performance feedback highly aversive may want to avoid it all together, but this is simply not possible.

Sixth, set clear expectations of how your supervisees should receive and respond to feedback. It is our experience that many supervisors and supervisees are simply unaware that they have differing assumptions about how feedback should be received and how the supervisee should respond. We suggest having a transparent conversation at the onset of supervision and planning to revisit this conversation at regular intervals. Within this conversation, make clear to your supervisee that performance feedback will identify both correct and incorrect behaviors. Be sure that your supervisee knows that they should solicit clarification when it is needed. Moreover, the two of you should discuss the timeline for correcting identified errors. For example, if you give your supervisee feedback that requires them to prepare new materials for a session, should those materials be prepared the following day? Or the following week? Any other expectations you have of your supervisee regarding how they should respond to feedback should be included in this conversation.

Finally, performance feedback is most effective when combined with other procedures. We encourage you to incorporate a number of antecedent interventions such a goal setting and prompting into your supervision in addition to performance feedback. You should also consider consequence interventions such as rewards for meeting a performance criterion. DiGennaro Reed and Henley (2015) offer excellent advice for incorporating rewards. These include first obtaining your supervisees' input on specific reward to ensure they are in fact preferred and rewarding (Wilder et al., 2011). Appendix C, *Performance Reward Survey*, provides you with a sample preference survey. Before using this survey, edit it so that only rewards that you can feasibly offer are presented. Second, create a sufficient list of low- or no-cost rewards such as use of a preferred parking spot and extended lunch break. And finally, reserve these rewards to be delivered only contingent upon the desired outcome.

Self-monitoring and self-evaluation are also excellent additions to performance feedback. Supervisees can select specific behaviors to monitor and do this both when practicing alone or when being observed. In fact, if your supervisee regularly self-monitors, you can occasionally observe their session collecting the same data that they are self-monitoring for the purposes of evaluating interobserver agreement (IOA). Self-monitoring can be helpful even if informal. In fact, one of our personal favorite techniques is to begin a performance feedback conversation by asking your supervisee, "*What are three things you did well and one thing that you would like to improve in the next session*?" This initial question serves many purposes. It encourages supervisees to self-monitor and self-evaluate, sets a positive tone for identifying and praising correct behaviors, and allows supervisees to recognize when they need to correct a mistake, which is typically more palatable than a supervisor calling out an error. We also find that this practice is very useful for supervisees suffering from imposter syndrome, low confidence, or difficultly promoting one's own strengths.

When and How Often

When planning to deliver performance feedback, a supervisor must determine when to deliver the feedback and how often to deliver feedback. The immediacy of performance feedback can range from delivering feedback immediately after the observation to delivering feedback days after the observation (Codding et al., 2005). A general rule of thumb is immediate is better. Immediate feedback is effective (Codding et al., 2005; Scheeler et al., 2004). Solomon et al. (2012) found that performance feedback delivered within the day of the observation was more effective than that delivered within a week of the observation.

The most obvious advantage of immediate feedback is that it prevents the supervisee from repeating observed errors before they are corrected. Additionally, if praise delivered within the context of performance feedback may serve as a reinforcer, a delay between the behavior and the delivery of that praise may weaken the response–reinforcer relation (Critchfield & Lattal, 1993; Sidman, 1960). However, there are caveats to be considered. Immediate feedback may disrupt ongoing client activities. For example, if you observed your supervisee conduct a preference assessment at 8:00 am, but they were scheduled to be with clients until 3:00 pm, there may be no choice but to delay feedback so that client sessions are not hindered. Similarly, supervisees who find performance feedback aversive or anxiety provoking may need time to think through feedback before returning to ongoing activities, making immediate feedback difficult to implement without disruption. Needless to say, performance feedback should be delivered as immediate as possible without losing the momentum of ongoing client activities (O'Reilly et al., 1994).

In order to deliver immediate performance feedback without the aforementioned drawbacks, we encourage you to consider the use of bug-in-ear devices that will allow you to deliver immediate praise and error correction without disruption. However, follow this with a complete set of performance feedback activities (e.g., rationale discussion, role-play). You may also consider using written feedback (e.g., written note or email) to deliver the most important praise and corrective feedback immediately and follow up with a scheduled meeting to complete the full performance feedback process.

As a supervisor, you not only need to plan for when to deliver performance feedback after an observation, but also how frequently to observe and deliver performance feedback. In this book, performance feedback is incorporated several times in each chapter. Other than feasibility, we can think of no drawbacks to frequent performance feedback. And as we stated earlier, if done well, supervisees will find this to be a preferred activity. Moreover, research indicates that performance feedback is more effective when it occurs more often rather than less often (Sleiman et al., 2020). Relatedly studies have shown that weekly performance feedback leads to increased fidelity of implementation and is also practical for supervisors (Mortenson & Witt, 1998).

Whether you are a novice or a seasoned supervisor, we know that performance feedback can be an intimidating task. At first, delivering performance feedback can feel awkward. This is particularly true if you or your supervisee currently associate performance feedback with feeling of being reprimanded. If you practice delivering feedback using this guidance, we are certain both you and your supervisees can begin to find performance feedback a rewarding experience for all.

Appendix A: Supervision Observation: Procedural Fidelity Checklist

Supervisee: _____ Date: _____

Supervisor: _____ Client: _____

Section One: General Observations

Instructions: 0 = Not completed 100% of the time. 1 = Completed some of the time. 2 = Completed 100% of the time. NA = not applicable.

Professionalism	**Score**	**Notes**
Begins session on time		
Ends session on time		
Treats client with dignity and respect.		
Environmental Arrangement		
Prepares materials and stimuli before the session begins		
Removes possible distractions		
Arranges physical environment to promote success		
Time Management		
Uses time effectively		
Paces time between activities appropriately		
Duration of blocks of teaching trials is appropriate to the child		
Instructional Practices		
Supervisee has established clear routines and procedures		
Provides client with choices when feasible		
Intersperses trials to prevent rote responses and boredom		
Ends instruction after a correct response		
Dimensions of reinforcement match behavior		
Varies reinforcement (social, tangible, etc.)		
Pairs non-social reinforcement with praise		
Use an effective schedule of reinforcement		
Changes reinforcer if not effective		

Section Two: Percent Opportunity

Instructions: When observing instruction, record if the supervisee performed each item correctly (+) or incorrectly (-) per teaching trial. After observing 10 opportunities, calculate the percent opportunity.

Instructional Trials	1	2	3	4	5	6	7	8	9	10	Total	Percent
Gains client's attention before delivering instruction											/	%
Proper instruction provided											/	%
Records data for each trial											/	%
Paces time between trials appropriately											/	%

Section Three: Momentary Time Sampling

Instructions: Operationally define engagement and indices of happiness for the client. Observe for 5 minutes. Use a 10-s momentary time sampling to record engagement and indices of happiness. Circle the "E" when the client engages in engaged behaviors and the "H" with client engages in indices of happiness.

Engagement Definition: _____

_____

Indices of Happiness: _____

_____

	0:10	0:20	0:30	0:40	0:50	0:60
0:00 – 1:00	E H	E H	E H	E H	E H	E H
0:00 – 2:00	E H	E H	E H	E H	E H	E H
0:00 – 3:00	E H	E H	E H	E H	E H	E H
0:00 – 4:00	E H	E H	E H	E H	E H	E H
0:00 – 5:00	E H	E H	E H	E H	E H	E H
Percent of Intervals with Engagement						
Percent of Intervals with Indices of Happiness						

Section Four: Frequency

Instructions: Observe for 10 minutes. During this time, record the number of praise statements and corrective statements your supervisees makes toward the client. Categorize them as specific praise (e.g., "yes, this is a cat") or general ("good").

Praise		Correction	
General Praise	**Specific Praise**	**General Correction**	**Specific Correction**
Total:	Total:	Total:	Total:
Ratio of Praise to Correction			

Section Five: IOA Sample

Instructions: Collect data with therapist on at least one target. Calculate IOA with the following formula: *total # of agreements/(total # of agreements + total # of disagreements) * 100.*

IOA Score: _____

Summary of Observation:

Skills to maintain:

_____

_____

_____

_____

Skills to improve:

_____

_____

_____

_____

Appendix B: Performance Feedback Preference Survey

Supervisee: _____ Date: _____

Instructions: Check the response option that best fits your agreement with each statement. Respond to the final prompt.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I enjoy receiving feedback.	○	○	○	○	○
I am apprehensive about receiving feedback	○	○	○	○	○
I dread receiving feedback.	○	○	○	○	○
I benefit from verbal discussion of feedback.	○	○	○	○	○
I benefit from written feedback.	○	○	○	○	○
I respond well to individual, rather than group feedback.	○	○	○	○	○
I respond well to feedback delivered in a group.	○	○	○	○	○
I prefer to receive feedback as immediately as possible.	○	○	○	○	○
I feel comfortable with my supervisor correcting my errors during the observation.	○	○	○	○	○
After I receive feedback, I need time alone to think about it before I am ready to ask questions or discuss ways to improve.	○	○	○	○	○
I feel comfortable asking my supervisor questions.	○	○	○	○	○
I feel comfortable role playing with my supervisor.	○	○	○	○	○
It is important for me to understand why my supervisee makes a recommendation.	○	○	○	○	○
I respond well to anecdotal feedback.	○	○	○	○	○
I respond well to quantifiable feedback.	○	○	○	○	○

My supervisor should know the following about me, as it relates to receiving performance feedback:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix C: Performance Reward Preference Survey

Supervisee: _____ Date: _____

Instructions: Your supervisor would like to reward you for meeting performance criteria throughout your supervision process. Please check the circle that most closely describes your preference for potential rewards. Provide additional suggestions below.

	Highly Preferred	Preferred	Not Preferred	Aversive
Public recognition at group supervision meeting	○	○	○	○
Public recognition via group email	○	○	○	○
Public recognition on agency website	○	○	○	○
Extended lunch break	○	○	○	○
Sweet treats (e.g., cookie, candy bar)	○	○	○	○
Savory treats (e.g., chips, popcorn)	○	○	○	○
One-hour work break (e.g., come late, leave early)	○	○	○	○
Preferential parking spot	○	○	○	○
Handwritten note	○	○	○	○
Restaurant gift cards	○	○	○	○
Favorite drink	○	○	○	○
Financial support for professional development (e.g., conference travel)	○	○	○	○
Work-from-home “pass”	○	○	○	○
Catered lunch	○	○	○	○
New office supplies	○	○	○	○
Salon or spa gift card	○	○	○	○
Store gift cards	○	○	○	○

Additional suggestions for rewards:

_____

_____

_____

_____

_____

_____

_____

References

Akers, J. S., Davis, T. N., McGinnis, K., & Swensson, R. (2022). *Effectiveness of remote performance feedback on accurate implementation of parent coaching [Manuscript submitted for publication]*. Department of Educational psychology, Baylor University.

Barton, E. E., Fuller, E. A., & Schnitz, A. (2016). The use of email to coach preservice early childhood teachers. *Topics in Early Childhood Special Education, 36*(2), 78–90.

Behavior Analyst Certification Board. (2020). *Ethics code for behavior analysts*. https://www.bacb.com/wp-content/bacb-compliance-code-future

Behavior Analyst Certification Board. (2022). *Supervisor training curriculum outline*. https://www.bacb.com/wp-content/Supervision-Training-Curriculum/

Carroll, R. A., Kodak, T., & Fisher, W. W. (2013). An evaluation of programmed treatment-integrity errors during discrete-trial instruction. *Journal of Applied Behavior Analysis, 46*, 379–394. https://doi.org/10.1002/jaba.49

Carroll, R. A., Preas, E. J., & Paden, A. R. (2022). Training supervisors to provide performance feedback using video modeling with voiceover instructions: A replication. *Journal of Applied Behavior Analysis, 55*(2), 603–621.

Codding, R. S., Feinberg, A. B., Dunn, E. K., & Pace, G. M. (2005). Effects of immediate performance feedback on implementation of behavior support plans. *Journal of Applied Behavior Analysis, 38*(2), 205–219.

Coogle, C. G., Ottley, J. R., Rahn, N. L., & Storie, S. (2018). Bug-in-ear eCoaching: Impacts on novice early childhood special education teachers. *Journal of Early Intervention, 40*, 87–103. https://doi.org/10.1177/1053815117748692

Critchfield, T. S., & Lattal, K. A. (1993). Acquisition of a spatially defined operant with delayed reinforcement. *Journal of the Experimental Analysis of Behavior, 59*, 373–387. https://doi.org/10.1901/jeab.1993.59-373

Daniels, A. C., & Bailey, J. S. (2014). *Performance management: Changing behavior that drives organizational effectiveness* (5th ed.). Performance Management Publications.

DiGennaro Reed, F. D., & Henley, A. J. (2015). A survey of staff training and performance management practices: The good, the bad, and the ugly. *Behavior Analysis in Practice, 8*(1), 16–26.

Fixsen, D. L., Naoom, S. F., Blasé, K. A., Friedman, R. M., & Wallace, F. (2005). Research on core implementation components. In D. L. Fixsen, S. F. Naoom, K. A. Blase, R. M. Friedman, & F. Wallace (Eds.), *Implementation research: A synthesis of the literature* (pp. 35–55). University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231).

Leblanc, M., Ricciardi, J. N., & Luiselli, J. K. (2005). Improving discrete trial instruction by paraprofessional staff through an abbreviated performance feedback intervention. *Education and Treatment of Children, 28*(1), 76–82.

Mangiapanello, K., & Hemmes, N. (2015). An analysis of feedback from a behavior analytic perspective. *The Behavior Analyst, 38*(1), 51–75. https://doi.org/10.1007/s40614-014-0026-x

Mortenson, B. P., & Witt, J. C. (1998). The use of weekly performance feedback to increase teacher implementation of a pre-referral academic intervention. *School Psychology Review, 27*, 613–627.

O'Reilly, M. E., Renzaglia, A., & Lee, S. (1994). An analysis of acquisition, generalization and maintenance of systematic instruction competencies by preservice teachers using behavioral supervision techniques. *Education and Training in Mental Retardation and Developmental Disabilities, 29*(1), 22–33.

Pantermuehl, R. M., & Lechago, S. A. (2015). A comparison of feedback provided in vivo versus an online platform on the treatment integrity of staff working with children with autism. *Behavior Analysis in Practice, 8*, 219–222. https://doi.org/10.1007/s40617-015-0059-y

Parsons, M. B., & Reid, D. H. (1995). Training residential supervisors to provide feedback for maintaining staff teaching skills with people who have severe disabilities. *Journal of Applied Behavior Analysis, 28*(3), 317–322. https://doi.org/10.1901/jaba.1995.28-317

Pence, S. T., & St Peter, C. C. (2015). Evaluation of treatment integrity errors on mand acquisition. *Journal of Applied Behavior Analysis, 48*, 575–589. https://doi.org/10.1002/jaba.238

Reid, D. H., Parsons, M. B., & Green, C. W. (2012). *The supervisor's guidebook: Evidence-based strategies for promoting work quality and enjoyment among human services staff*. Habilitative Management Consultants, Inc..

Scheeler, M. C., Ruhl, K. L., & McAfee, J. K. (2004). Providing performance feedback to teachers: A review. *Teacher Education and Special Education, 27*(4), 396–407.

Sellers, T. P., Valentino, A. L., Landon, T. J., & Aiello, S. (2019). Board Certified Behavior Analysts' supervisory practices of trainees: Survey results and recommendations. *Behavior Analysis in Practice, 12*(3), 536–546.

Shuler, N., & Carroll, R. A. (2019). Training supervisors to provide performance feedback using video modeling with voiceover instructions. *Behavior Analysis in Practice, 12*, 576–571. https://doi.org/10.1007/s40617-018-00314-5

Sidman, M. (1960). *Tactics of scientific research*. Basic Books.

Sleiman, A. A., Sigurjonsdottir, S., Elnes, A., Gage, N. A., & Gravina, N. E. (2020). A quantitative review of performance feedback in organizational settings (1998–2018). *Journal of Organizational Behavior Management, 40*(3–4), 303–332.

Solomon, B. G., Klein, S. A., & Politylo, B. C. (2012). The effect of performance feedback on teachers' treatment integrity: A meta-analysis of the single-case literature. *School Psychology Review, 41*(2), 160–175.

Wilder, D. A., Atwell, J., & Wine, B. (2006). The effects of varying levels of treatment integrity on child compliance during treatment with a three-step prompting procedure. *Journal of Applied Behavior Analysis, 39*, 369–373. https://doi.org/10.1901/jaba.2006.144-05

Wilder, D. A., Harris, C., Casella, S., Wine, B., & Postma, N. (2011). Further evaluation of the accuracy of managerial prediction of employee preference. *Journal of Organizational Behavior Management, 31*, 130–139. https://doi.org/10.1080/01608061.2011.569202

Chapter 4
Obtaining Feedback from Supervisees

The previous chapter covered providing feedback to supervisees, and this chapter will cover the inverse, which is seeking out and obtaining feedback from supervisees. Specifically, we will review why inviting and encouraging feedback from supervisees is important, how to guide supervisees to provide relevant feedback, and strategies for regularly requesting feedback.

When you became a supervisor, regularly requesting feedback may not have been something you planned to do. However, we hope to convince you that it should be a high priority, and we outline three reasons why this activity should be conducted. The first reason is because it is included in the Ethics Code for Behavior Analysts. Specifically, code 4.10 states that "Behavior analysts actively engage in continual evaluation of their own supervisory practices using feedback from others and client and supervisee or trainee outcomes" (BACB, 2020). Therefore, we are called as supervisors to regularly review outcomes and recruit feedback. In addition to providing ethical supervision, recruiting feedback can aide you in providing high-quality supervision. If you have built a supervisory relationship on trust and mutual respect, the feedback provided by your supervisees will likely be geared toward improving your supervisory practices, which we assume are already better than most because you are reading this book. Third, recruiting supervisee feedback allows you to minimize or eliminate your engagement in ineffective supervisory practices. Sellers, Alai-Rosales, and colleagues (2016a) provide three potential risks of failing to recruit feedback regarding the quality of supervision being provided. These risks include failing to replicate effective supervisory practices, providing ineffective supervision which results in harm to future clients, and modeling ineffective supervision which is likely to perpetuate ineffective supervision because the supervisees will imitate these supervisory practices. We highlight the importance of each risk separately. The first risk refers to situations in which your supervisees did not have the opportunity to praise supervisory practices that they found most beneficial. Therefore, your behavior will fail to contact the appropriate contingencies, and shaping of effective strategies will not occur. The second risk is important because

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_4

it breaks the oath made to our clients to provide effective services with the goal of improving their lives. We hope that use of this book will reduce the likelihood of this occurring as you will consistently evaluate your supervisee's implementation of assessments and interventions with their clients; however, frequent supervisee feedback will provide an additional safeguard against ineffective services. Finally, the third risk is important because modeling ineffective supervision strategies will likely result in your supervisee engaging in these ineffective practices once they become a supervisor. Thus, in order to break the cycle of modeling and imitating ineffective strategies, supervisee feedback should be regularly recruited.

The next topic we introduce is the importance of intentionally guiding the substance of the recruited feedback. In order to receive feedback that is related to your supervisory practices, you must purposely guide your supervisees to provide useful information. For example, we have experienced situations in which college students fill out teaching evaluations, and their comments are related to the time of the class or the room in which the class was held. Neither of these comments have anything to do with the instructor's pedagogy. This issue is applicable within the supervisory evaluation if the supervisees provide feedback related to their client's schedule or displeasure with the other clinicians working with their clients. This type of feedback is completely unrelated to the supervisory practices and is likely out of the supervisor's control. Therefore, you must proactively ensure that this does not happen. We recommend that at the onset of the supervisory relationship, you have a conversation about the type of information that will enhance your ability to provide effective supervision. In addition, we suggest developing specific questions that will directly target the information of interest. For example, instead of posing the question "What do you most like/dislike about your field experience?" you might pose the question "Does your supervisor provide explanations along with their critical feedback?" Behavior analysts are typically very thoughtful about presenting discriminative stimuli in a manner that is most likely to evoke the desired response; however, they may be less thorough when posing questions to evaluate their own supervision. Therefore, we suggest experimenting with several questions to determine which will be most effective. It is also possible to adopt an established questionnaire for use such as the one provided in Turner et al. (2016).

Finally, we present some strategies for recruiting feedback. During your initial supervision meeting, ask your supervisee to inform you of how they prefer to provide feedback (Sellers et al., 2016b). Multiple sources of feedback are ideal, so encourage your supervisee to endorse as many formats as possible with which they feel comfortable. Examples of formats include face-to-face, questionnaires, electronic polls, and rating scales. Reassess for preference of formats to provide feedback throughout the supervisory relationship as your supervisee's comfort may change as they become more acquainted with you. Ask your supervisee about their comfort level of submitting their anonymous feedback to you or if they would prefer for a third party to review their responses. For anonymity to be suggested, it is imperative to request this information from multiple supervisees at the same intervals. If your supervisee agrees to provide face-to-face feedback, discuss the type of information you are interested in and examples of questions you will regularly ask

during individual supervision meetings. In the event that questionnaires, rating scales, or polls will be used, review the questions that will be posed and discuss the purpose of each question. This discussion is not meant to influence the supervisee's evaluative responses but rather to ensure the responses they provide are an accurate description of their perceptions. It is also important to discuss a specific plan about the frequency with which you will request your supervisee's feedback. The intervals of recruitment should be often enough to allow for your supervisory behavior to be impacted but not so frequent that it becomes a burden to your supervisee.

References

Behavior Analyst Certification Board. (2020). Ethics code for behavior analysts. https://www.bacb.com/wp-content/bacb-compliance-code-future

Sellers, T. P., Alai-Rosales, S., & MacDonald, R. P. (2016a). Taking full responsibility: The ethics of supervision in behavior analytic practice. *Behavior Analysis in Practice, 9*(4), 299–308. https://doi.org/10.1007/s40617-016-0144-x

Sellers, T. P., Valentino, A. L., & LeBlanc, L. A. (2016b). Recommended practices for individual supervision of aspiring behavior analysts. *Behavior Analysis in Practice, 9*(4), 274–286. https://doi.org/10.1007/s40617-016-0110-7

Turner, L. B., Fischer, A. J., & Luiselli, J. K. (2016). Towards a competency-based, ethical, and socially valid approach to the supervision of applied behavior analytic trainees. *Behavior Analysis in Practice, 9*(4), 287–298. https://doi.org/10.1007/s40617-016-0121-4

Chapter 5
Operant Behavior and Measurement

Topics Covered Within This Chapter

Topics
Defining Behavior
Operational Definitions
Selecting Measurement System
Interobserver Agreement

Defining Behavior

What is behavior? This is the most basic question that defines the area of interest for our field. Behavior analysts have a very broad definition of behavior which is anything an organism does (Pierce & Cheney, 2017). This includes both overt responses (e.g., jumping) and covert responses (e.g., thinking). In Table 5.1, we present a list of examples of responses that meet the definition of behavior. The specific examples of responses that apply to your supervisee will be dependent upon their clients.

It is imperative to stress to your supervisees the difference between the way behavior analysts define behavior and how it is defined colloquially. Becoming a behavior analyst requires us to change the lens with which we view the world. Supervisees must intentionally work to alter the way they describe and interpret behavior. Skinner highlights this point when describing behavior as a subject matter.

Supplementary Information: The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_5].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_5

Table 5.1 Examples of behavior

Overt	Covert
Drawing	Thinking
Typing	Feeling
Eating	Perceiving
Talking	Remembering
Singing	Sensing

> We all know thousands of facts about behavior. Actually there is no subject matter with which we could be better acquainted, for we are always in the presence of at least one behaving organism. But this familiarity is something of a disadvantage, for it means that we have probably jumped to conclusions which will not be supported by the cautious methods of science. Even though we have observed behavior for many years, we are not necessarily able, without help, to express useful uniformities or lawful relations. (pg. 14, Skinner, 1953)

Operational Definitions

The first step in moving toward a science of behavior is developing operational definitions. An observational definition should be specific and include examples and nonexamples. The test for a good operational definition is whether it results in accurate recording of the behavior. In Table 5.2, we provide several examples of

Table 5.2 Examples of operational definitions

Behaver	Behavior	Definition
Avy, a Mastiff	Jumping	Any instance in which Avy rises on her hind two legs, and forcefully lands her front two legs on a human. Examples: Jumping on visitors who did not request for her to do so. Nonexamples: Instances in which Avy's owners request for her to jump up to greet them. Instances in which Avy places one of her front legs on a seated individual.
Greg, an office employee	Recycling paper	Any instance in which Greg places acceptable office paper in the designated recycling bin. Each individual piece paper is counted unless the paper is bound such as a packet which is recorded as one paper. Acceptable office paper includes copy paper, card stock, index cards, and note size paper. Unacceptable paper includes paper towels, paper with food waste, and laminated paper.
Alexis, a child with feeding issues	Packing	Any instance in which Alexis holds food larger than a pea in her mouth 30 seconds after accepting the food.
Julian, a child with a developmental disability	Crying	Any occurrence of vocalization (sounds or words) above a normal conversational level with or without tears for at least 3 seconds. Recording will begin after 3 seconds and end after 3 seconds of the behavior being absent. Nonexamples include singing in the car or cheering at a baseball game.

operational definitions. Here are some questions to discuss with your supervisee when evaluating observational definitions.

1. Is there enough information such that someone without any history with the client could record instances or bouts of the behavior?
2. Is it clear what constitutes one instance or bout of the behavior?
3. Are the parameters of the behavior evident (i.e., at what point does the response meet the definition and at what point does it not).

Selecting Measurement System

Once your supervisees have mastered the art of developing observational definitions, they will need to determine which data collection is most appropriate for the behavior they are recording and the context in which the behavior is being recorded. This chapter will cover frequency, duration, latency, percent correct or percentage of opportunities, whole and partial interval, and momentary time sampling. We have created a flow chart (Appendix A) for selecting a measurement system that can be used with your supervisee to guide this discussion. This is by no means an exhaustive guide; it is simply a tool to use as your supervisees are in the initial stages of learning to be a behavior analyst. Your supervisees will undoubtedly be exposed to additional measurement systems and sharpen their skills for selecting appropriate measures as they continue through their training. We believe this guide meets a common need exhibited by supervisees who have just begun accruing hours. They often select data collection methods based on what they have done in the past rather than what is most appropriate for the situation. Our hope is that practicing selection using the guide will help supervisees avoid this tendency. For a more descriptive and precise measurement decision-making guide, see LeBlanc et al. (2016).

The first distinction between measurement systems is whether they are continuous or discontinuous. Continuous measurement means that all instances of the target behavior are recorded. Continuous measurement is ideal; however, some settings/situations/responses are not conducive to this type of data collection. Discontinuous measures are ideal for situations in which the recorder cannot feasibly record every instance of the behavior or the target behavior is a compilation of multiple responses that can be difficult to record or determine the exact onset or offset of the behavior. A special consideration for discontinuous measures (i.e., partial interval, whole interval, and momentary time sampling) is the length of the interval as shorter intervals allow for more accurate data collection (Table 5.3).

The second distinction to emphasize is the difference between free-operant responses and responses that are limited by the presence of a separate stimulus. The field of behavior analysis was built on measuring free-operant responses; however, this distinction is often not highlighted during training for those accruing hours. In his seminal text on measurement, Sidman writes on the topic of free-operant responses "…the experimental organism is free to respond at any time…the lever is

Table 5.3 Description of measurement systems

Measurement system	Continuous/ discontinuous	Free operant/ trial-based	Important feature of the measurement
Frequency	Continuous	Free operant	Instances/time
Duration	Continuous	Free operant	Length of time of event
Latency	Continuous	Trial-based	Length of time between stimulus and initiation of response
Per opportunity/ percent correct	Continuous	Trial-based	Correspondence between stimulus and response
Whole interval	Discontinuous		
Partial interval	Discontinuous		
Momentary time sampling	Discontinuous		

never withdrawn from the experimental space to prevent the subject from responding at times that would be inconvenient for the investigator's theory. The only restrictions placed upon the subject's recorded behavior are those inherent in the laws of behavior. This is called a "free-responding situation" (Sidman, 1960, p. 409). Free-operant responding includes responses that can occur at any point, such as the lever press described by Sidman. In contrast, trial-based data collection includes instances in which the response is limited based on the presence or absence of a specific stimulus/situation. For example, if your supervisee is recording vocal responses made by their client following initiations made by a peer, the number of vocal responses will be controlled by the number of initiations made by the peer. That is, a vocal response can only occur following an initiation made by the peer. Trial-based data collection is common within our field; however, the importance of free-operant responding should never be disregarded.

The final step is identifying the important dimension or feature of the target behavior. This can be determined by asking three questions. Is it important to know how often the behavior is occurring? Is it important to know the amount of time in which the behavior is occurring? Is it important to know the amount of time between a stimulus and the initiation of the behavior?

Interobserver Agreement (IOA)

After concluding your discussion of definitions and data collection methods with your supervisees, it is important to review the basics of IOA. IOA is the extent to which data collected by two independent observers align. The typical recommendation for IOA collection is at least 20% of sessions for each phase (e.g., 20% of baseline sessions and 20% of treatment sessions; Kennedy, 2005). Acceptable levels of IOA are considered to be 80% or better agreement. IOA is not only important for researchers, rather it should be routinely recorded in all settings in which data are collected. Cooper et al. (2020) present three reasons why IOA data are invaluable. First, these data are

important for training individuals to collect data accurately. That is, new clinicians should record data along with someone who has already been collecting data to demonstrate mastery prior to serving as the primary data collector. Second, having a secondary data collector can help safeguard against observer drift or any other unintended human bias. Finally, high agreement between data collectors increases the believability of the data we present. When displaying data to present a case for continued investment from the client and/or funding from insurance companies, the enhanced believability or trustworthiness of the data supported by IOA is crucial.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Operational Definitions
20:00–35:00	Measurement Systems
35:00–45:00	Data Sheets
45:00–55:00	Video Practice
55:00–60:00	Knowledge Check

Materials Needed

- Appendix B: *Operational Definitions*: *Examples and Nonexamples*, 1 copy per supervisee
- Appendix C: *Data Collection Sheets*, 1 copy per supervisee (may want to use data sheets specific to field experience placement instead)
- Appendix D: *Calculating IOA Practice*, 1 copy per supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- LeBlanc et al. (2016)
- Meany-Daboul et al. (2007)
- Rapp et al. (2008)

Operational Definitions

Begin by discussing operational definitions. Explain that clinicians must first define the behavior of interest in a way that is observable and measurable. An observable and measurable behavior definition is referred to as an *operational definition* because anyone who observes, measures, or discusses that behavior will operate under that definition.

Explain to supervisees that an operational definition should have the following characteristics. For each characteristic, describe the characteristic and ask supervisees to explain why this is a critical characteristic of an operational definition:

1. Objective: The definition only describes observable characteristics of the behavior. The definition does not infer mental states or intentions of the individual (e.g., "intended to harm").
   - Supervisees should identify that an objective definition facilitates consistency between anyone measuring or discussing the behavior.
2. Measurable: The definition allows one to count the number of times a behavior occurred over a period of time.
   - Supervisees should identify that measurement of behavior is a foundational component of behavior analysis; it is the means to identify behavior change. In order to measure behavior, supervisees recognize that the behavior definition must be defined in a way that allows for measurement.
3. Clear: The definition is explicit and easy to read.
   - Supervisees should explain that clear and easy to read definitions will be easier to commit to memory; therefore, easier to use when measuring behavior.
4. Complete: The definition allows for one to easily determine what behavior topographies are and are not included, which allows an observer to easily determine if an observed behavior does or does not meet the definition.
   - Supervisees should explain that complete definitions leave no need for individual interpretation or judgment. Further, they recognize that if a definition was incomplete, it would compromise the validity and reliability of measurement.
5. Concise: The definition uses as few as words as possible while still meeting the aforementioned characteristics.
   - Supervisees should identify that concise definitions are easier to read, commit to memory, and use. Definitions that are excessively wordy are laborious to apply when observing behavior.

Distribute *Operational Definition: Examples and Nonexamples* (Appendix B) to your supervisees. Instruct them to determine if each description of challenging behavior constitutes an operational definition or not. If not, have them revise the

description so that it is an operational definition. Inform your supervisees that you will allot 5 minutes to work on this activity, and they may choose to work independently or in pairs. When they complete the activity, resume to the large group and share their answers. Praise correct responses and correct errors.

Measurement Systems

After a supervisee has operationally defined a behavior of interest, the supervisee must then select the method of measuring that behavior. Measurement systems can be categorized in many ways, but for the purpose of this activity, they are organized as continuous and discontinuous methods. Begin by explaining to supervisees that continuous methods measure every occurrence of a behavior. A measurement system is considered continuous because the measurement and recording of behavior occur continuously throughout the observation period. On the other hand, discontinuous methods, also referred to as *time sampling* methods, measure and record behavior only during specific intervals within the observation period. Before introducing the specific continuous and discontinuous measurement, have supervisee identify some strengths and weaknesses of each method (see Table 5.4).

Table 5.4 Strengths and weaknesses of continuous and discontinuous measurement systems

Continuous		Discontinuous	
Strengths	Weaknesses	Strengths	Weaknesses
Accurate	Require constant attention to single behavior	Easy to conduct in applied settings	Provide an estimate of behavior

Continuous Measurement Systems

Review with supervisees the following continuous methods for measuring the occurrences of behavior. For each method, ask supervisees to identify specific topographies of behavior that may be well-suited for each method of measurement and describe their justification. Encourage supervisees to think about their actual clients' behaviors of interest rather than general examples of behavior topographies. In other words, it is best for the supervisee to visualize a specific behavior they will be responsible for measuring. Also encourage supervisees to provide examples of both desired and undesired behaviors that could be measured with each method.

1. Frequency: The number of times a behavior occurs. Other terms used to describe this measurement system are *count* and *frequency count*.
    - Supervisees should identify behaviors with a clear beginning and ending are well-suited to frequency measurements.

- Examples of desired behaviors that supervisees may identify include mands for a preferred item, bites of food consumed, and homework problems completed.
- Examples of undesired behavior that supervisees may identify include kicks to furniture and vocalizing profanity or curse words.

2. Rate: The number of times a behavior occurs per unit of time. Rate is calculated by dividing the frequency count by the duration of the observation period.

   - Supervisees should identify behaviors with a clear beginning and ending are well-suited to rate.
   - Examples of desired behaviors that supervisees may identify include mands for a preferred item per hour, bites of food consumed per 30-minute lunch.
   - Examples of undesired behavior that supervisees may identify include kicks to furniture per 2-hour therapy session and curse words vocalized per hour.

3. Duration: The elapsed time from beginning to the end of a response. Duration can be reported cumulatively across a session by summing the duration of responses across the observation session. Duration can also be reported as mean duration per occurrence by averaging the duration of each occurrence of behavior recorded.

   - Supervisees should identify behaviors with a clear beginning and ending, and those that occur for extended amounts of time are well-suited to duration.
   - Examples of desired behaviors that supervisees may identify include pretend play, reading, and staying in one's seat.
   - Examples of undesired behavior that supervisees may identify include tantrums and crying.

4. Latency: The elapsed time from the signal to begin a response to the onset of that response.

   - Supervisees should identify behaviors with a clear signal to begin and a clear onset of the response are well-suited to latency measurement.
   - An example of desired behaviors that supervisees may identify includes latency between asked to clean up and the onset of cleaning up toys.
   - An example of an undesired behavior that supervisees may identify includes latency between being told to put away a preferred item and the onset of a tantrum.

5. Percent Correct/Percent of Opportunities: The percent of total responses in which a client made a correct response. To calculate percent correct, simply divide the number of correct responses by the total number of responses and multiply by 100%. The percent of incorrect responses per opportunities can be calculated in a similar manner, although such data are rarely more useful than reporting percent correct and it is recommended to report percent correct in most cases. A similar approach is used to measure percent of opportunities. Percent of opportunities is obtained by dividing the number of responses by the number of

opportunities to response and multiplying by 100%. Percent opportunities reflect the proportion of behaviors relative to the number of opportunities to engage in that behavior.

- Supervisees should identify behaviors that occur within a set of opportunities. Typically, percent correct is only used to measure desired behaviors.
- Examples of desired behaviors measured via percent correct that supervisees may identify include percent of words read correctly or percent of numerals tacted correctly.
- Examples of desired behaviors measured via percent of opportunities that supervisees may identify include percent of opportunities a client responded to a question and percent of opportunities a client washed his hands after using the restroom.
- Examples of undesired behaviors measured via percent of opportunities that supervisees may identify include percent of opportunities a client threw work materials provided to her and percent of opportunities a student eloped from the teacher when walking to the bus after school.

Discontinuous Measurement Systems

As you did with the continuous measurement systems, review with supervisees the following discontinuous methods. Next, ask supervisees to identify situations in which this measurement system may be well-suited and explain their justification.

1. Partial Interval Recording: The observer divides an observation session into equal intervals (e.g., 10-second intervals). The observer records if the behavior occurs during any part of each interval. Data are reported as percent of intervals.

    - Supervisees should identify that situations in which an overestimate of the target behavior is acceptable are well-suited for partial interval recording. Supervisees may also note that partial-interval recording is ideal for behaviors without a clear beginning and ending and for observers who are responsible for observing multiple clients simultaneously or multitasking during the observation session.

2. Whole Interval Recording: The observer divides an observation session into equal intervals. Intervals should be brief (e.g., 5 seconds) because the observer records if the behavior occurs throughout the entire interval. Data are reported as percent of intervals.

    - Supervisees should identify that situations in which an underestimate of the target behavior is acceptable are well-suited for whole-interval recording. Supervisees may also note that whole-interval recording is also ideal for behaviors without a clear beginning and ending and for observers who are responsible for observing multiple clients simultaneously or multitasking during the observation session.

3. Momentary Time Sampling: The observer divides an observation session into equal intervals records if the behavior occurs at the moment the interval ends. Like the previous discontinuous measurement systems, data are reported as percent of intervals.

    - Supervisees should identify that situations in which an overestimate or under estimate of the target behavior is acceptable are well-suited for momentary time sampling. Like other discontinuous measurement systems, supervisees may also note that is ideal when the observer must multitask during the observation session.

To obtain practice selecting a data collection method to the behavior of interest, have your supervisees retrieve *Operational Definitions: Examples and Nonexample* (Appendix B). Assign your supervisee into pairs. Instruct the pairs to review each definition and determine which measurement system(s) would be a good fit for each behavior. Distribute *Data Collection Decision-Making Guide* (Appendix A) to use for this process. For most behaviors, multiple measurement systems may be suitable. In those cases, they should discuss what factors should be considered when selecting among several measurement systems. When the pairs complete their activity, resume to the group and discuss their measurement system selections and justifications.

Data Sheets

The last portion of your group meeting will involve introducing your supervisees to the specific data collection materials you wish for them to use. In some settings, these materials may be prescribed for supervisees by their field experience placements. In other settings, supervisees may have he leniency to amend existing data collection documents or even develop their own. We provide you with data collection documents; however, we encourage you to introduce supervisees to the specific materials they will use in their settings if such materials will be prescribed for them. Distribute *Data Collection Sheets* (Appendix C) or data sheets associated with the field experience placement, and review how to use each document.

Interobserver Agreement

Begin by asking your supervisees the following questions to facilitate the discussion of interobserver agreement.

1. What is reliability?
2. How is reliability different from validity and accuracy?

- Supervises should identify that validity refers to if the measurement system captures the phenomena of interest and accuracy refers to the how well measurement system captured the actual behavior observed.

3. How can you improve reliability of measurement with your clients?
   - Supervises should identify that well-designed measurement system and proper training of the use of that measurement system should improve reliability of behavior measurement.

Distribute *Calculating IOA Practice* (Appendix D) to your supervisees. One-by-one, review with supervisees each method to calculate IOA. Begin by explaining the IOA calculation method and then demonstrating calculating IOA for the first sets of data together, modeling for supervisees how to use the calculation. Allow the supervisees to calculate the second sets of data independently, but have them stop after calculating this set and share their results to be sure they are calculating correctly. If they calculated the second set correctly, allow them to calculate the remaining sets independently and check answers as they complete their calculations. If they make an error in calculating the second set, use subsequent sets for more modeling and feedback. This activity only includes a small sample of methods to calculate IOA. You may wish to replace or add to these methods IOA calculation methods that are more frequently used in your supervisees' settings.

Video Practice

Spend the last 15 minutes of your group supervision combining all of the practices skills. We recommend you find a few online videos that include behaviors that are likely to be measured at your supervisee's field experience placement. For each video, follow these steps.

1. Play the video without collecting data. Ask supervisees to simply observe the target behavior.
2. After watching the video, develop an operational definition for the target behavior and select an appropriate measurement system.
3. Provide all supervisees with the appropriate data sheet. Play the video again. Have supervisees independently record data. You may need to spread supervisees across the room so that their recording is not influenced by the visible behavior of other supervisees.
4. As a whole group, ask supervisees to identify an appropriate method for calculating IOA. Once the method is selected, pair supervisees together in order to calculate IOA.
5. As a whole group, share IOA scores. For those with IOA lower than 80%, discuss what could be improved about the measurement experience to improve IOA.
6. Optional: If you have enough time, use two or more measurement systems to measure the same behavior. Encourage students to use at least one discontinuous

measurement system to experience how such methods over- or overestimate the behavior. Discuss the pros and cons of each measurement system used.

Knowledge Check

1. What are the five characteristics of an operational definition?
2. What is continuous measurement? What are continuous measurement systems? What are the advantages and disadvantages of continuous measurement?
3. What is discontinuous measurement? What are discontinuous measurement systems? What are the advantages and disadvantages of discontinuous measurement?
4. What is latency?
5. Describe how to collect data using a percent of opportunities technique.

Homework for Individual Supervision without a Client

1. Identify five client behaviors that are associated with the client's goals (i.e., those targeted for skill acquisition or behavior reduction).

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–05:00	Operational Definition Activity
05:00–15:00	Selecting Data Collection
15:00–30:00	Client-Directed Activities

Materials Needed

- Appendix A: *Data Collection Decision-Making Guide*, 1 copy
- Appendix E: *Selecting Data Collection Vignettes for Supervisees*, 1 copy
- Appendix F: *Selecting Data Collection Vignettes Answer Sheet*, 1 copy

Operational Definition Activity

Select one or two of the operational definitions written by your supervisee. Engage in the behavior according to the definition and ask the supervisee whether the response you engaged in matched the topography that they were envisioning. For example, if the supervisee wrote an operational definition for *sharing* as a client giving a toy to another person. While pretending to be the client, you could give an item to the supervisee in a rough manner (not forceful enough to cause discomfort) or pick up an item that you did not previously possess and give it to the supervisee without relinquishing the item that you did possess. This will highlight that the definition lacked clarity because the way in which the client gives the item was not specified nor was it specified that the item should be one that was possessed by the client rather than a different nonpreferred item. This activity should lead to a discussion of the importance of specificity and clarity with operational definitions.

Selecting Data Collection

Distribute *Data Collection Decision-Making Guide* (Appendix A) and *Selecting Data Collection Vignettes* (Appendix E) to your supervisee. You may also wish to have a copy of *Selecting Data Collection Vignettes Answer Sheet* (Appendix F) on hand. Use the vignettes (or ones you develop) with the decision-making guide to select a measurement system with your supervisee. We walk through the questions for the first vignette. Repeat this process for each vignette to ensure your supervisee has plenty of practice opportunities.

Client-Directed Activities

Now that your supervisee is familiar with writing operational definitions and selecting measurement systems, they must demonstrate these skills in relation to the clients with whom they work. The supervisee should present the two behaviors they would like to target with their client. Together, you and your supervisee should develop operational definitions for these responses. Provide the opportunity for your supervisee to try to complete this task as independently as possible, but with your guidance and feedback. Remember, your supervisee must behave to be shaped, meaning they must contact the contingencies to learn how to be an effective behavior analyst. Once the operational definitions are finalized, you and your supervisee should select measurement systems for each response using the decision-making guide.

Homework for Individual Supervision without a Client

1. Develop a data sheet for each of the two target behaviors.
2. At least 48 hours prior to your next meeting, provide your supervisor with the data sheets.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Homework Review
5:00–45:00	Observe and Measure Selected Behaviors
45:00–60:00	Performance Feedback

Materials Needed

- Supervisee-developed data sheets, 2 copies of each
- Clipboard
- Pen/pencil

Homework Review

Prior to your meeting with your supervisee, they should have completed their homework: (a) selecting two behaviors of interest, (b) operationally defining those behaviors, (c) selecting at least two methods to measure those behaviors, and (d) preparing two copies of each data sheet. They should have provided you with the copies of the data sheet 48 hours prior to this meeting. Use this time to provide performance feedback on these completed tasks. Next, ask your supervisee to train you to use the methods of measurement selected. Together, plan what portion of the client's session you will conduct each measurement. Be sure to identify signals to one another about when to start and stop each measurement system so that low IOA cannot be attributed to misaligned observation start times.

Observe and Measure Selected Behaviors

Join your supervisee's session in person or via videoconference in order to observe and measure the selected behavior simultaneously. Spend the first half of your observation observing the first behavior and the second half observing the second behavior. Communicate to your supervisee which method you are utilizing and when to start and stop measurement. During this time, do your best to collect data independently of your supervisee. You can do this by positioning yourself so that you cannot see each other's data sheet. Attempt to minimize your physical movement when recording a behavior so that such movement does not signal to your supervisee to also record a behavior that the supervisee may otherwise have not recorded.

Performance Feedback

After you observe your supervisee, provide them with your data sheets and ask your supervisee to calculate IOA. Observe how your supervisee calculates IOA in order to confirm accuracy of the calculation. If IOA fell below 100% for either measurement, which is to be expected in most cases, discuss with your supervisees why you may have recorded the same behavior differently. Perhaps the operational definition or measurement system could be improved to address inadequate IOA. After discussing steps to take to improve the measurement approach, which will ultimately improve IOA, provide your supervisee with performance feedback. Identify specific behaviors in which the supervisee engaged that resulted in successful measurement. Also provide specific feedback as to how your supervisee could improve their performance in measuring behavior. When providing corrective feedback, include a justification as to why a behavior needs to change. If time permits, you may offer to model and/or role-play to improve behaviors in need of improvement. Finally, end this session with the opportunity for your supervisee to ask questions.

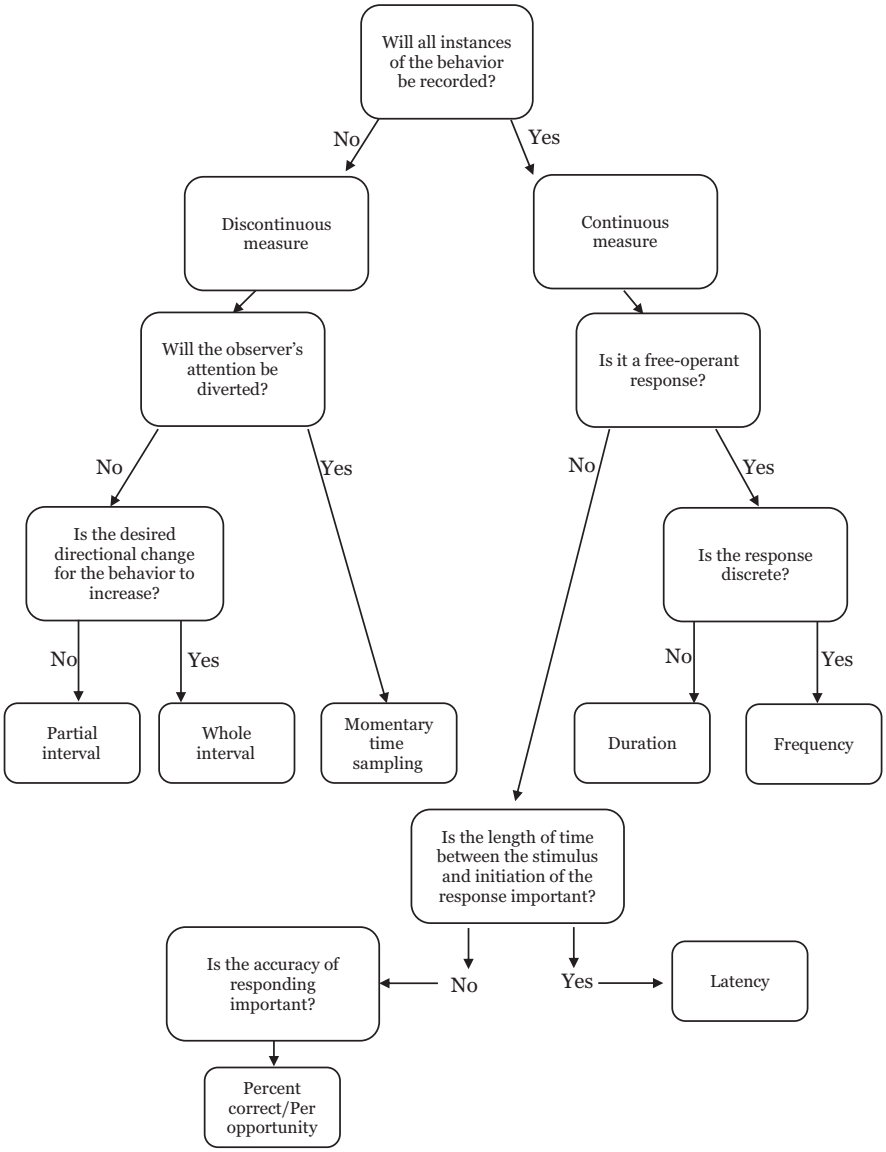
Mastery Criteria

In order to progress from this lesson, your supervisee must accurately collect data on two different client behaviors with at least 80% agreement. If this is not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled followed by another opportunity to meet the mastery criterion.

Future Growth

- ☐ Observe your supervisee collecting data on a different target behavior. Measure IOA.
- ☐ Observer your supervisee collecting data using a different measurement system. Measure IOA.
- ☐ Observe your supervisee teach a client's caregiver or another service provider (e.g., teacher) to collect data.

Appendix A: Data Collection Decision-Making Guide



Appendix B: *Operational Definitions: Examples and Nonexamples*

Instructions: For each behavior, determine if the definition is operational. If not, revise the definition so that it is operational.

1. Multiplication Facts: When shown a flash card of a multiplication problem with a single digit multiplied by a single digit (e.g., "3 × 2 ="), Charlotte vocalizes the correct numeral (e.g., "6").

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

2. Elopement: Juniper's body is 3 feet or more from her assigned seat.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

3. Hands to Self: In the classroom, Marco keeps his hand to himself.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

4. Hand Flapping: Luke moves one or both hands with no intent to use them functionally.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

5. Happiness: Zoe is happy at school.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

6. Tacting Colors: When presented with a colored flashcard and asked, "What color?" Jana vocalizes the correct color name.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

7. Requests: Greyson requests his favorite leisure items.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

8. Responding to questions: When asked a question, Tanner provides a thorough response.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable_____
   _____
   _____

9. Elopement: When the expectation to be in the classroom is implicitly or explicitly communicated, any portion of Sydney's body crosses or has crossed the threshold of the classroom door.

   Is this operational: Yes No
   If not, please revise the definition so that it is observable and measurable: _____
   _____
   _____

10. Curse Words: Jaxson vocalizes a curse word at a typical indoor voice volume.

    Is this operational: Yes No
    If not, please revise the definition so that it is observable and measurable: _____
    _____
    _____

Appendix C: Data Collection Sheets

Sample frequency count data sheet.

Client: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Instructions: Enter date, time observation began, and time observation ended. Tally each behavior observed. If desired, utilize frequency count and observation duration to convert to rate.

Date	Observation Start Time	Observation End Time	Frequency Count Tally

Sample duration data sheet.

Client: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Instructions: Enter the time the behavior started and the time the behavior started. Use this to calculate the total duration of the behavior in the final column. Use multiple entries per observation period to calculate total duration across the observation session or multiple entries to calculate the average duration per occurrence.

Date	Behavior Start Time	Behavior End Time	Duration

Sample latency data sheet.

Client: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Instructions: Enter the time the signal cuing the behavior to begin was displayed and the time the behavior actually began. Use this to calculate the latency in the final column.

Date	Time of Signal for Behavior	Time Behavior Began	Latency

Sample percent correct data sheet.

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Instructions: For each trial, circle if the client performed the behavior correctly or not. Use the final column for additional anecdotal notes, as needed. Calculate percent correct on bottom row.

Trial	Performed Correctly?	Notes
1	Yes No	
2	Yes No	
3	Yes No	
4	Yes No	
5	Yes No	
6	Yes No	
7	Yes No	
8	Yes No	
9	Yes No	
10	Yes No	
11	Yes No	
12	Yes No	
13	Yes No	
14	Yes No	
15	Yes No	
16	Yes No	
17	Yes No	
18	Yes No	
19	Yes No	
20	Yes No	
Percent Correct:		

Sample percent of opportunities data sheet.

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Instructions: For each trial, circle if the client performed the behavior correctly or not. Use the final column for additional anecdotal notes, as needed. Calculate percent correct on bottom row.

Opportunity	**Behavior Emitted?**	**Notes**
1	Yes No	
2	Yes No	
3	Yes No	
4	Yes No	
5	Yes No	
6	Yes No	
7	Yes No	
8	Yes No	
9	Yes No	
10	Yes No	
11	Yes No	
12	Yes No	
13	Yes No	
14	Yes No	
15	Yes No	
16	Yes No	
17	Yes No	
18	Yes No	
19	Yes No	
20	Yes No	
Percent of Opportunities:		

Sample data sheet for discontinuous data collection: partial interval recording, whole interval recording, or momentary time sampling. Note that example is for an 8-minute observation using 10-second intervals. This data sheet can be edited for varying duration of observations and varying interval length.

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Behavior: _____

Partial-Interval Recording Instructions: For each interval, circle if the behavior occurred during any part of the interval. Calculate percent intervals on the bottom row.

Whole-Interval Recording Instructions: For each interval, circle if the behavior occurred during the entire interval. Calculate percent intervals on the bottom row.

Momentary Time Sampling Instructions: For each interval, circle if the behavior occurred during the last second of the interval. Calculate percent intervals on the bottom row.

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
1:01–2:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
2:01–3:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
3:01–4:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
4:01–5:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
5:01–6:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
6:01–7:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
701–8:00	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No

Percent of Intervals: _____

Appendix D: Calculating IOA Practice

Total Count IOA

$$\frac{\text{Smaller Frequency Count}}{\text{Larger Frequency Count}} \times 100$$

Use this method when behavior was measured with frequency count.

Practice Data Sets:

- Data Set One: Observer One measured 14 mands and Observer Two measured 12 mands.
- Data Set Two: Observer One measured 28 cans placed in the recycling bin and Observer Two measured 26 cans.
- Data Set Three: Observer One measured 4 kicks to the furniture and Observer Two measured 5 kicks.
- Data Set Four: Observer One measured 5 towels folded while doing laundry and Observer Two measured 5 towels folded.
- Data Set Five: Observer One measured 43 cans placed on the shelves at the client's job at the grocery store and Observer Two measured 38 cans.

Total Duration IOA

$$\frac{\text{Shorter Duration}}{\text{Longer Duration}} \times 100$$

Use this method when behavior was measured with duration or latency.

Practice Data Sets:

- Data Set One: Observer One measured 36 minutes of in-seat behavior and Observer Two measured 37.5 minutes.
- Data Set Two: Observer One measured 12.25 minutes of walking and Observer Two measured 11.75 minutes.
- Data Set Three: Observer One measured 2.5 minutes of crying and Observer Two measured 2.5 minutes of crying.
- Data Set Four: Observer One measured 6.5 minutes of mopping at the client's job and Observer Two measured 6.25 minutes.
- Data Set Five: Observer One measured 32.75 minutes of head placed down on the desk during work time and Observer Two measured 30.5 minutes.

Interval-by-Interval IOA

$$\frac{\#\text{ of Intervals with Agreement}}{\text{Total }\#\text{ of Intervals}} \times 100$$

Use this method when behavior was measured with a discontinuous measurement system, percent correct, or percent of opportunity measurement techniques.

Practice Data Sets One:
Sample momentary time sampling data sheet.

Client: Mason

Date: May 13 Time: 1:15–1:20 pm

Observer One: Emily Observer Two: Jose

Behavior: In seat

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00	✔				✔	
1:01–2:00	✔		✔			
2:01–3:00				✔		✔
3:01–4:00						✔
4:01–5:00			✔			

Client: Mason

Date: May 13 Time: 1:15–1:20 pm

Observer One: Emily Observer Two: Jose

Behavior: In seat

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00	✔	✔			✔	
1:01–2:00			✔	✔		
2:01–3:00	✔					✔
3:01–4:00						✔
4:01–5:00			✔			

Practice Data Set Two:
Sample partial interval recording data sheet.

Client: Damon

Date: May 14 Time: 10:25–10:10 am

Observer One: Victoria Observer Two: Brent

Behavior: Completing work at desk

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00				✔	✔	
1:01–2:00	✔	✔	✔	✔	✔	
2:01–3:00	✔	✔	✔	✔		✔
3:01–4:00		✔				✔
4:01–5:00		✔	✔	✔		✔

Client: Damon

Date: May 14 Time: 10:25–10:10 am

Observer One: Victoria Observer Two: Brent

Behavior: Completing work at desk

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00	✔	✔		✔		
1:01–2:00	✔	✔	✔	✔	✔	
2:01–3:00	✔	✔	✔	✔		✔
3:01–4:00		✔				✔
4:01–5:00		✔	✔			

Practice Data Set Three:
Sample whole interval recording data sheet.

Client: Olivia

Date: October 19 Time: 2:30–2:35 pm

Observer One: Denise Observer Two: Kenny

Behavior: Crying

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00		✔				✔
1:01–2:00	✔	✔				✔
2:01–3:00	✔	✔				✔
3:01–4:00	✔	✔				✔
4:01–5:00	✔	✔				

Client: Olivia

Date: October 19 Time: 2:30–2:35 pm

Observer One: Denise Observer Two: Kenny

Behavior: Crying

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00	✔	✔	✔			✔
1:01–2:00	✔	✔				✔
2:01–3:00	✔	✔				✔
3:01–4:00	✔	✔				✔
4:01–5:00	✔	✔				

Practice Data Set Four:
Sample percent of opportunities data sheet.

Client: Dylan
Date: March 3 Time: 1:00–2:00 pm
Observer One: Yumiko Observer Two: Julia
Behavior: Responding appropriately to question during job interview

Opportunity 1	X	Opportunity 6	✔
Opportunity 2	X	Opportunity 7	✔
Opportunity 3	✔	Opportunity 8	✔
Opportunity 4	✔	Opportunity 9	✔
Opportunity 5	✔	Opportunity 10	X

Client: Dylan
Date: March 3 Time: 1:00–2:00 pm
Observer One: Yumiko Observer Two: Julia
Behavior: Responding appropriately to question during job interview

Opportunity 1	X	Opportunity 6	✔
Opportunity 2	✔	Opportunity 7	✔
Opportunity 3	✔	Opportunity 8	✔
Opportunity 4	✔	Opportunity 9	✔
Opportunity 5	✔	Opportunity 10	X

Practice Data Set Five:
Sample percent of opportunities data sheet.

Client: Abby

Date: September 30 Time: 9:00–9:20 am

Observer One: Daniel Observer Two: Tyrone

Behavior: Vocalizing correct answer to multiplication fact presented on flashcard

Flashcard 1	✔	Flashcard 6	✔
Flashcard 2	✔	Flashcard 7	X
Flashcard 3	✔	Flashcard 8	✔
Flashcard 4	✔	Flashcard 9	✔
Flashcard 5	✔	Flashcard 10	✔

Client: Abby

Date: September 30 Time: 9:00–9:20 am

Observer One: Daniel Observer Two: Tyrone

Behavior: Vocalizing correct answer to multiplication fact presented on flashcard

Flashcard 1	✔	Flashcard 6	✔
Flashcard 2	✔	Flashcard 7	X
Flashcard 3	✔	Flashcard 8	✔
Flashcard 4	✔	Flashcard 9	✔
Flashcard 5	✔	Flashcard 10	✔

Appendix E: *Selecting Data Collection Vignettes*

1. Aki is conducting a parent training with Jeffery. Jeffery has expressed that he wants his son to follow the instruction "clean up." After gathering some additional information, Aki determines that Jeffery's son does clean up his toys after his father provides the instruction "clean up," but it takes him a long time to start cleaning.
2. Ms. Aguirre is a teacher in a first-grade classroom. She has a student who is engaging in disruptive behavior in the form of throwing toys during free play. She is the only teacher for a class of 30 students. During the free play time, students are scattered across the classroom engaging in a variety of activities.
3. Jaylen has a client who engages in aggressive behavior in the form of hitting. Jaylen works with the client one-on-one and is worried that his client will be kicked out of his classroom if the behavior continues to occur. There is often a 30-second interval between each instance of the behavior.
4. Rylee is providing consultation services for a school district. She is observing a student in classroom who engages in frequent negative vocalizations in the form of crying and screaming. Rylee would like for the paraprofessional to collect data on the negative vocalizations during the times in which Rylee is unavailable. The paraprofessional is assigned to the target student but is required to multitask during specific activities.
5. Kyle flops to the ground and screams and cries (i.e., tantrum behavior) during public outings with his mother. The behavior analyst has request for the mother to collect data on these bouts of behavior.
6. Luis is conducting a small group activity with three clients. The activity is arranged such that Luis and three clients are sitting at a horseshoe table and Luis can easily observe all three clients. For one of the clients, Luis plans to develop an intervention targeting on-task behavior. Luis plans to collect data on the client's behavior while implementing teaching trials.
7. Jasmine is teaching her client to emit the response "car" every time Jasmine holds up a picture of a car and presents the instruction "what is it."

Appendix F: Selecting Data Collection Vignettes

Supervisor Answer Sheet

1. Aki is conducting a parent training with Jeffery. Jeffery has expressed that he wants his son to follow the instruction "clean up." After gathering some additional information, Aki determines that Jeffery's son does clean up his toys after his father provides the instruction "clean up," but it takes him a long time to start cleaning.

   Let us practice walking through the decision-making guide.

   1. Will all instances of the behavior be recorded?

      (a) Yes, Jeffery observes his son's behavior after he presents the instruction.

   2. Is it a free-operant response?

      (a) No, the behavior only occurs after the instruction is provided.

   3. Is the length of time between the stimulus and initiation of the response important?

      (a) Yes, the goal is to decrease the lag time between the instruction and the child initiating the cleaning task.

   Best measurement technique: Latency

2. Ms. Aguirre is a teacher in a first-grade classroom. She has a student who is engaging in disruptive behavior in the form of throwing toys during free play. She is the only teacher for a class of 30 students. During the free play time, students are scattered across the classroom engaging in a variety of activities.

   Best measurement technique: Momentary time sampling

3. Jaylen has a client who engages in aggressive behavior in the form of hitting. Jaylen works with the client one-on-one and is worried that his client will be kicked out of his classroom if the behavior continues to occur. There is often a 30-second interval between each instance of the behavior.

   Best measurement technique: Frequency

4. Rylee is providing consultation services for a school district. She is observing a student in classroom who engages in frequent negative vocalizations in the form of crying and screaming. Rylee would like for the paraprofessional to collect data on the negative vocalizations during the times in which Rylee is unavailable. The paraprofessional is assigned to the target student but is required to multitask during specific activities.

   Best measurement technique: Partial interval

5. Kyle flops to the ground and screams and cries (i.e., tantrum behavior) during public outings with his mother. The behavior analyst has request for the mother to collect data on these bouts of behavior.
   Best measurement technique: Duration

6. Luis is conducting a small group activity with three clients. The activity is arranged such that Luis and three clients are sitting at a horseshoe table and Luis can easily observe all three clients. For one of the clients, Luis plans to develop an intervention targeting on-task behavior. Luis plans to collect data on the client's behavior while implementing teaching trials.
   Best measurement technique: Whole interval

7. Jasmine is teaching her client to emit the response "car" every time Jasmine holds up a picture of a car and presents the instruction "what is it."
   Best measurement technique: Per opportunity

References

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* (3rd ed.). Pearson.
Kennedy, C. H. (2005). *Single-case designs for educational research*. Allyn and Bacon.
LeBlanc, L. A., Raetz, P. B., Sellers, T. S., & Carr, J. E. (2016). A proposed model for selecting measurement procedures for the assessment and treatment of problem behavior. *Behavior Analysis in Practice, 9*(1), 77–83. https://doi.org/10.1007/s40617-015-0063-2
Meany-Daboul, M. G., Roscoe, E. M., Bourret, J. C., & Ahearn, W. H. (2007). A comparison of momentary time sampling and partial-interval recording for evaluating functional relations. *Journal of Applied Behavior Analysis, 40*(3), 501–514.
Pierce, W. D., & Cheney, C. D. (2017). *Behavior analysis and learning: A biobehavioral approach* (6th ed.). Routledge.
Rapp, J. T., Colby-Dirksen, A. M., Michalski, D. N., Carroll, R. A., & Lindenberg, A. M. (2008). Detecting changes in simulated events using partial-interval recording and momentary time sampling. *Behavioral Interventions: Theory & Practice in Residential & Community-Based Clinical Programs, 23*(4), 237–269.
Sidman (1960). *Tactics of Scientific Research: Evaluating Experimental Data in Psychology*.
Skinner, B. F. (1953). *Science and human behavior*. Macmillan.

Chapter 6
Graphing, Interpreting Graphs, and Experimental Designs

Topics Covered Within This Chapter

Topics
Graphing
Visual Analysis
Experimental Designs

Graphing

Data are a fundamental component of any behavior change program. Data are used to make every decision within a behavior change program, regardless if that program is to increase an adaptive behavior or reduce a challenging behavior. As discussed in Chap. 5, your supervisees will become experts in operationally defining behavior and collecting data. However, raw data are difficult to manage and use for decision-making. Graphical displays of those data will allow your supervisee to make sense of their raw data by giving them the ability to summarize, interpret, analyze, and communicate about their data. Consequently, it is important that your supervisees master graphing skills early in their field experience.

Types of Graphical Displays

There are a number of graphical displays used in applied behavior analysis. In this chapter, we will focus on those used most frequently by clinicians: line graphs and bar graphs. However, we highly encourage you to place more emphasis on

Supplementary Information: The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_6].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_6

additional types of graphs (e.g., cumulative records, standard celeration chart, scatterplots) if your supervisees use any of these graphical displays frequently in their field experience. The activities included in the group and individual supervision meetings can be conducted with additional types of graphical displays if you wish to substitute the graphs recommended for those activities with a different graphical display.

Line graphs are formed by a series of data points across time and/or environmental conditions that are connected by a line. Each data point reflects a quantifiable feature of the dependent variable in relationship to an independent variable. The line connecting the data point can be examined among a variety of features such as level, trend, and variability (What Works Clearinghouse [WWC], 2020). Line graphs offer a great deal of variety to the user as several variations of a basic line graph are frequently employed by behavior analysts. For example, a single line graph may include multiple dependent variable data paths, or a single dependent variable under two or more conditions (e.g., baseline and treatment).

Bar graphs provide a summary of data displayed in a bar or column. Because a summary of data is displayed, rather than each individual datum point, bar graphs boast the ability to present a large amount of data in an efficient manner. On the other hand, bar graphs typically report mean or median scores, which precludes the ability to analyze trend and variability within a data path.

Essential Graph Components

Regardless of the type of graph your supervisees opt to use, all graphical displays of data must include several essential components. Before we review these essential components, we want to first acknowledge that it is quite likely that your supervisees are completing a field experience at an agency that uses data collection software which automatically graph inputted data, with little onus on the clinician to create the graph. While programs with such features can be an excellent contribution to the professional work of behavior analysts, we highly encourage you to ensure that your supervisees can create accurate and complete graphs with nonautomated software such as Microsoft Excel. This recommendation is based on two factors. First, we find that supervisees learning how to graph in this manner develops a better understanding of graphical displays which leads to improved interpretation, analysis, and communication regarding graphed data. Second, your supervisee is likely to work in a variety of settings across their career, and likely many of these settings will use different approaches to developing graphs. Some will use differing software programs with graph automation others will rely on the clinician to develop a graph using Microsoft Excel. Regardless of their field experience placement of place of employment at any given moment in time, access to Microsoft Excel is ubiquitous across employment settings. Therefore, if your supervisee develops the skill of creating graphs in Microsoft Excel, they will be able to graph data at any place of employment, regardless of the various specialized software available. We

have supervised individuals who do not initially understand the benefit of learning to graph in Microsoft Excel when their field experience offers software with an automated graphing feature. Therefore, we encourage you to be proactive about explaining the benefits of learning to graph.

The essential features of a graph include the following: (a) horizontal axis, (b) vertical axis, (c) axis labels, (c) condition change lines, (d) condition labels, (e) data points, (f) data path line, and (g) a figure caption (Cooper et al., 2020). In many graphs, a key is also necessary. In most cases, the horizontal axis, or *x*-axis, will represent passage of time. When creating graphs, clinicians should mark this passage of time in equal intervals. In most situations, clinicians do not measure a target behavior 7 days a week. For example, if working in a public school, clinicians would only collect data on weekdays, but not weekends. Be sure that supervisees learn to create equal intervals across sessions, even when the spacing between sessions is not constant (e.g., some sessions spaced 1 day apart and others spaced 3 days apart). The vertical axis, or *y*-axis, will display a range of a metrics measuring the dependent variable (e.g., frequency or percent of intervals). In most cases, the lower points, closer to the *x*-axis, will represent lower values and the higher points will represent higher values. Similarly, in most cases, your supervisees will need to mark equal intervals across the *y*-axis as well. In other words, if the *y*-axis depicting frequency ranges from 1 to 20, then your supervisees would want to equally space out markings on the *y*-axis perhaps by 2's or 5's. After creating each axis, clinicians create concise, but clear labels.

Graphs typically contain at least two conditions; for example, a baseline and an intervention condition. To indicate the change from one condition to another, the graph should contain a vertical line from the *x*-axis to about the height of the *y*-axis. Similarly, the conditions should be labeled clearly and concisely.

Clinicians should graph each data point so that it accurately reflects the time, based upon its position along the *x*-axis, and value, based upon its position along the *y*-axis. These data points will be connected with a line to create the data path. Data markers are added to improve readability. Readability is easy to obtain when graphing only one data path, but trickier as more data paths are added to a single graph. Tinkering with data marker size, shape, and fill as well as with the width of the data path line can maximize readability when graphing multiple data paths.

Figures require a concise caption statement that facilitates readers' understanding of the data presented. The publication manual of the American Psychological Association (APA, 2020) provides excellent guidance for figure captions. In many cases, a key (or legend) is also necessary to interpret the graph. This is the case in which multiple data paths are displayed on a single graph. The key informs readers as to which data path represents which behaviors.

In addition to the essential components of graphs, your supervisees should also develop graphing habits that will lead to clearer displays of data that align with the APA (2020) publication manual's guidance for figures. Such features include the use of only black ink, removal of gridlines, and removal of visible border lines from the graph or other graph components. We provided a graph checklist (Appendix A) summarizing all of the important features to include in a graph. You may use this

checklist to provide feedback on your supervisees' graphs. Alternatively, they may use the checklist to self-evaluate.

Visual Analysis

Visual analysis is a methodical inspection of graphed data, typically conducted for two reasons. First, to determine if a functional relation exists between independent and dependent variables (Johnston & Pennypacker, 1980). Second, to determine if changes in dependent variables are meaningful. A functional relation is when change in the independent variable consistently and reliably produces a change in the dependent variable. For example, if delivery of a client's favorite snack, potato chips, in response to mands for potato chips consistently and reliably increases the rate of mands for potato chips, but placing mands for potato chips on extinction consistently and reliability decreases the frequency of mands for potato chips, we could conclude a functional relation between delivery of potato chips contingent upon mands (independent variable) on the rate of mands (dependent variable).

Within Condition Analysis

Visual analysis involves first analyzing data within conditions and then across conditions. Analyzing data within conditions consists of examining (a) the number of data points, (b) level, (c) variability, and (d) trend (WWC, 2020). First, a clinician must determine if there are a sufficient number of data points. They should ask themselves, "Are there enough data to be confident that these data are an accurate estimation of the actual behavior?" Clinicians must consider several factors when asking this question. Generally, more data points across time increase the likelihood of an accurate representation of the behavior, with more variable data necessitating more data points compared to stable data. That being said, more data are not always better. For example, maintaining a baseline condition means more data points, but also equates to a longer latency to accessing intervention. In cases in which a lack of intervention represents a risk to the client, a quicker transition to intervention may be worth the loss of confidence in the data's accuracy (Cooper et al., 2020).

When evaluating level, clinicians should ask themselves, "At what value on the y-axis do these data congregate?" This is an easy question to answer among stable data, but much more difficult with variable data. In most cases, a mean or median level line can answer this question with sufficient accuracy.

When evaluating variability, clinicians should ask themselves, "To what extent do the measures of this behavior across time produce different results?" Cases in which data points represent different results across time are considered variable and those in which the data points are roughly about the same value on the *y*-axis are considered stable. As mentioned previously, variable data give reason to doubt its

accuracy. Ideally, data allow us to safely predict how a behavior would respond if no changes are made to the environment (Kazdin, 1982). Stable data give us confidence in this prediction with very few data points, but more data are required for a similar level of confidence among variable data.

To evaluate trend, clinicians should ask, "What direction is this data path taking?" Trends are typically described by their direction and magnitude. The direction can be described as *increasing*, *decreasing*, or *zero* trend; whereas magnitude can be described as *gradual* or *rapid* (Kazdin, 1982; Roane et al., 2011; WWC, 2020). In some cases, a trend cannot be determined. These cases include when data increase then decrease (or vice versa), data are missing, or data are highly variable.

Across Condition Analysis

The next phase of visual analysis involves comparing data across conditions. Generally, supervisees will need to note any differences in the level, trend, and variability across adjacent conditions. This analysis includes evaluating (a) immediacy of change, (b) overlap, and (c) consistency across similar conditions, when applicable (WWC, 2020). To evaluate immediacy of change, clinicians should ask, "How quickly did the level in the subsequent condition change?" Immediate changes in level indicate a stronger likelihood that a change in the independent variable (i.e., introduction, withdrawal, or modification of the independent variable) influenced this change in the dependent variable. However, in some cases, interventions must be applied over time to affect change. For example, changing to a healthier diet may take several weeks to influence weight. Such a delayed effect should not always be interpreted as a lack of functional relation.

Next, clinicians should ask, "How many of the data points overlap among the adjacent conditions?" We can feel more confident that the change in the independent variable influenced the change in the dependent variable when there is little to no overlap among data points in adjacent conditions. On the contrary, more overlap in data points between adjacent conditions leads to uncertainty of the functional relation.

In cases in which any condition is implemented two or more times, for example, in an ABAB design, a clinician should ask, "Are the data in both X conditions similar?" For example, if analyzing an ABAB design in which A represents baseline and B represents intervention, a clinician would ask, "Are the data in both baseline conditions similar?" and "Are the data in both intervention conditions similar?" Data that consistently respond to identical changes in the independent variable indicate a higher likelihood of a functional relation. The more repetitions of conditions resulting in similar changes in dependent variables, the more confidence a clinician can have in the functional relation between the independent and dependent variables.

Experimental Designs

Experimental designs allow one to demonstrate a functional relation between independent and dependent variables. At this point in their careers, it is highly unlikely that your supervisees will be planning and executing experimental research. Rather, it is likely that they will need to employ experimental designs for clinical purposes and need to be critical consumers of research. As a result, we have limited this portion of their field experience to discuss the concepts associated with experimental control to the following designs: AB, ABAB, and multielement.

Behavior analysts strive to exert control over a behavior; that is, to control when the behavior occurs or does not occur (Baer et al., 1968). In order to demonstrate this functional relation between variables, also described as *experimental control*, supervisees must first understand the components of experimental designs. In order to demonstrate a functional relation, a study must have internal validity. Internal validity is the demonstration that the independent variable, as opposed to confounding variables, consistently and reliably produces changes in the dependent variable (Horner et al., 2005). External validity, on the other hand, refers to the degree to which the results of any evaluation are generalizable to other settings, participants, or behaviors (Horner et al., 2005). Experiments should aim to have strong internal and external validity.

The two most defining features of single-case designs are that the participant serves as their own control and the use of repeated measures. In other words, the participant's behavior under one condition is compared to that same participant's behavior under another condition. Moreover, measurement of the dependent variable, typically an observational measure, is repeated within conditions and conditions are conducted multiple times for increased experimental control. For a full description of the features of single-case designs and concepts related to experimental design, see Horner et al. (2005) and WWC (2020).

ABAB Design

The ABAB design, also referred to as a *reversal* or *withdrawal* design, is a powerful design to demonstrate a functional relation (Kennedy, 2005). With an ABAB design, the letter A represents one condition, and the letter B represents a different condition. Frequently, those are *baseline* and *intervention*, respectively. Condition A (e.g., baseline) involves repeated measure of a behavior, which allows clinicians to predict how the behavior will continue to occur if no environmental changes are made. In Condition B (e.g., intervention), the behavior is repeatedly measured under a new condition. If the behavior changes course, this provides evidence of a functional relation between the environmental changes associated with the two

conditions. To verify this hypothesis, each condition is repeated. Each time the behavior responds similarly across Condition A (e.g., baseline) and changes consistently across Condition B (e.g., intervention), this more strongly suggests a functional relation (Risley, 2005).

AB Design

The AB design is a modification of the ABAB design. As the name implies, Condition A and Condition B are conducted only once, allowing only one opportunity to analyze across conditions. This lack of replication of each condition precludes the ability to validate a functional relation. However, what an AB design lacks in experimental control, it gains in practicality. In clinical and educational settings, a return to a baseline condition presents obvious limitations. Once a client is making meaningful gains on a goal, it is difficult to justify to caregivers and stakeholders a return to baseline conditions in which the client's behavior was most likely subpar. Clinicians must determine on a case-by-case basis if the benefits of an AB design outweigh the drawbacks. Some factors may be taken into consideration. First, the ethics of reinstating a condition in which the client's behavior was suboptimal. If the baseline condition involved high rates of behavior that pose risk to the client or others, it is likely unethical to reinstate this condition (Cooper et al., 2020). Second, if a supervisee is using an intervention with significant scientific support, such as functional communication training (FCT), an assumption that this scientifically supported intervention caused change in the dependent variable is safe to make.

Multielement Design

The multielement design involves a fast alternation between two or more conditions. The multielement design is well suited to comparing the effectiveness of two or more treatments on a behavior (Kennedy, 2005). The multielement design has several advantages in comparing two or more treatments relative to an ABCBC design. That is, the evaluation can be done much more quickly with a multielement design rather than an ABCBC which requires stable responding across several conditions before a comparison can be made. Moreover, the rapid alternation between treatments within a multielement design controls for the threat of maturation to internal validity. The multielement design is discussed in more detail in Chap. 9 because it is the most prominent design used within a functional analysis (Beavers et al., 2013).

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Graphs: Essential Components and Features
15:00–35:00	Graphing Practice
35:00–50:00	Visual Analysis Practice
50:00–55:00	Experimental Designs
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Graph Component Checklist*, 18 copies for each supervisee
- Appendix B: *Sample Graphs*, one copy per supervisee or presented on PowerPoint slides
- Appendix B: *Sample Graphs Answer Sheet*, one copy for supervisor
- Appendix C: *Graphing Practice Raw Data Sets*, one copy per supervisee or presented on PowerPoint slides
- Appendix D: *Graphs for Visual Analysis Practice*, one copy per supervisee or presented on PowerPoint slides
- Laptop or tablet with Microsoft Excel, one per supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Horner et al. (2005)
- Kazdin (2019)
- Watts and Stenhoff (2021)
- WWC (2017)

Graphs: Essential Components and Features

Begin by asking your supervisees why behavior analysts graph data. Next ask them to share their experience graphing. What responsibilities have they maintained in relation to graphing? Perhaps some have created graphical displays of raw data with

software with automated graphing or with Microsoft Excel. Others may have experience analyzing graphed data as well.

Transition the discussion to the types of graphical displays. Ask your supervisees to list the type of graphs they have used in their own practice. We anticipate that most will have experience with line and bar graphs, but if not, inform them that they will frequently use line and bar graphs, but there are many possible graphs to use. Display the line and bar graphs provided in the PowerPoint slides while pointing out the distinctive features of both graphs. Ask supervisees to share ideas of when a line or bar graph may be the best suited graphs for displaying their client's data.

Review the essential features of a graph. Do so by displaying a sample AB graph (one is provided in the PowerPoint slides for this chapter) and point out the following essential components: (a) horizontal axis, (b) vertical axis, (c) axis labels, (c) condition change lines, (d) condition labels, (e) data points, (f) data path line, and (g) a figure caption. As you point to each feature on the example graph, ask your supervisees to explain why the inclusion of that component, for example, axis labels, are considered essential. Additionally, provide tips for constructing a graph with these components. For example, you could note that the horizontal axis typically represents the passage of time and should be marked in equal intervals. After reviewing the essential graph components, discuss the additional good habits of graphing: (a) using only black ink, (b) removal of gridlines, (c) removal of border lines, and (d) any other graphing habits you would like your supervisees to adopt.

Next, distribute the *Graph Component Checklist* (Appendix A) to your supervisees. This is a checklist to use to ensure that graphs contain essential components and features. Read through each component or feature to confirm that your supervisees understand each listed and could use this checklist independently. Next, display the first of the eight graphs in *Sample Graphs* (Appendix B; also presented in the PowerPoint slides). Model using this checklist to rate the graph. Next, display the second of the eight graphs and ask your supervisees to independently rate the graph using the checklist. After providing about a minute to do so, ask supervisees to share their scores. Praise correct application of the checklist and reteach areas in which several supervisees incorrectly applied the checklist. You may wish to have them evaluate the third graph with your guidance, based on the number of errors made with the second graph. When you believe your supervisees are ready to evaluate the remaining graphs, give them access to the remaining graphs (printed Appendix B or via PowerPoint slides) and allow them to evaluate all graphs before reconvening the group. When you reconvene the group, share scores for each graph, one at a time. As before, praise correct application and reteach as necessary. For your convenience, *Sample Graphs Answer Sheet* (Appendix B) summarizes the errors in each of the graphs.

Graphing Practice

Now that your supervisees are well versed in the essential components and features of a graph, give them the opportunity to graph raw data sets. *Graphing Practice Raw Data Sets* (Appendix C) contains ten data sets. Model for your supervisees how to graph the first data set. Begin with a blank Microsoft Excel spreadsheet so they can observe the process from start to finish. If your graphing skills could use some updating, we recommend the following articles to help you improve your skills: Chok (2019), Deochand (2017), and Watts and Stenhoff (2021). After you complete the graph, return to the *Graphing Component Checklist* (Appendix A) and apply those criteria to your graph so that supervisees see how you addressed each item on this checklist. Demonstrate as many graphs as you feel necessary and then allow supervisee to graph the remaining independently. When you instruct them to graph the remaining data sets, be sure to inform them that it is in their best interest to create each graph from a blank sheet, rather than copy and paste a completed graph and change the data or save the first graph as a template. More practice will lead to more fluent skills! Give them sufficient time to graph all data sets so they will not be encouraged to shortcut this learning experience.

After your supervisees complete their graphs, ask them to partner up with another supervisee to check one another's work. They will use their remaining *Graph Component Checklist* forms (Appendix A) to check their peer's graph. After they check the graphs, ask them to report back to one another what errors need to be corrected in future graphs.

Visual Analysis Practice

Review with your supervisees the steps to visual analysis. Begin by reviewing how to analyze within conditions, by examining the following: (a) the number of data points, (b) level, (c) variability, and (d) trend. Next review how to analyze across conditions, by examining (a) immediacy of effect, (b) overlap, and (c) consistency across similar conditions, when applicable. Provide your supervisees with *Graphs for Visual Analysis Practice* (Appendix D) or present the graphs in the provided PowerPoint. As you present the first graph, model for your supervisees how to analyze the graph by evaluating first within conditions and next across conditions. After you complete your analysis, report if there is a functional relation between the independent and dependent variable. Display the second graph and call on a supervisee to do each of the seven evaluations, praising correct evaluations and correcting errors. You may wish to conduct more modeling and group analyses based on your supervisees' expertise with visual analysis. When you feel they are ready, instruct your supervisee to complete the visual analysis for the remaining graphs in *Graphs for Visual Analysis Practice* (Appendix D). After they complete the visual analysis, quickly review their final decision regarding the functional relation between the

independent and dependent variables. Some graphs in this handout have clear functional relations or clearly lack a functional relation; others are not as clear. As a result, expect a variety of responses from supervisees on the same graph and use those opportunities to allow supervisees to vocalize how they came to their conclusions and correct errors you may observe.

Experimental Designs

Begin the brief review of experimental designs by asking your supervisees to review concepts. First, ask a volunteer to define internal validity, then external validity, and finally experimental control. Discuss with them the value of demonstrating a functional relation in the field of behavior analysis.

Next, ask volunteers to describe the defining features of a single-case design. Confirm that supervisees identify that participants serve as their own control and the use of repeated measures. Correct any erroneous descriptions of features. When discussing that a participant serves as their own control, be sure to emphasize that the term *participant* can be misleading. In fact, the term *single case* means that the case (often, but not always, a single participant) can actually be a group of people, such as an entire classroom of students. Inform them that you will limit today's brief review to the three most common designs they will employ in practice.

For the ABAB design, ask for a volunteer to describe the design as they would to a student on the first day of their single-case design course in graduate school. Next, ask for a volunteer to describe how this design provides experimental control. After thoroughly discussing the ABAB design, inform students that they may frequently use a modification, the AB design, in clinical practice. Ask them to identify the benefits and limitations of this design. Finally, call for volunteers to provide an identical discussion of the multielement design, first describing the design to a student in a single-case design graduate course and then describing how the design protects against threats of internal validity.

Knowledge Check

1. What are the benefits of graphing?
2. In a line graph, what is typically plotted along the vertical axis? And the horizontal axis?
3. True or false: graphs should include gridlines.
4. What are the four questions asked during visual analysis within conditions?
5. Define internal and external validity.

Homework for Individual Supervision without a Client

1. Go to www.singlecase.org. Complete the visual analysis practice for ABAB designs. Print the results page and bring to the next supervision meeting.
   - Ideally at least 80% of your ratings will exactly match (green) or within =/- 1 (yellow). If not, more practice is warranted.
2. Go to www.singlecase.org. Complete the visual analysis practice for alternating treatments (i.e., multielement) designs. Print the results page and bring to the next supervision meeting.
   - Ideally at least 80% of your ratings will exactly match (green) or within =/- 1 (yellow). If not, more practice is warranted.

Individual Supervision Meeting without Without a Client

Below is a plan for activities to incorporate into a 50-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Homework Review
10:00–25:00	Graph Raw Data
25:00–35:00	Evaluate Graphs
35:00–45:00	Visual Analysis
45:00–50:00	Data-Based Decision-Making

Materials Needed

- Raw data for two of your supervisee's clients, at least three goals per client (total of six raw data sets)
- Appendix A: *Graph Component Checklist*, six copies
- Computer for both supervisee and supervisor

Homework Review

Your supervisee should bring two result printouts from singlecase.org to the meeting. Remind them of the goal: 80% of their responses to be exact matches (green) or within +/− 1 (yellow). If either of the two practices fell below that, open the website and begin another round of practice, but do so together. Model for your supervisee how you would analyze each graph. You do not need to compete the entire practice, but provide enough modeling to correct any potential errors leading to subpar

scores. If you have time, allow them to score some graphs while thinking aloud so you can praise correct analyses and correct any errors you observe.

Graph Raw Data

Your supervisee will bring at least six raw data sets to the meeting. It is likely that these data sets are already graphed for analysis of the client's educational or behavioral program. For the purpose of building fluency with graphing skills, instruct your supervisee to graph each data set, beginning with a blank Microsoft Excel spreadsheet. During this time, provide help only as needed. The hope is your supervisee is fairly well versed in graphing and will need minimal assistance.

Evaluate Graphs

After your supervisee completes all six graphs, they should send them to you electronically so you can look at them simultaneously. Number the graphs 1 to 6. Independently evaluate the graphs using the *Graph Component Checklist* (Appendix A). Remind them not to edit the graph when they find errors because this exercise is designed to evaluate the interrater reliability between evaluations; therefore, you and your supervisee need to evaluate the same version of each graph. After you both evaluate all six graphs, return to Graph 1. Review your checklist together. Identify any discrepancies between your ratings and discuss those until you reach a consensus. Next, determine which items on the checklist need revision. As you identify these components and features, be sure to elaborate as to why the graph component is essential and provide helpful tips for your supervisee to keep in mind next time they graph (e.g., "I always walk away from my graph for at least 30 minutes, then come back with a fresh pair of eyes to confirm is it clear and easy to read."). After the evaluation process is complete, allow your supervisee time to correct the graphs before moving to visual analysis.

Visual Analysis

Once the graphs are perfected, you will visually analyze the graphed data. Begin with Graph 1. Ask your supervisee to answer the four questions regarding within condition analysis:

1. Are there enough data to be confident that these data are an accurate estimation of the actual behavior?
2. At what value on the *y*-axis do these data congregate?

3. To what extent do the measures of this behavior across time produce different results?
4. What direction is this data path taking?

Provide support by praising correct analyses, correcting errors, and answering their questions. Next, ask your supervisee to answer the three questions corresponding with across condition analysis:

1. How quickly did the level in the subsequent condition change?
2. How many of the data points overlap among the adjacent conditions?
3. Are the data in both X conditions similar? (If applicable)

We understand that in some educational and clinical programs in which your supervisees may be completing field experience, collecting baseline data may not be standard practice. Therefore, it is possible that your supervisee will have data on behavior under only one condition (i.e., intervention). If this is the case, use this opportunity to emphasize the importance of collecting baseline data. Unfortunately, your supervisee will not be able to practice visual analysis across conditions if they only have data corresponding to a single condition.

Data-Based Decision-Making

End the meeting by using the recently graphed data to make decisions about the client's program. After thoroughly reviewing each graph, ask your supervisee this very simple question about each set of graphed data, "What should you do next?" In some cases, the data will indicate that maintaining the current treatment will likely lead to a mastered goal in a reasonable timeframe; therefore, no changes to the program are indicated. In other situations, perhaps data are changing in the intended direction, but not at an acceptable rate; therefore, changes to the client's program may still be indicated. In some cases, behavior changes may be opposite of what was intended (e.g., challenging behavior is increasing when the intervention was intended to reduce challenging behavior). In other words, some analyses may indicate minor tweaks to a program, and others may indicate a major overhaul of the program. For each graph, determine what changes, if any, are indicated by the data.

The point of this exercise is not to identify the exact changes to be made. Those will need to be done with the entire team of clinicians working with this client. On the contrary, the purpose of this activity is to facilitate your supervisee in learning how to accurately and consistently visually analyze data so that they will know when to alert the intervening team of clinicians about a possible need for revision to the behavior program. If your supervisee identifies the potential need for changes in the client's treatment programs, remind them that such changes are to be discussed with the client's team. Your supervisee should not misinterpret this activity as authority to implement changes without the approval of the client's entire intervening team of professionals. That being said, do seize the opportunity to assist your

client in brainstorming what variables may need to be changed in the client's treatment program and how to do so in a way that would allow your supervisee to draw conclusions about the effect of those changes on the client's behavior.

Homework

As you will see below, the individual supervision meeting with a client will not reflect the activities associated with this chapter. Therefore, no homework will be assigned.

Mastery Criteria

Typically, mastery criteria evaluations are conducted within the individual supervision meeting with a client. However, graphing and visual analysis rarely take place with a client, so the individual supervision meeting with a client will not involve these skills. Therefore, the evaluation will take place prior to that meeting.

In order to progress from this lesson, your supervisee must (a) complete the visual analysis practice for ABAB designs at www.singlecase.org with at least 80% of ratings as an exact match (green) or within +/− 1 (yellow) and (b) complete the visual analysis practice for alternating treatment (i.e., multielement) designs at www.singlecase.org with at least 80% of ratings an exact match (green) or within +/− 1 (yellow). If either of these is not met, additional supervision meetings without a client with for additional instruction and practice should be scheduled.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Supervision Observation: Procedural Fidelity Checklist
30:00–45:00	Review Observation and Provide Feedback

- *Supervision Observation: Procedural Fidelity Checklist* (see Chap. 3), one copy
- Clipboard
- Pen/Pencil

Observation

Use the *Supervision Observation: Procedural Fidelity Checklist* to conduct an observation of your supervisee providing services to a client. We recommend observing for at least 30 minutes. Feel free to observe as long as you feel necessary to be able to provide helpful feedback to your supervisee.

Review Observation and Provide Feedback

You should review and provide feedback at a time when you and your supervisee can allocate all of their attention to the conversation. Most likely, this will take place after your observation, with no clients present. We recommend scheduling the feedback discussion as soon as possible. When providing feedback, aim to provide more specific praise than corrections. Model behavior you are asking your supervisee to change. Give your supervisee ample time to role-play how to appropriately implement any changes you suggest. Provide sufficient time for your supervisee to ask questions. We are aware that the length of this meeting is dependent upon how much feedback needs to be delivered, so it may be shorter or longer than the recommended 15 minutes.

Future Growth

- ☐ Evaluate your supervisee's ability to create additional graphs (e.g., bar graphs, cumulative records, standard celeration chart)
- ☐ Review multiple baseline designs with your supervisees. Have them meet the aforementioned criteria for evaluating multiple baseline designs at www.singlecase.org.

Appendix A: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizonal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix B: Sample Graphs

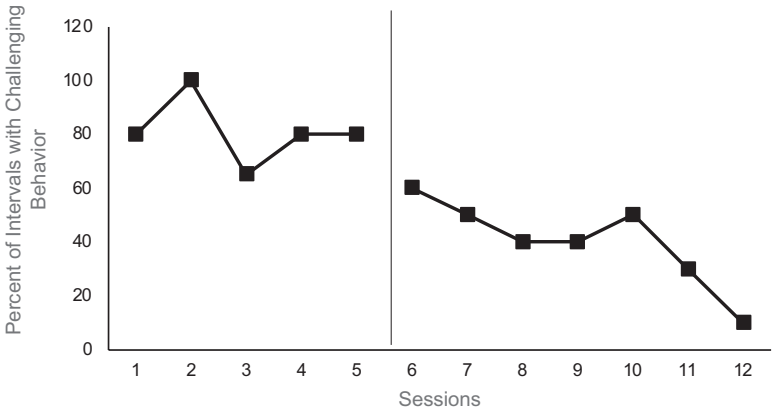


Fig. B.1 Percent of 10-second intervals in which Simon engaged in aggression across baseline and intervention conditions

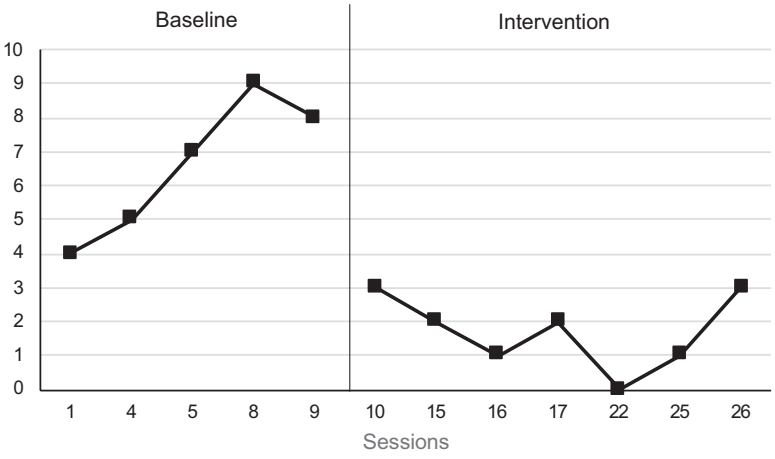


Fig. B.2 Frequency of mands for assistance across baseline and intervention conditions

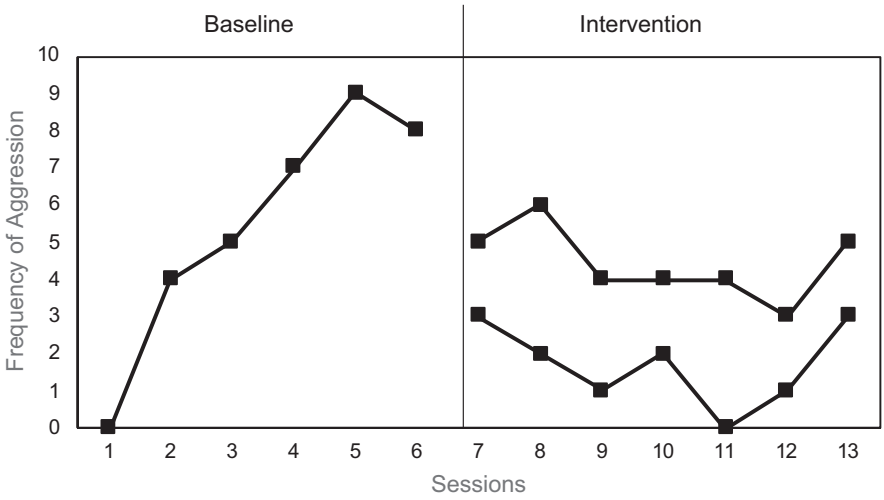


Fig. B.3 Frequency of disruptive behavior during baseline, noncontent reinforcement (NCR), and differential reinforcement of alternative behavior (DRA)

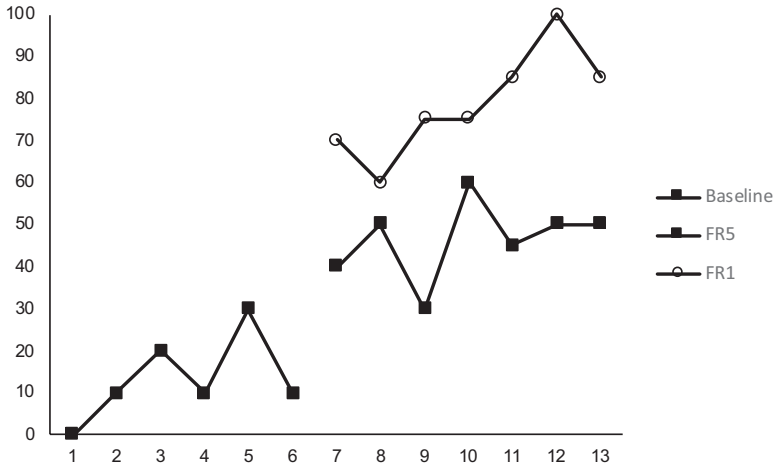


Fig. B.4 Percent of multiplication facts answered correctly across baseline, and FR5 schedule of reinforcement, and an FR 1 schedule of reinforcement

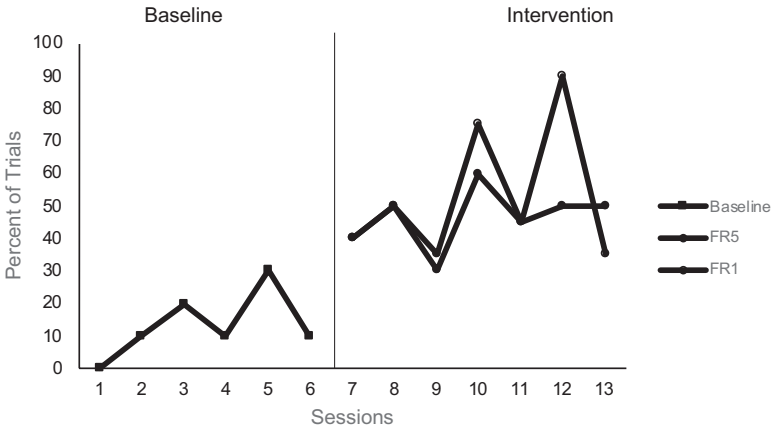


Fig. B.5 Percent of multiplication facts answered correctly across baseline, and FR5 schedule of reinforcement, and an FR 1 schedule of reinforcement

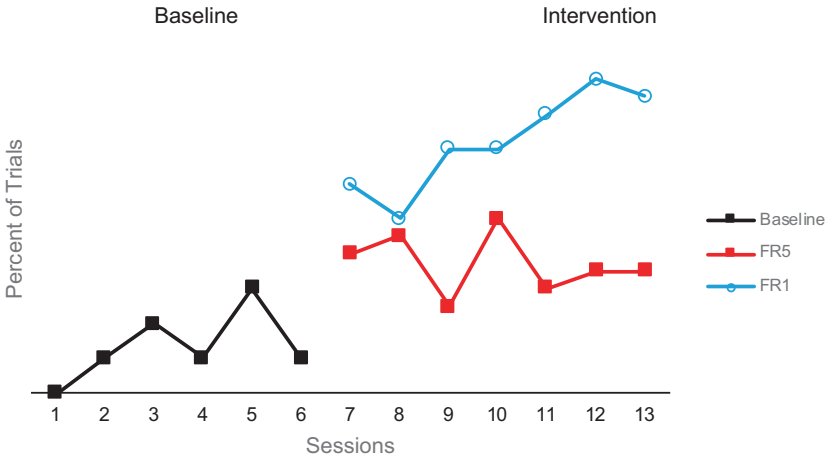


Fig. B.6 Percent of multiplication facts answered correctly across baseline, and FR5 schedule of reinforcement, and an FR 1 schedule of reinforcement

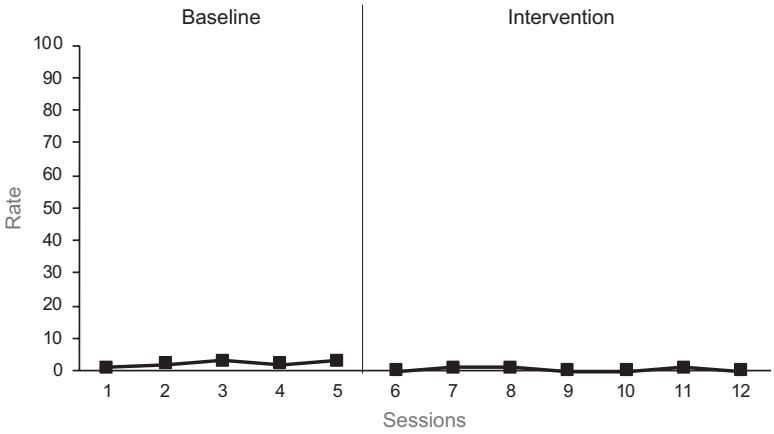


Fig. B.7 Rate of behavior

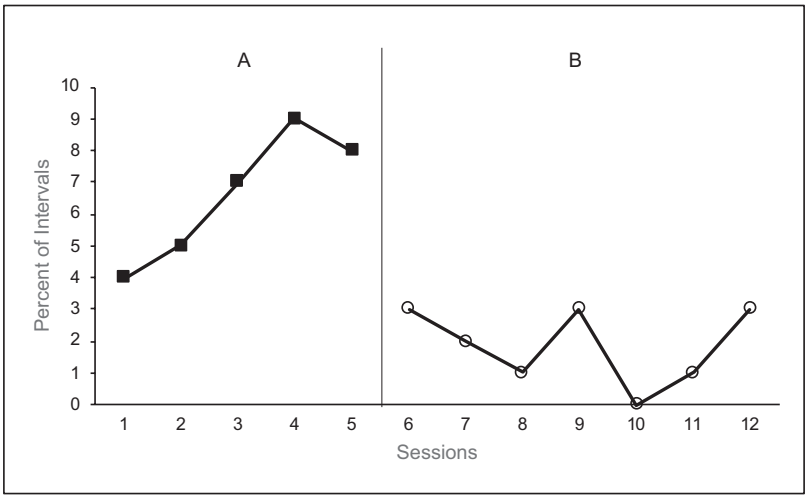


Fig. B.8 Percent of intervals under A and B conditions

Appendix C: Sample Graphs Answer Sheet

Figure B.1:

- Vertical axis range (should be 0–100%)
- Missing condition labels

Figure B.2:

- Horizontal axis is not in equal intervals
- Missing the vertical axis label
- Gridlines are visible

Figure B.3:

- Border lines need to be removed
- Data markers need to be differentiated so that one can determine which data path represents what variable in the second phase
- The key is missing

Figure B.4:

- Horizontal axis labels are missing
- Vertical axis labels are missing
- The condition change line is missing
- The condition labels are missing

Figure B.5:

- Data markers need to be revised so that one can distinguish between the two data paths (suggested to increase size of marker and select markers more easily differentiated)
- Data path needs to be revised so that one can distinguish between the two data paths (suggested to decrease the thickness of the line so that marker shapes are more distinguishable)

Figure B.6:

- Graph should only use blank ink
- The vertical axis is missing
- The condition change line is missing

Figure B.7:

- The vertical axis range is too large. It should be scaled 1–3
- The figure caption is unclear
- The vertical axis label is unclear

Figure B.8:

- Condition labels are unclear
- Data makers need to be revised because it is unclear if this is the same behavior graphed in the first and second conditions
- The vertical axis range is likely inaccurate. If graphing the percent of intervals, the values would likely range closer to 0–100%
- The figure caption is unclear

Appendix D: Graphing Practice Data Set

Data Set One: Percent of intervals

	1	2	3	4	5	5	6	8	9
Baseline	100	100	80	100					
Intervention					30	25	50	30	10

Data Set Two: Percent of trials

	1	2	3	4	5	5	6	8	9
Baseline	10	10	5						
Intervention				50	50	60	70	60	80

Data Set Three: Rate

	1	2	3	4	5	5	6	8	9
Baseline	1.2	1	1.4						
Intervention				0.5	0.2	0.3	0.4	0.2	0.1

Data Set Four: Duration (in seconds)

	1	2	3	4	5	5	6	8	9
Baseline	30	45	45						
Intervention				120	200	240	240	120	300

Data Set Five: Frequency

	1	2	3	4	5	5	6	8	9
Baseline	0	1	1						
Intervention				3	3	6	4	6	4

Data Set Six: Percent of trials

	1	2	3	4	5	5	6	8	9
Baseline	10	0	10						
Intervention				30	30	50	50	40	50

Data Set Seven: Rate

	1	2	3	4	5	5	6	8	9
Baseline	1	1	1.3						
Intervention 1				1	1.3	1	1.5	1	1
Intervention 2				0.2	0.3	0	0	0.2	0.3

Data Set Eight: Duration (in minutes)

	1	2	3	4	5	5	6	8	9
Baseline	2	4	2	4					
Intervention 1					5	4	6	4	6
Intervention 2					12	13	12	14	15

Data Set Nine: Percent of intervals

	1	2	3	4	5	5	6	8	9
Baseline	100	100	100						
Intervention 1				80	90	70	80	90	80
Intervention 2				30	40	30	50	20	20

Data Set Ten: Frequency

	1	2	3	4	5	5	6	8	9
Baseline	7	8	12						
Intervention				2	5	0	5	3	2

Appendix E: Graphs for Visual Analysis

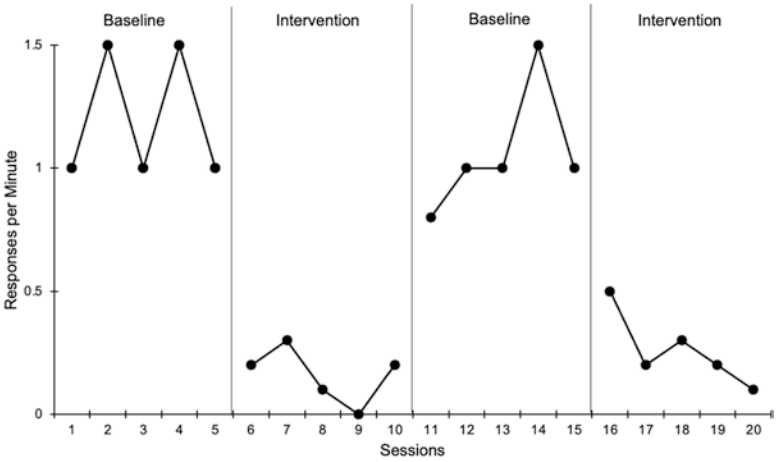


Fig. E.1 Rate of disruptive behavior across baseline and intervention conditions

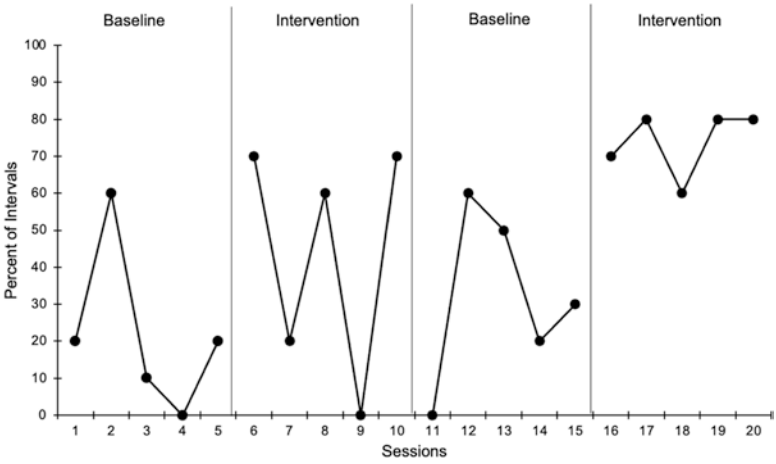


Fig. E.2 Percent of intervals with target two-word mands across baseline and intervention conditions

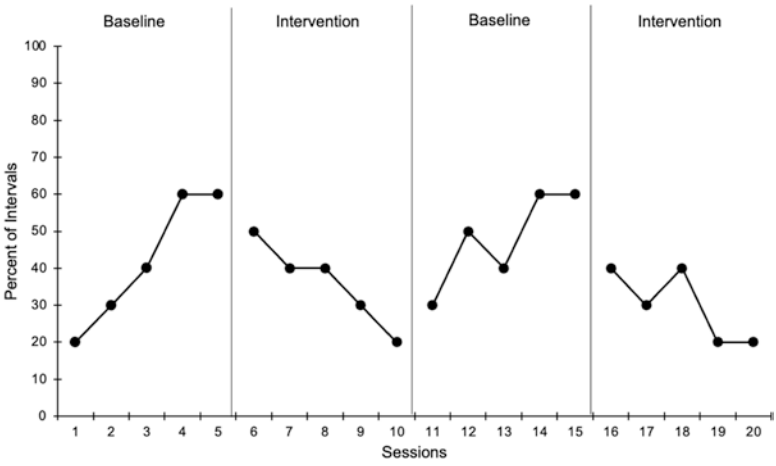


Fig. E.3 Percent of intervals with property destruction across baseline and intervention conditions

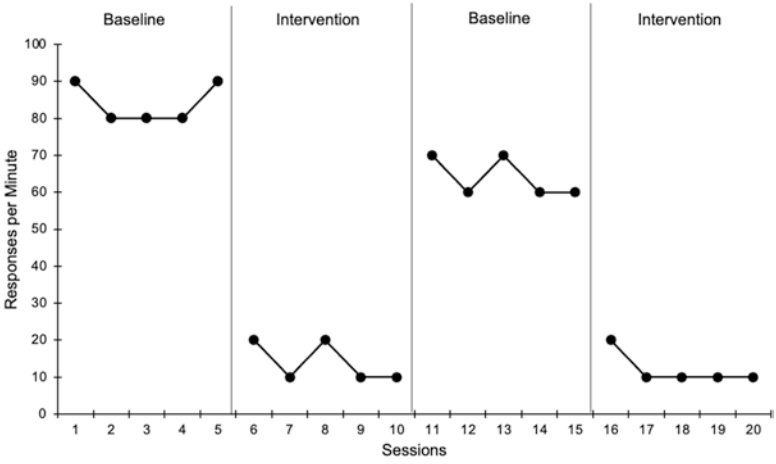


Fig. E.4 Percent of intervals with crying across baseline and intervention conditions

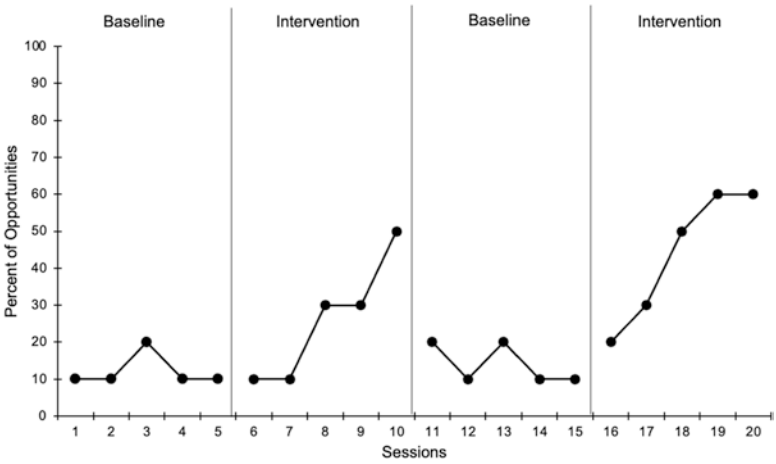


Fig. E.5 Percent of opportunities in which the client correctly responded to a greeting across baseline and intervention conditions

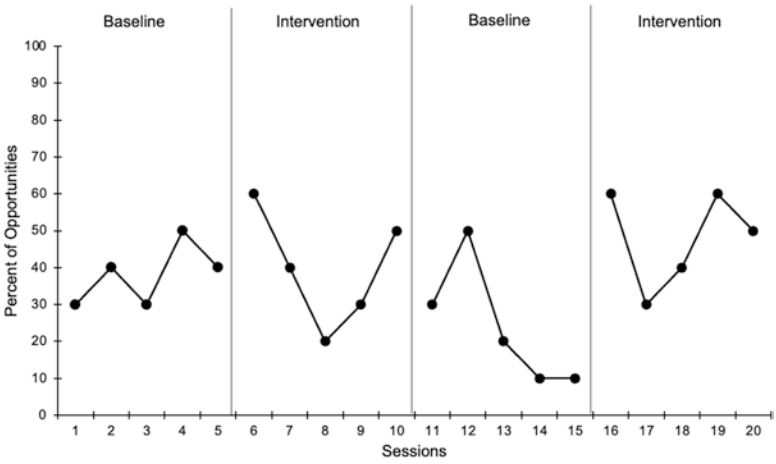


Fig. E.6 Percent of opportunities in which the client responded to his name by orienting to the speaker across baseline and intervention conditions

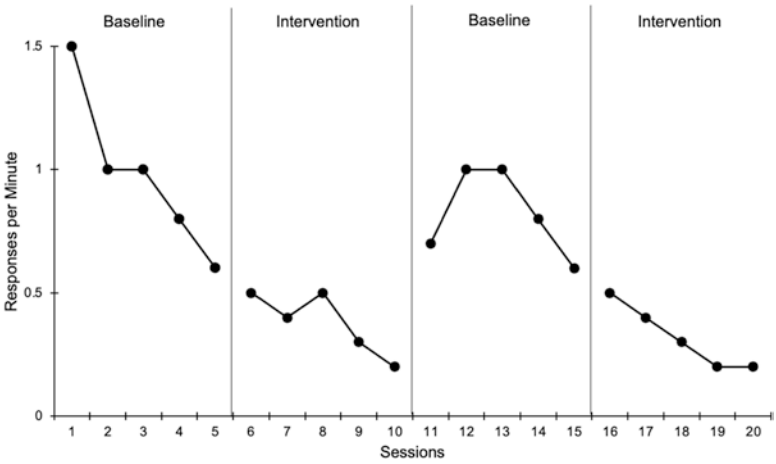


Fig. E.7 Percent of opportunities in which the client engaged in self-injury across baseline and intervention conditions

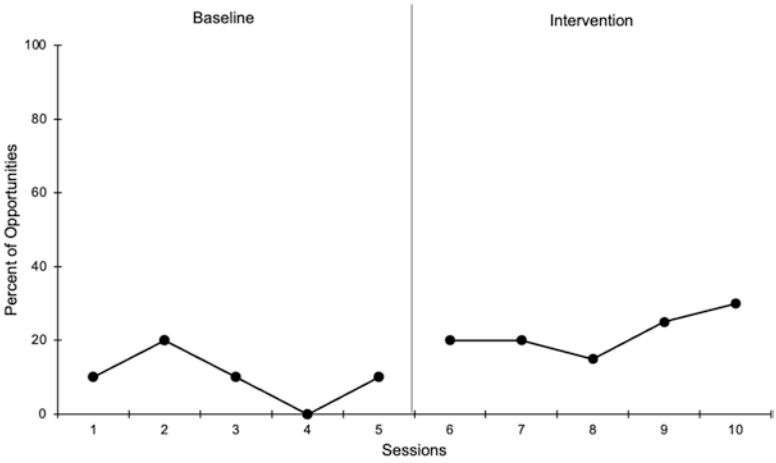


Fig. E.8 Percent of opportunities in which the client correctly reported his address across baseline and intervention

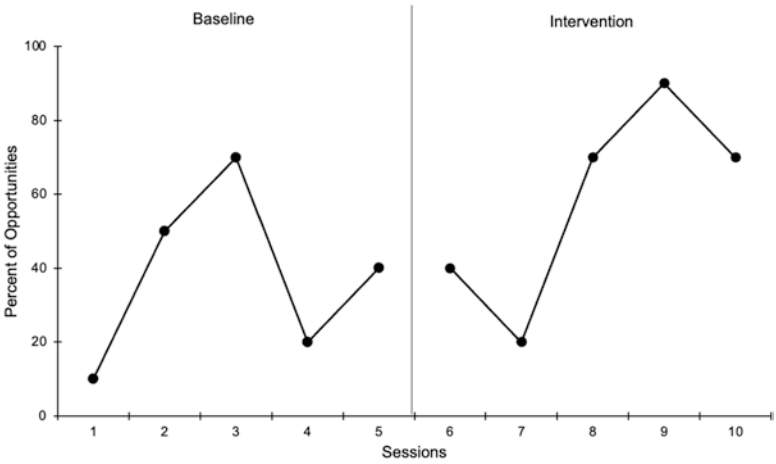


Fig. E.9 Percent of opportunities in which the client correctly reported his address across baseline and intervention

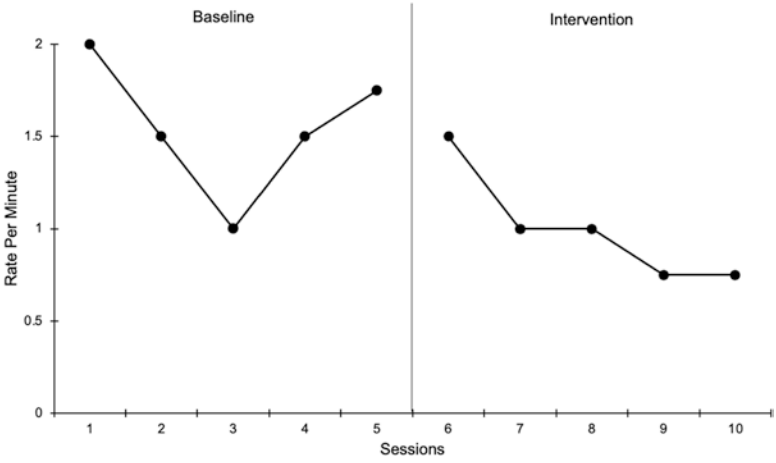


Fig. E.10 Percent of opportunities in which the client correctly reported his address across baseline and intervention

References

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). https://doi.org/10.1037/0000165-000

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*(1), 91.

Beavers, G. A., Iwata, B. A., & Lerman, D. C. (2013). Thirty years of research on the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 46*(1), 1–21.

Chok, J. T. (2019). Creating functional analysis graphs using Microsoft Excel® 2016 for PCs. *Behavior Analysis in Practice, 12*(1), 265–292.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis*. Pearson UK.

Deochand, N. (2017). Automating phase change lines and their labels using Microsoft Excel (R). *Behavior Analysis in Practice, 10*(3), 279–284.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71*(2), 165–179.

Johnston, J., & Pennypacker, H. (1980). *Strategies and tactics of human behavioral research*. Erlbaum.

Kazdin, A. E. (1982). Single-case experimental designs in clinical research and practice. *New Directions for Methodology of Social & Behavioral Science, 13*, 33–47.

Kazdin, A. E. (2019). Single-case experimental designs. Evaluating interventions in research and clinical practice. *Behaviour Research and Therapy, 117*, 3–17.

Kennedy, C. H. (2005). *Single-case designs for educational research* (Vol. 1). Pearson A & B.

Risley, T. (2005). Montrose M. Wolf (1935–2004). *Journal of Applied Behavior Analysis, 38*(2), 279–287. https://doi.org/10.1901/jaba.2005.165-04

Roane, H. S., Ringdahl, J. E., Kelley, M. E., & Glover, A. C. (2011). Single-case experimental designs. In W. W. Fisher, C. C. Piazza, & H. S. Roane (Eds.), *Handbook of applied behavior analysis* (pp. 132–147). The Guilford Press.

Watts, Z. B., & Stenhoff, D. M. (2021). Creating multiple-baseline graphs with phase change lines in Microsoft Excel for Windows and macOS. *Behavior Analysis in Practice, 14*(4), 996–1009.

What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. (2017). Appendix A: Pilot single-case design standards. In What works clearinghouse, Institute of Education Sciences, U.S. Department of Education (Eds.), *What works clearinghouse: Standards handbook* (Version 4.0, pp. A1–A17).

What Works Clearinghouse, Institute of Education Sciences, U.S. Department of Education. (2020). *What works clearinghouse: Standards handbook* (Version 4.1).

Chapter 7
Descriptive Assessment of Challenging Behavior

Topics Covered Within This Chapter

Topics
Functional Behavior Assessment
Descriptive Assessments
Hypothesis Statements

Functional Behavior Assessment

A functional behavior assessment (FBA) is a process to identify the function of challenging behavior. As a result, your supervisees will undoubtedly conduct countless FBAs in their careers. Further, many supervisees are likely to have participated in an FBA to some degree prior to addressing this topic in their field experience. Learning to conduct FBAs is a critical skill for clinicians because conducting FBAs enable them to develop function-based interventions to reduce challenging behavior. The three steps to conducting an FBA are as follows:

1. Collect information on the challenging behavior using descriptive assessments.
2. Develop a hypothesis regarding the function of challenging behavior.
3. Experimentally evaluate the hypothesis with a functional analysis.

Although all FBAs will follow these three general steps, the specific assessments used in the initial phase of the process are not prescribed. On the other hand, an FBA should always conclude with a functional analysis. As we will discuss in this chapter, nonexperimental indirect and direct assessments can provide your supervisees with helpful information, but cannot reliably identify a function of challenging

Supplementary Information: The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_7].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_7

behavior (Fee et al., 2016; St. Peter et al., 2005; Thompson & Iwata, 2007). Therefore, a functional analysis is a necessary component to the FBA to identify a function and develop appropriate, effective function-based interventions. With this chapter, your supervisees will develop a solid understanding of the process of an FBA and explore indirect and direct assessments of challenging behavior. Due to the importance of functional analyses to the process of an FBA, we have reserved two chapters specifically for functional analyses (see Chaps. 9 and 10).

Descriptive Assessments

The first step in conducting an FBA is to gather information about the challenging behavior, which can be accomplished via descriptive assessments. At a minimum, the first phase of an FBA should provide supervisees with information about (a) the topography of challenging behavior, (b) antecedents correlated with the occurrence of challenging behavior, (c) consequences correlated with the occurrence of challenging behavior, and (d) insight into safety protocols that should be put into place during the functional analysis. In this initial phase, your supervisees should also aim to gain a better understanding of the client, particularly if this is the first interaction the supervisee will have with the client. For example, supervisees should obtain additional information about the client's communication skills, preferences, strengths, and abilities.

Indirect Assessments

Indirect assessments are those that do not involve the direct observation of the behavior. Instead, these assessments involve the use of an informant who is familiar with the client and the targeted challenging behavior. Your supervisees may use a myriad of indirect assessments, such as interviews and rating scales.

Behavioral Interviews We recommend supervisees begin the FBA process with a behavioral interview. This open-ended format allows clinicians to gather a great deal of potentially relevant information from respondents (Reese et al., 2003). Behavioral interviews can be conducted with any person familiar with the client and the targeted challenging behavior; therefore, parents, caregivers, teachers, and service providers often make excellent interview respondents. In some cases, it may also be helpful to interview the client for whom the FBA is being conducted. For example, older clients with sufficient communication skills and an expressed desire to change their own behavior may be excellent candidates to serve as informants in a behavioral interview.

A number of interviews are available for your supervisees to use. See Hanley (2012) and O'Neill et al. (2014) for examples. While we have no reservations with clinicians developing their own behavioral interviews, we suggest that your supervisees begin their interview experience with existing interviews. As new clinicians, your supervisees will not have the experience necessary to develop a thorough set of questions that will gather all relevant information. Perhaps after many years of experience conducting existing behavioral interviews, a clinician will have the experience and expertise to develop a complete set of interview questions, but your supervisees are far from this phase of their careers. However, you may wish to encourage your supervisees to individualize questions within existing interviews to best suit the needs of the client or the information that is needed, on a case-by-case basis.

A successful interview requires more than a sufficient list of questions; it also involves a specific skillset among the interviewer. First, supervisees must learn to emit behaviors that put respondents at ease during an interview, thus increasing the likelihood of respondents providing helpful information. This may be particularly important during interviews with caregivers who may experience feelings of stress and frustration associated with their child's challenging behavior. Warm and inviting behavior emitted from the interviewer can go a long way to improving the quality of an interview. Additionally, your supervisees must learn to ask questions and/or follow-up with clarifying questions in a way that ensures respondents report factual information rather than inferences. For example, if a parent reports that their son elopes from the home when he is frustrated with his little brother, a skilled interviewer will follow-up with questions asking parents to further describe this situation in a way that specifically describes what the parents observe rather than what they infer about their son's mental state of frustration.

Rating Scales Rating scales typically consist of a number of questions or statements about a behavior to which a respondent answers with yes/no responses or provides scores on a Likert-type scale. A number of rating scales are available for use: Motivation Assessment Scale (MAS; Durand & Crimmins, 1985), Problem Behavior Questionnaire (PBQ; Lewis et al., 1994), Functional Analysis Screening Tool (FAST: Iwata et al., 2013), and Questions about Behavioral Function (QABF; Paclawskyj et al., 2000), for example. Rating scales are appealing because they are easy to administer, less time consuming, and allow for easy hypothesis development through quantitative scoring. Unfortunately, however, they are also unreliable (Iwata et al., 2013; Newton & Sturmey, 1991; Nicholson et al., 2006; St. Peter et al., 2005; Shogren & Rojahn 2003; Thompson & Iwata, 2007). While there are situations in which a rating scale can be helpful, we recommend you instead allocate supervision time to developing your supervisees' skills conducting behavioral interviews and direct assessments, as these will likely prove to be more helpful tools in their toolbox.

Direct Assessments

Direct assessments involve directly observing the target behavior. However, unlike an experimental functional analysis, during direct assessments, the behavior is observed in natural settings, without systematic manipulation of environmental events. While direct assessments can be very helpful in developing a hypothesis of the function of a challenging behavior, they cannot replace a functional analysis in the FBA process. Nonetheless, your supervisees will benefit from developing skills in administering two direct assessments: antecedent behavior consequence (ABC) recording and scatterplot recording.

ABC Recording There are two approaches to ABC recordings: ABC continuous recording and ABC narrative recording. An ABC continuous recording requires the observer to first identify the challenging behavior topography, as well as antecedents and consequences likely to be observed (Cooper et al., 2020). Conducting a behavioral interview and/or ABC narrative recording are helpful in identifying these variables. Once identified, a data sheet is developed in which the observer records every instance of each event (e.g., antecedent, behavior, and/or consequence) using an interval recording system or frequency measure. See Appendix A for an example. Specifically, the observer records an antecedent or consequence regardless if the behavior occurred in conjunction with the event. See Lalli et al. (1993) for an example of ABC continuous recording.

ABC continuous recording allows the behavior clinician to calculate conditional probabilities and conduct contingency space analysis. See Martens et al. (2008) for a thorough discussion of these analyses. The results from an ABC continuous recording can inform the functional analysis, such as indicate which conditions to include in the analysis, specific establishing operations that may evoke the target behavior, and topographies of reinforcement to incorporate into the analysis.

An ABC narrative recording also involves observation in the natural environment; however, data are collected only when the target challenging behavior occurs (Cooper et al., 2020). Therefore, as opposed to selecting among previously identified antecedent and consequence events when the challenging behavior occurs, the observer records the events that immediately preceded and followed the behavior in a narrative format. Narrative recording is an easier approach to implement; however, it has limitations. Because an observer only records an environmental event if it occurred in conjunction with the target challenging behavior, the ABC narrative recording approach does not provide data on how often a consequence occurred in the absence of the challenging behavior. For example, an ABC narrative recording would capture that a teacher attended to 7 of 13 occurrences of cursing within an hour, but would not capture that the teacher delivered attention to that same student an additional 15 times that was not associated with occurrences of cursing. Therefore, the ABC narrative recording provides a less complete picture when compared to the ABC continuous recording approach. Nonetheless, an ABC narrative

recording approach may also prove useful in many ways. First, the results could be used to inform an ABC continuous recording data sheet. Moreover, this approach may be more feasible for a parent, teacher, caregiver, or supervisor to conduct. In such cases, some data may be better than no data, proving the utility of the ABC narrative recording method.

Scatterplot Recording Scatterplots allow clinicians to identify patterns between the target challenging behavior and time of day and/or activities. For each interval, an observer reports how frequently the behavior occurred (Cooper et al., 2020; Touchette et al., 1985). Typically, rather than an exact frequency, the observer notes a general description of the frequency, such as reporting if the behavior occurred frequently, occasionally, or not at all during that interval. A scatterplot recording data sheet can be found in Appendix B.

To conduct a scatterplot recording, your supervisee will divide a day into intervals of time. Therefore, scatterplot recording may be useful for identifying times of day or activities correlated with challenging behavior, which could assist your supervisees in pinpointing when to observe the challenging behavior for further analysis. However, the correlational patterns identified via scatterplot recording should not be overestimated; subsequent functional analysis is necessary. See Touchette et al. (1985) as an example of use of a scatterplot.

Hypothesis Statements

After sufficient information has been gathered, a hypothesis regarding the function of challenging behavior can be developed. These should be organized in the ABC format and include a hypothesis summary statement. See the example below in Table 7.1.

Table 7.1 Example hypothesis statement

Hypothesis summary statement: escape from one-to-one instructional activities.		
Antecedent	Behavior	Consequence
When Cameron is instructed to complete a task during one-to-one instructional activities…	He throws or destroys task materials…	Providing a temporary escape from work tasks as the instructor gathers new materials.

Hypothesis statements, such as the example above, should then be experimentally evaluated with a functional analysis. In some cases, evaluation of a single hypothesis is warranted. In other cases, clinicians develop multiple hypotheses to evaluate via functional analysis. In fact, most functional analyses evaluate multiple potential functions (Beavers et al., 2013). Therefore, it is important that supervisees

do not mistakenly believe FBAs that lead to a single hypothesis are superior to those that lead to multiple hypotheses. If the first two steps of the FBA inform a functional analysis in any way, even if this is simply clarifying the operational definition of the challenging behavior, the FBA has successfully improved the validity of the functional analysis.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Review Major Concepts
15:00–30:00	Interpret a Behavioral Interview
30:00–40:00	Interpret a Scatterplot
40:00–55:00	Interpret ABC Continuous Recording
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *ABC Continuous Recording Data Sheet*, 1 copy for each supervisee
- Appendix B: *Scatterplot Recording Data Sheet*, 1 copy for each supervisee
- Appendix C: *FAI Example*, 1 copy for each supervisee
- Appendix D: *Scatterplot Example*, 1 copy for each supervisee
- Appendix E: *ABC Continuous Recording Example*, 1 copy for each supervisee

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Hanley (2012)
- Lalli et al. (1993)
- Touchette et al. (1985)

Review Major Concepts

The first 15 minutes of your group supervision meeting will be dedicated to reviewing concepts regarding direct assessment. During this time, you will briefly discuss the steps to completing FBAs, indirect assessments, direct assessments, and hypothesis statements.

Introduction to an FBA

Begin by asking your supervisees what constitutes an FBA. During this discussion, be sure your supervisees recognize an FBA is a multistep process for identifying the function of challenging behavior. Often, it is our experience that supervisees mistakenly believe the terms *function-based assessment* and *functional analysis* are synonymous. Therefore, it is important to recognize and correct supervisees that may share this erroneous assumption when discussing FBAs. By the end of the discussion, if your supervisees have not specified the three steps to conducting an FBA, conclude your introduction by identifying these three steps:

1. Collect information on the challenging behavior using descriptive assessments.
2. Develop a hypothesis regarding the function of the challenging behavior.
3. Experimentally evaluate the hypothesis with a functional analysis.

Indirect Assessments

First, ask your supervisees to define the term *indirect assessment*. It is important to ensure that they recognize the lack of direct observation of the client is the distinguishing characteristic of indirect assessments. Next, share with them that indirect assessments are typically categorized into behavioral interviews and rating scales.

Ask your supervisees about their experiences in conducting behavioral interviews. Encourage your supervisees to share with the group both successful and unsuccessful experiences as both can provide guidance to supervisees who have less experience. Next, ask them to identify the advantages and disadvantage of conducting a behavioral interview. At a minimum, your supervisees should identify the following advantages: (a) collect a great deal of data, (b) ability to develop or confirm an operational definition of the challenging behavior with stakeholders, (c) provide the opportunity to ask clarifying or follow-up questions, (d) responses could inform the development of a functional analysis, and (e) build rapport with stakeholders. Similarly, your supervisees should identify the following limitations: (a) time consuming, (b) cannot accurately identify function of behavior, and (c) informants may fail to report observable and objective information. End the discussion by asking supervisees to identify specific interviewer behaviors that would likely improve the success of a behavioral interview.

Because we do not recommend your supervisees use rating scales for aforementioned reasons, you do not need to dedicate a significant amount of time on this topic. Limit the discussion to describing rating scales and providing your supervisees with some examples. Ask your supervisees to share experiences with utilizing rating scales. Specifically, ask them to identify the advantages and disadvantages they discovered in their own practice. End the discussion by pointing out the limitations of rating scales.

Direct Assessments

To transition into a discussion of direct assessments, ask your supervisees to define this term. In this definition, be sure that they identify both parts: (a) the assessment involves a direct observation of the client, and (b) the assessment occurs within natural environments without experimentally controlling environmental events. Explain that ABC recordings and scatterplots are the most prevalent direct assessments used by clinicians.

It is our experience that supervisees are much more familiar with ABC narrative recording rather than ABC continuous recording. Therefore, introduce the ABC continuous recording procedure by explaining the defining features: (a) an individualized data sheet is created for observations with previously identified antecedents, behaviors, and consequences; (b) antecedents, behaviors, and consequences are recorded using an interval or frequency recording system; (c) an observer records antecedents and consequences regardless if they occurred in close proximity to the target challenging behavior; and (d) this observation allows for the calculation of conditional probability. Provide the example of an ABC continuous recording data sheet in Appendix A and quickly summarize how to use this form.

Next, summarize ABC narrative recording. You will also want to explain both its defining features, as well as what distinguishes this observation from the ABC continuous recording: (a) data are recorded in narrative form, and (b) antecedents and consequences are only recorded if they occur immediately preceding or following the target challenging behavior, respectively. Many of your supervisees are likely to have experience conducting ABC narrative recordings. If this is the case, ask them to share their experiences. End the discussion of the two ABC recording approaches by identifying the relative strengths and weaknesses of each approach.

Finally, review scatterplots with your supervisees. Provide them with the example scatterplot data sheet (Appendix B) and explain how clinicians record data with this approach. After providing a thorough explanation of scatterplots, end the discussion by asking your supervisees to identify the advantages and disadvantages of scatterplots.

Hypothesis Statements

You will end this portion of your group supervision meeting by reviewing the formatting and purpose of hypothesis statements. First, discuss the format by providing supervisees with example hypothesis format (available on the provided PowerPoint slides). After reviewing the concept, ask supervisees to discuss how a hypothesis statement could be helpful.

Interpret a Behavioral Interview

During the second 15-minute segment of your group supervision meeting, distribute a *FAI Example* (Appendix C). This is an example of a completed interview slightly adapted from the Functional Assessment Interview (FAI; O'Neil et al., 2014). Ask your supervisees to read the interview carefully. Inform them that after reading the interview, they should be able to do the following:

- Operationally define the target challenging behavior(s)
- Identify antecedents correlated with the target challenging behavior(s)
- Identify consequences correlated with the target challenging behavior(s)
- Identify strategies to mitigate risk of injury during the functional analysis
- Identify how the results of the interview would inform functional analysis procedures
- Develop a hypothesis statement

Allot 10 minutes to reviewing the example interview. Spend the remaining 5 minutes discussing the bulleted items above. Additionally, ask your supervisees to identify any additional information they would want to seek from the informant. Discuss what the supervisees would recommend as the next steps in the process.

Interpret a Scatterplot

Distribute the *Scatterplot Recording Example* (Appendix D). Allot 5 minutes for your supervisees to review the form, encouraging them to think about the following:

- What patterns are found in these data?
- How would these data inform the next steps of the FBA process?
- How do these data inform my hypothesis statement, if at all?

After reviewing the example, use the last 8 minutes to discuss their responses to each of the three questions above.

Interpret an ABC Continuous Recording

The last activity is to interpret an ABC continuous recording. Distribute *ABC Continuous Recording Example* (Appendix E) to your supervisees. Again, allow your supervisees about 5 minutes to review the form, encouraging them to think about the following:

- What patterns are found in these data?
- How would these data inform the next steps of the FBA process?
- How do these data inform my hypothesis statement, if at all?

As with the previous practice activities, spend the last 10 minutes reviewing your supervisee's answers to the three questions above.

Knowledge Check

1. What is the difference between a functional behavior assessment and a functional analysis?
2. Why might a behavior analyst want to conduct a behavioral interview?
3. Explain the major differences between an ABC continuous recording and an ABC narrative recording approach.
4. Why might a behavior analyst want to conduct a scatterplot recording?
5. Should a hypothesis statement be verified? Why? And if so, how?

Homework for Individual Supervision without a Client

1. Select a behavioral interview.
   - We recommend one in which your supervisee's field experience placement uses consistently or one of those found in Hanley (2012) or O'Neill et al. (2014). However, any previously developed behavioral interview would be sufficient. We advise you not to allow your supervisee to create their own interview with their limited experience.
2. Conduct the behavioral interview with a caregiver or service provider who knows the client well.
   - If you or your supervisee are concerned that more practices is needed to feel comfortable with the supervisee interviewing a client's caregiver, interviewing a BCBA that has sufficient knowledge of the client's challenging behavior is an excellent way to practice interview skills with reduced anxiety. BCBAs who have been in the shoes of the supervisee should demonstrate empathy for a supervisee sharpening their skills.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 40-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Interpret Behavioral Interview
15:00–20:00	Develop Hypothesis Statement
20:00–40:00	Plan ABC Continuous Recording

Materials Needed

- Completed behavioral interview for client, 2 copies (one for supervisor and one for supervisee)
  - Instruct your supervisee to provide you with the completed interview at least 48 hours prior to your individual supervision meeting to give you time to review the results before the individual supervision meeting.
- Appendix A: *ABC Continuous Recording Example*, electronic access for supervisor and supervisee
- Appendix F: *Behavioral Interview Worksheet*, 1 copy
- Appendix G: *Hypothesis Statement Worksheet*, 1 copy
- Laptop or tablet

Interpret Behavioral Interview

The purpose of this individual supervision meeting is to facilitate your supervisee in interpreting the behavioral interview. Prior to the meeting, review the interview results your supervisee provided you. As you review the results, make notes of any evidence of a successful interview. For example, your supervisee recorded an observable and objective description of the topography of challenging behavior or answers to all questions were recorded. Similarly, make notes of suggestions for future interviews. For example, perhaps the recorded description of antecedents associated with the target challenging was vague; you could recommend they ask follow-up questions in future interviews.

At the start of the meeting, ask your supervisee to identify three things they did well during the interview. Often, supervisees will answer this question with a description of another person's behavior (e.g., "Client's parents were so good at describing the target behavior."). Ensure that your supervisee focuses compliments on their own behavior (e.g., "I practiced the interview by reading all of the questions aloud the night before I interviewed my client's mom."). Next, ask them to identify

one thing they would do differently to improve upcoming interviews. Restrict them to identifying only one improvement even if more corrections are warranted so that they experience more self-praise than self-correction during this feedback session. Our experience is most supervisees are more likely to identify their own errors rather than their own successes and thus, a good supervisor can help reshape this pattern.

Ask your supervisee to summarize the responses to the group of questions in each section of the selected interview. Rather than having your supervisee review responses to each individual question, summarizing by section allows for efficiency and provides them with an opportunity to practice summarizing and interpreting, rather than regurgitating responses. With each summary, provide praise for accurate interpretations (based on the available responses) and correct interpretations that fail to accurately reflect the recorded responses. After summarizing each section, ask your supervisee to answer the questions below. Feel free to answer the questions as well, as your supervisee can benefit from your modeling of how to use behavioral interview results. Keep in mind that this is not an assessment, rather a collaborative activity with you and your supervisee. See *Behavioral Interview Summary Worksheet* (Appendix F) for a worksheet that can be used to document the responses to these questions.

1. What is the target challenging behavior?
2. What is the operational definition of the target challenging behavior?
3. What antecedents are associated with this behavior?
4. What consequences are associated with this behavior?
5. What strategies should you implement to ensure safety of the client and staff during a functional analysis or intervention sessions with this client?
6. What recommendations, if any, do you have in regard to functional analysis procedures?
7. Is there any other information that is relevant to a functional analysis of this target challenging behavior? If yes, what will you do with this information?

Develop Hypothesis Statement

After summarizing the interview, your supervisee will be prepared to develop a hypothesis statement (or two, or three). Use the *Hypothesis Statement Worksheet* (Appendix G) to record as many hypotheses as your supervisee has developed in response to the interview results. As with the previous activity, this is to be done collaboratively. Feel free to provide your own hypotheses so that your supervisees can benefit from your modeling.

Plan ABC Continuous Recording

During the final activity of your individual supervision meeting, work with your supervisee to devise an ABC continuous recording document to be used in an upcoming observation. You may choose to formally create the document using *ABC Continuous Recording Data Sheet* (Appendix A) as a guide, or simply take notes in narrative form and have your supervisee organize this information into a formal ABC continuous recording form in their own time after the meeting. As you develop the items to place in the antecedent, behavior, and consequence columns, confirm that your supervisee has included antecedents and consequences associated with their hypothesis statement(s).

Homework for Individual Supervision with a Client

1. Finalize ABC continuous recording data sheet for a client.
2. Send the final ABC continuous recording data sheet to the supervisor at least 48 hours prior to implementing during the individual supervision meeting with a client.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–05:00	Review Homework
5:00–45:00	Conduct ABC Continuous Recording for Client
45:00–60:00	Calculate IOA on ABC Continuous Recording

Materials Needed

- Two copies of supervisee-developed ABC continuous recording data sheet (one for supervisor and one for supervisee)
- Clipboard
- Pen/Pencil

Homework Review

Prior to this meeting, your supervisee should provide you with the ABC continuous recording data sheet. During the first 5 minutes of your meeting, provide feedback you may have from your prior review of the data sheet. It may be best to conduct this 5-minute homework review when the client is not present so that you and your supervisee can allocate maximum attention to this task. In this case, schedule this portion of your supervision session on the same day as the upcoming observation when both you and your supervisee are free of distraction. It is not necessary for you to deliver feedback just prior to the observation.

Conduct ABC Continuous Recording

Ideally, you would conduct this observation with one of your supervisee's clients. You and your supervisee will independently and simultaneously collect data on a client's challenging behavior using the supervisee-developed ABC continuous recording data sheet. However, it is imperative that this observation and data recording be done when your supervisee has no other responsibilities with this client. In other words, the observation cannot be conducted while the supervisee is targeting other goals with the client. Preferably, you and your supervisee should observe the client in a setting when another service provider is implementing services. For example, an ideal observation would take place when the client is working with another clinician or observing the client in their classroom at school. If these opportunities are unavailable, there two additional approaches you can take to ensure a distraction-free observation: (a) collect data using a video recording of your supervisee interacting with their client, or (b) allow your supervisee to observe an individual who is not their client working with another clinician (e.g., another client at their field experience placement).

During the observation, you want to ensure that you and your supervisee are able to independently collect data. To do so, you need to be situated so you can both see the client, but cannot see one another's recording. We recommend a 40-minute observation, but feel free to shorten or lengthen this observation based on the needs of your supervisee and the client. Similarly, you may conduct these observations across more than one session. You want to observe for long enough that you record several antecedents, behaviors, and consequences so that you can effectively compare the reliability of data collection.

After the observation is complete, you and your supervisee will spend the final 15 minutes without a client, calculating your IOA. Instruct your supervisee to select a method for calculating IOA and observe their calculation process. Provide feedback, both praise and correction, for your supervisee's selection and use of the IOA procedure. Identify how the data recording sheet, operational definitions, observation process, and more contribute to the IOA score and thus, could be improved for future observations.

Mastery Criterion

In order to progress from this lesson, your supervisee must accurately collect ABC continuous recording data for 25 or more minutes using a supervisee-developed data sheet with at least 80% agreement.

Future Growth

- ☐ Evaluate your supervisee's ability to calculate conditional probability on ABC continuous recording.
- ☐ Provide feedback regarding a supervisee-developed scatterplot for a natural change agent (e.g., parent, teacher) to use to collect data on a target challenging behavior for their client. You may also wish to observe and provide feedback when you supervisee teaches the natural change agent how to use this form.

Appendix A: ABC Continuous Recording Example

Client's Name: _____ Observer: _____

Date: _____ Time Observed: _____

Antecedent	Behavior	Consequence
☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered

☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered

Appendix B: Scatterplot Recording Example

Client's Name: _____ Observer: _____

Week Observed: _____

Challenging Behavior(s): _____

Key

Behavior Did Not Occur	
Behavior Occurred A Little	/
Behavior Occurred A Lot	X

Activity	Time	Mon	Tues	Wed	Thurs	Fri
Wake-up Routine (wake up, get dressed, brush teeth, brush hair)	6:15 – 6:45 am					
Breakfast	6:45 – 7:15 am					
Transport to school	7:15 – 7:45 am					
School pick-up & transport to home	3:30 – 4:00 pm					
Free time	4:00 – 4:30 pm					
Homework	4:30 – 5:30 pm					
Free time	5:30 – 6:30 pm					
Dinner	6:30 – 7:00 pm					
Bedtime routine (bath, brush teeth, put on PJs)	7:00 – 7:30 pm					
Read books in bed	7:30 – 7:45 pm					

Appendix C: Functional Assessment Interview* Example

*Slightly adapted from FAI form found in:
O'Neill, R. E., Albin, R. W., Storey, K., Horner, R. H., & Sprague, J. R. (2014). *Functional assessment and program development* (3rd ed.). Cengage Learning.

Functional Assessment Interview (FAI)

Person of concern: *Owen* Age: *8 years* Sex: *Male*

Date of interview: *March 3* Interviewer: *Brent*

Respondents: *Owen's parents (Scott and Brandon)*

A. DESCRIBE THE BEHAVIORS

1. For each of the behaviors of concerned, define the topography (how it is performed), frequency (how often it occurs per day, week, or month), duration (how long it lasts when it occurs), and intensity (how damaging or destructive the behaviors are when they occur)

Behavior	Topography	Frequency	Duration	Intensity
a. Throwing	*Forcefully launches items in non-functional manner 2' or more*	*1 – 3 times per meal*	*1 min*	*Moderate (makes a mess, but does not usually destroy items or hurt people)*
b. Crying & Screaming	*Non-word vocalizations in above normal pitch and/or volume*	*1 – 3 times per meal*	*3 – 5 min*	*Moderate (interrupts meals, but does not hurt people or property)*

2. Which of the behaviors described above are likely to occur together in some way? Do they occur about the same time? In some kind of predictable sequence or "chain"? In response to the same type of situation?

He typically cries and screams first and then begins to throw. If he is allowed to terminate his meal after he cries or screams, he will not also throw items or food. However, if the instruction to finish his meal is maintained, he is likely to escalate to throwing.

B. DEFINE ECOLOGICAL EVENTS (SETTING EVENTS) THAT PREDICT OR SET UP THE PROBLEM BEHAVIORS.

1. What *medications* is this person taking (if any), and how do you believe these may affect their behavior?

   He takes Concerta twice a day to help improve attention and reduce hyperactivity. There has been no observed impact of Concerta on his crying, screaming, and throwing during meals. He also takes Claritin for seasonal allergies, but there is no observed impact of Claritin on his challenging behavior.

2. What *medical* or *physical* conditions (if any) does the person experience that may affect their behavior (e.g., asthma, allergies, rashes, sinus infections, seizures, problems related to menstruation)?

   He has a severe allergy to tree nuts. This was identified as a young toddler and has been managed since then. Although he did have a few significant reactions when he was very young, there is no reason to believe he remembers those. Today, he is a very picky eater. He only likes a few unhealthy foods such as chicken nuggets, goldfish crackers, tortilla chips. He does not like many other foods and refuses to try them. Medical evaluation has ruled there is no medical cause to this severe food restriction.

3. Describe the *sleep patterns* of the individual and the extent to which these patterns may affect their behavior.

   He is a good sleeper. He goes to sleep at 9:00 every night and sleeps through the night. He has been a good sleeper since he was a baby.

4. Describe the *eating routines and diet* of the person and the extent to which these may affect their behavior.

   He is a very picky eater. There are only three foods he will eat consistently (chicken nuggets, goldfish crackers, and tortilla chips). On occasion he will eat cheese cubes or French fries, but not consistently. He says he hates to eat and he usually hides when it is meal time. His problem behaviors occur most frequently during meals.

5. Briefly list below the person's typical daily schedule of activities. (Check the boxes by those activities the person enjoys and those activities most associated with problems).

Time	Activity	Enjoys	Problems
7:00 am	*Wakes up, gets dressed*		*X*
7:20 am	*Breakfast*		*X*
7:45 am	*Riding school bus to school*	*X*	
8:00 – 3:00	*At school (no problem behavior reported)*	*X*	
3:00	Riding school bus to home	*X*	
3:30	*Homework*	*X*	
4:00	*Free play*	*X*	
5:00	*Soccer practice (Tues & Thurs only)*	*X*	
6:30	*Dinner*		*X*
7:00	*Family TV time*	*X*	
8:15	*Bath & bedtime preparation*		*X*

b. To what extent are the activities on the daily schedule predictable for the person, with regard to what will be happening, when it will occur, with whom, and for how long?

His schedule is very predictable. The family loves routines.

c. To what extent does the person have the opportunity during the day to make choices about their activities and reinforcing events (e.g., food, clothing, social companions, leisure activities).

He is allowed to pick out the clothes he wears on the weekends (he wears a uniform to school). He gets to choose what to do during free play at 4:00. The family takes turns picking out the TV show to watch every night, so he gets a choice about every 4th day. All other choices are made by the parents (e.g., meals, bedtime)

6. How many other persons are typically around the individual at home, school, or work (including staff, classmates, and housemates)? Does this person typically seem bothered in situations that are more *crowded and noisy?*

He lives with his dads, younger brother, and dog. At school he has about 22 students in his classroom. He is very social and enjoys his friends. He does not appear to be bothered in crowded or noisy. He doesn't enjoy going out to eat, though. He often engages in problem behavior at restaurants.

7. What is the pattern of *staffing support* that the person receives in home, school, work, and other settings (e.g., 1:1, 2:1)? Do you believe that the *number* of staff, the *training* of staff, or their *social interactions with the person* affect the problem behaviors?

At home he gets 1:1 support (2 parents and 2 kids). At school, his teacher has 22 students, so it is a 1:22 ratio.

C. DEFINE SPECIFIC IMMEDIATE ANTECEDENT EVENTS THAT PREDICT WHEN BEHAVIORS ARE LIKELY AND NOT LIKELY TO OCCUR.

1. *Times of Day: When* are the behaviors most and least likely to happen?

Most Likely: *During meals. Also engages in some problem behavior when he is getting dressed in the morning and getting ready for bed at night, but not as frequent or as intense.*

Least Likely: *During free time, play time, school, or at soccer.*

2. *Settings: Where* are the behaviors most and least likely to happen?

Most Likely: *At the table during a meal. Most likely at home, but still occurs frequently at restaurants.*

Least Likely: *Any place other than a meal setting or in his bedroom when he is getting ready for the day or getting ready for bed.*

3. *People: With whom* are the behaviors most and least likely to happen?

   Most Likely: *Parents and grandparents*

   Least Likely: *Teachers, coaches, friends*

4. *Activities: What activities* are most and least likely to produce the behaviors?
   Most Likely: *Meals with non-preferred foods*

   Least Likely: *Playing, soccer, school, homework*

5. Are there particular or idiosyncratic situations or events not listed above that sometimes seems to "set off" the behaviors, such as particular demands, noises, lights, or clothing?
   Meal times set him off, particularly if the meal isn't a combination of chicken nuggets, goldfish crackers, or tortilla chips.

6. What *one thing* could you do that would most likely make the undesirable behaviors occur?
   Instruct him to eat a meal that isn't entirely chicken nuggets, goldfish, and/or tortilla chips.

7. Briefly describe how the person's behavior would be affected if…
   a. You asked them to perform a difficult task.

      He is pretty good at doing his homework and school work with. No problem behavior.

   b. You interrupted a desired activity, such as eating ice cream or watching tv.

      He may fuss a bit, but no significant problem behavior. More likely to whine (e.g., Dad, can I have 5 more minutes, please)

   c. You unexpectedly changed their typical routine or schedule of activities.

      Not a problem unless his meal routine is changed. He would is upset when soccer is cancelled, but does not engage in problem behavior, mostly just whining or pouting.

   d. They wanted something but weren't able to get it (e.g., a food item up on a shelf).

      He would just ask for it or help.

   e. You didn't pay attention to that person or left him or her alone for a while (e.g., 15 minutes).

      He is happy playing alone for the most part (especially for just 15 minutes).

D. IDENTIFY THE CONSEQUENCES OR OUTCOMES OF THE PROBLEM BEHAVIORS THAT MAY BE MAINTAINING THEM (I.E., THE FUNCTIONS THEY SERVE FOR THE PERSON IN PARTICULAR SITUATIONS).

1. Think of each of the behaviors listed in Section A and try to identify the *specific* consequences or outcomes the person gets when the behaviors occur in different situations.

Behavior	Particular Situations	What exactly do they get?	What exactly do they avoid?
a. Throwing	*Mealtime (sometimes when getting dressed or prepping for bed)*	*Redirection Time out*	*Eating non-preferred foods*
b. Crying & Screaming	*Mealtime (sometimes when getting dressed or prepping for bed)*	*Redirection Time out*	*Eating non-preferred foods*

E. CONSIDER THE OVERALL EFFECIENCY OF THE PROBLEM BEHAVIORS. EFFICIENCY IS THE COMBINED RESULT OF (1) HOW MUCH *PHYSICAL EFFORT* IS REQUIRED, (2) *HOW OFTEN* THE BEHAVIOR IS PERFORMED BEFORE IT IS REWARDED, AND (3) *HOW LONG* THE PERSON MUST WAIT TO GET THE REWARD.

Problem Behavior	Low Efficiency				High Efficiency
Throwing	1	2	(3)	4	5
Crying & Screaming	1	2	3	(4)	5

F. WHAT *FUNCTIONAL ALTERNATIVES* BEHAVIORS DOES THE PERSON ALREADY KNOW HOW TO DO?

1. What socially appropriate behaviors or skills can the person already perform that may generate the same outcomes or reinforcers produced by the problem behaviors?
   Owen has the ability to ask politely for a new meal, but his parents want him to at least try new food and attempt to broaden his list of foods he will eat.

G. WHAT ARE THE PRIMARY WAYS THE PERSON COMMUNICATES WITH OTHER PEOPLE?

1. What are the general expressive communication strategies used by or available to the person? These might include vocal speech, signs and gestures, communication boards and books, or electronic devices. How consistently are the strategies used?

   Owen has a slight speech delay, but his vocal communication is easily understood by peers and adults.

2. On the following chart, indicate the behaviors the person uses to achieve the communication outcomes listed:

Communicative Functions	Complex Speech (sentences)	Multiple-Word Phrases	One-Word Utterances	Echolalia	Other Vocalizing	Complex signing	Single Signs	Pointing	Leading	Shaking Head	Grabbing/Reaching	Giving Objects	Increased Movement	Moving Close to You	Moving Away or Leaving	Fixed Gaze	Facial Expression	Aggression	Self-Injury	Other
Request attention	*X*																			
Request help	*X*																			
Request break	*X*																			
Show you something or some place	*X*																			
Indicate physical pain (e.g., headache, illness)	*X*																			
Indicate confusion or unhappiness	*X*																			
Protest or reject a situation or activity	*X*																			

3. With regards to the person's receptive communication, or ability to understand other persons…

   a. Does the person follow spoken requests or instructions? If so, approximately how many? (List if only a few).

   Owen follows most instructions, typical of that of an 8-year-old.

   b. Does the person respond to signed or gestural requests or instructions? If so, approximately how many? (List if only a few).

   Owen does not know ASL, but he responds to common gestures (e.g., waving to say hello, gestures to come here, gestures to be quiet)

   c. Is the person able to imitate if you provide physical models for various tasks or activities? (List if only a few).

   Yes. Owen demonstrates the ability to imitate at the level of a typical 8-year-old.

   d. How does the person typically indicate *yes or no* when asked if they want something, want to go somewhere, or so on?

   Owen uses complete vocalized sentences.

H. WHAT ARE THINGS YOU *SHOULD DO* AND THINGS YOU *SHOULD AVOID* IN WORKING WITH AND SUPPORTING THIS PERSON?

1. What things can you do to improve the likelihood that a teaching session or other activity will go well with this person?

   Owen responds well to praise. He enjoys playing soccer and doing puzzles. If you play soccer or do a puzzle with him, he will instantly like you. He loves talking about and watching soccer, so those are good activities to use as rewards or ways to build rapport.

2. What things should you avoid, that might interfere with or disrupt a teaching session or activity with this person?
   If you give Owen non-preferred food, he will get upset. If you expect him to eat non-preferred food, you will likely observe some level of problem behavior. He is a bit shy and will not usually engage in the same level of intensity of problem behavior around new people. For example, he does not have meltdowns at school over food (he does bring a sack lunch of preferred food, so this may help).

I. WHAT ARE THINGS THE PERSON LIKES AND ARE REINFORCING FOR THEM?

1. *Food items:*
   Chicken nuggets, goldfish crackers, tortilla chips.

2. *Toys and objects:*
   Soccer ball, puzzles, iPad, PlayStation, bicycle, trampoline

3. *Activities at home:*
   Playing on his iPad or PlayStation, riding his bicycle, jumping on the trampoline in the backyard, kicking his soccer ball outside, watching TV with the family.

4. *Activities/Outings in the community:*

   Playing soccer, going to the trampoline park, going to the park, amusement parks too!

5. *Other:*
   No others come to mind.

J. WHAT DO YOU KNOW ABOUT THE HISTORY OF THE UNDESIRABLE BEHAVIORS, THE PROGRAMS THAT HAVE BEEN ATTEMPTED TO DECREASE AND ELIMINATE THEM, AND THE EFFECTS OF THOSE PROGRAMS?

Behavior	How long has this been a problem?	Programs	Effects
a. Throwing, Crying, and Screaming	*6 years*	*Redirection*	*Not effective*
b. Throwing, Crying, and Screaming	*6 years*	*Time out*	*Not effective*

K. DEVELOP SUMMARY STATEMENTS FOR EACH MAJOR PREDICTOR AND/OR CONSEQUENCE.

Distant Setting Event	Immediate Antecedent (Predictor)	Problem Behavior	Maintaining Consequence
Tired or hungry	*Asked to eat non-preferred food*	*Throwing, crying, and/or screaming*	*Avoid or delay eating.*
Tired or hungry	*Asked to eat non-preferred food*	*Throwing, crying, and/or screaming*	*Attention from parents.*

How confident are you that this summary statement is accurate?

Not Very Confident					Very Confident
1	2	3	4	(5)	6

Appendix D: Scatterplot Recording Completed Example

Client's Name: Claire Observer: Mr. Owens (classroom teacher)

Week Observed: February 1st – 5th

Challenging Behavior(s): Self-injury.- forceful contact with any portion of Claire's hand to an object or her body that does not obviously serve an adaptive purpose (e.g., tapping desk with beat of music during music class would be considered serving an adaptive purpose)

Key

Behavior Did Not Occur	
Behavior Occurred A Little	/
Behavior Occurred A Lot	X

Activity	Time	Mon	Tues	Wed	Thurs	Fri
Morning meeting (attendance, calendar, etc.)	8:00 – 8:45 am		/			
Reading	8:45 – 9:30 am	/	X	X	X	/
Physical Education	9:30 – 10:15 am	X	X	X	X	X
Math	10:15 – 11:00 am			/		
Occupational Therapy	11:00 – 11:45 am	/	X	X	/	X
Lunch	11:45 – 12:15 pm					
Social Studies	12:15 – 1:00 pm				/	
Co-curricular (art, library, etc.)	1:00 – 1:45 pm		X		X	
Speech Therapy	1:45 – 2:30 pm					
Science	2:30 – 3:15 pm	/		/	/	

Appendix E: ABC Continuous Recording Completed Example

Client's Name: Chadley Observer: Mrs. Sanchez (classroom paraprofessional)

Date: November 7th Time Observed: _____

Antecedent	Behavior	Consequence
☑ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☑ Crying ☐ Throwing items	☑ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☑ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☑ Throwing items	☑ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☑ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered

☐ Whole class instruction ☐ Small group instruction ☑ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☑ Accessed preferred activity or item ☐ Work task or activity delivered
☑ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☑ Throwing items	☐ Instruction terminated ☐ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☑ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☑ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered

☐ Whole class instruction ☑ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☑ Crying ☐ Throwing items	☑ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☑ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☑ Throwing items	☐ Instruction terminated ☑ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☑ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☑ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☑ Crying ☐ Throwing items	☑ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☑ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☑ Accessed preferred activity or item ☐ Work task or activity delivered

☐ Whole class instruction ☐ Small group instruction ☑ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☐ Throwing items	☐ Instruction terminated ☐ Work task terminated ☑ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☐ Reprimand or redirection ☑ Accessed preferred activity or item ☐ Work task or activity delivered
☑ Whole class instruction ☐ Small group instruction ☐ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☑ Throwing items	☐ Instruction terminated ☑ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☑ Reprimand or redirection ☐ Accessed preferred activity or item ☐ Work task or activity delivered
☐ Whole class instruction ☐ Small group instruction ☑ One-on-one instruction ☐ Independent work ☐ Free play alone ☐ Free play with peers ☐ Engaged in preferred activity or with preferred item ☐ Preferred activity terminated or preferred item removed ☐ Adult attention diverted ☐ Peer attention diverted ☐ Alone with no activities	☐ Crying ☑ Throwing items	☐ Instruction terminated ☑ Work task terminated ☐ Adult attention delivered ☐ Peer attention delivered ☐ Adult attention diverted ☐ Peer attention diverted ☑ Reprimand or redirection ☑ Accessed preferred activity or item ☐ Work task or activity delivered

Appendix F: Behavioral Interview Summary Worksheet

Client's Name: _____

1. What is the target challenging behavior?

   _____

   _____

2. What is the operational definition of the target challenging behavior?

   _____

   _____

   _____

3. What antecedents are associated with this behavior?

   _____

   _____

   _____

4. What consequences are associated with this behavior.

   _____

   _____

   _____

5. What strategies should you implement to ensure safety of the client and staff during a functional analysis or intervention sessions with this client?

   _____

   _____

   _____

6. What recommendations, if any, do you have in regards to functional analysis procedures?

_____

_____

_____

7. Is there any other information that is relevant to a functional behavior assessment of this target challenging behavior? If yes, what will you do with this information?

_____

_____

_____

Appendix G: Hypothesis Statement Worksheet

Client's Name: _____

Challenging Behavior: _____

Operational Definition: _____

_____

_____

Hypothesis One: _____

Hypothesis summary statement: _____

Antecedent	Behavior	Consequence

Hypothesis Two: _____

Hypothesis summary statement: _____

Antecedent	Behavior	Consequence

Hypothesis Three: _____

Hypothesis summary statement: _____

Antecedent	Behavior	Consequence

References

Beavers, G. A., Iwata, B. A., & Lerman, D. C. (2013). Thirty years of research on the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 46*(1), 1–21.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* (3rd ed.). Pearson.

Durand, V. M., & Crimmins, D. B. (1985). *The Motivation Assessment Scale: An administration manual. Unpublished manuscript*. University at Albany, State University of New York.

Fee, A., Schieber, E., Noble, N., & Valdovinos, M. G. (2016). Agreement between questions about behavior function, the motivation assessment scale, functional assessment interview, and brief functional analysis of children's challenging behaviors. *Behavior Analysis: Research and Practice, 16*(2), 94.

Hanley, G. P. (2012). Functional assessment of problem behavior: Dispelling myths, overcoming implementation obstacles, and developing new lore. *Behavior Analysis in Practice, 5*(1), 54–72.

Iwata, B. A., DeLeon, I. G., & Roscoe, E. M. (2013). Reliability and validity of the functional analysis screening tool. *Journal of Applied Behavior Analysis, 46*(1), 271–284.

Lalli, J. S., Browder, D. M., Mace, F. C., & Brown, D. K. (1993). Teacher use of descriptive analysis data to implement interventions to decrease students' problem behaviors. *Journal of Applied Behavior Analysis, 26*(2), 227–238.

Lewis, T. J., Scott, T. M., & Sugai, G. (1994). The problem behavior questionnaire: A teacher-based instrument to develop functional hypotheses of problem behavior in general education classrooms. *Diagnostique, 19*(2–3), 103–115.

Martens, B. K., DiGennaro, F. D., Reed, D. D., Szczech, F. M., & Rosenthal, B. D. (2008). Contingency space analysis: An alternative method for identifying contingent relations from observational data. *Journal of Applied Behavior Analysis, 41*(1), 69–81.

Newton, J. T., & Sturmey, P. (1991). The Motivation Assessment Scale: Inter-rater reliability and internal consistency in a British sample. *Journal of Mental Deficiency Research, 35*, 472–474.

Nicholson, J., Konstantinidi, E., & Furniss, F. (2006). On some psychometric properties of the questions about behavioral function (QABF) scale. *Research in Developmental Disabilities, 27*, 337–352.

O'Neill, R. E., Albin, R. W., Storey, K., Horner, R. H., & Sprague, J. R. (2014). *Functional assessment and program development* (3rd ed.). Cengage Learning.

Paclawskyj, T. R., Matson, J. L., Rush, K. S., Smalls, Y., & Vollmer, T. R. (2000). Questions About Behavioral Function (QABF): A behavioral checklist for functional assessment of aberrant behavior. *Research in Developmental Disabilities, 21*, 223–229.

Reese, R. M., Richman, D. M., Zarcone, J., & Zarcone, T. (2003). Individualizing functional assessments for children with autism: The contribution of perseverative behavior and sensory disturbances to disruptive behavior. *Focus on Autism and Other Developmental Disabilities, 18*(2), 89–94.

Shogren, K. A., & Rojahn, J. (2003). Convergent reliability and validity of the Questions About Behavioral Function and the Motivation Assessment Scale: A replication study. *Journal of Developmental and Physical Disabilities, 15*, 367–375.

St. Peter, C. C., Vollmer, T. R., Bourret, J. C., Borrero, C. S., Sloman, K. N., & Rapp, J. T. (2005). On the role of attention in naturally occurring matching relations. *Journal of Applied Behavior Analysis, 38*(4), 429–443.

Thompson, R. H., & Iwata, B. A. (2007). A comparison of outcomes from descriptive and functional analyses of problem behavior. *Journal of Applied Behavior Analysis, 40*(2), 333–338.

Touchette, P. E., MacDonald, R. F., & Langer, S. N. (1985). A scatter plot for identifying stimulus control of problem behavior. *Journal of Applied Behavior Analysis, 18*(4), 343–351.

Chapter 8
Direct Assessment

Topics Covered Within This Chapter

Topics
Stimulus Preference Assessments
Demand Assessments

How do we know if a stimulus will function as a reinforcer? Behavior analysts recognize that a stimulus can only be labeled as a reinforcer if its contingent application results in an increase in the target behavior. Reinforcer assessments can be used to identify stimuli that function as reinforcers by evaluating the extent to which responding increases when followed by different stimuli. Despite the accuracy that is yielded by a reinforcer assessment, there are a few drawbacks including the time requirement and the limited number of stimuli that can be assessed (Fisher et al., 1996). Therefore, preference assessments are often used to identify stimuli with which clients choose to engage more frequently as research has shown that high-preference stimuli are more likely to function as reinforcers than low-preference stimuli (e.g., Horrocks & Higbee, 2008). In 1961, Herrnstein conducted the seminal study on choice within a behavior analytic framework and proposed the matching law which states that response allocation is a function of frequency of reinforcement. Since the publication of these findings, behavior analysts have continued investigating choice behavior and preference for different response options. According to Pierce and Cheney (2017), choice is the distribution of operant behavior across different options, and preference is the frequent selection of one of the options.

Supplementary Information: The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_8].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_8

Stimulus Preference Assessments

It is important to highlight to your supervisees that the extent to which a preferred stimulus will function as a reinforcer is not guaranteed. Therefore, the purpose of conducting preference assessments is to identify preferred stimuli that may function as reinforcers.

Research supports the effectiveness of different types of preference assessments across multiple populations. Table 8.1 displays citations for preference assessment studies that include different populations, a variety of stimuli, and distinct formats. This is in no way meant to be an exhaustive list, rather it can serve as a starting point for directing the instruction for your supervisees. We suggest guiding your supervisees through the process of effectively implementing preference assessments using the following steps: (a) identifying stimuli to include within the assessment, (b) selecting an assessment format, (c) determining how to present the stimuli to the client, and (d) analyzing data gathered during the assessment.

Table 8.1 Stimulus preference assessment research

Population	Individuals with DD	Davis et al. (2021)
	School children	Resetar & Noell (2008)
	Parents	Fisher et al. (1996)
	Adults with schizophrenia	Wilder et al. (2003)
	Adults with a TBI	Verriden & Roscoe (2016)
	Animals	Vicars et al. (2014)
Stimuli for assessment	Edibles	Butler & Graff (2021)
	Tangible items	Fisher et al. (1992)
	Auditory stimuli	Horrocks and Higbee (2008)
	Social interactions	Davis et al. (2021)
	Animals	Guerin et al. (2017)
Presentation of stimuli	Target stimuli	Butler & Graff (2021)
	Pictorial	Davis et al. (2021)
	Video	Brodhead et al. (2017)
	Verbal-vocal	Wilder et al. (2003)
	Verbal-written	Fisher et al. (1996)
Assessment format	Open-ended questionnaire	Fisher et al. (1996)
	Free-operant assessment	Kang et al. (2010)
	Trial-based assessment	Carr et al. (2000)

Identifying Stimuli

The first decision your supervisees will need to consider is the category of stimuli that will be included within the assessment. Examples include edibles, tangible items, activities, and social interactions. A preference assessment is only as good as the included items; therefore, selecting appropriate items and activities is

imperative. Researchers have shown that items identified by caregivers using a structured interview called the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD) resulted in the identification of more potent reinforcers than a standard set of items (Fisher et al., 1996). Therefore, when appropriate, conducting an open-ended interview with caregivers should be considered. In addition to gathering the information from stakeholders, reinforcer inventories might be used to interview the individual whose preference is being assessed. Finally, observing the client's interactions during nonstructure time periods may provide additional information about stimuli with which the client engages.

Assessment Format

Next, your supervisees must determine the way in which the assessment will be conducted. That is, will it be conducted in an open-ended interview format, a free-operant format, or a trial-based format. Open-ended interviews are only appropriate for clients with strong verbal repertoires. If the stimuli identified using an open-ended interview do not result in an increase in responding, it may be necessary to use a different format. Even when humans can respond to such open-ended questions, they may still inaccurately tact stimuli that may function as reinforcers. Skinner cautions against disregarding all other forms of assessments in favor of "…simply asking a man what reinforces him. His reply may be of some value, but it is by no means necessarily reliable. A reinforcing connection need not be obvious to the individual reinforced" (Skinner, 1953, pg. 75). Therefore, the use of open-ended surveys should be employed when appropriate as they require less time and resources, but if the identified stimuli do not function as reinforcers be prepared to shift to using another assessment strategy.

Free-operant preference assessments are appropriate for all clients. They are ideal for clients who engage in challenging behavior contingent on removal of preferred stimuli (Kang et al., 2010). These assessments are simple to implement as the client is free to interact with any of the items during the assessment.

Trial-based assessments include a variety of formats; however, we will include the two most common within this chapter. A paired-stimulus assessment includes the presentation of two stimuli per trial, and a multiple-stimulus without replacement assessment includes the presentation of up to five to seven stimuli per trial. When implementing a multiple stimulus without replacement assessment, each trial will include one less stimulus than the previous trial because the selected stimulus will not be reintroduced to the array.

Stimulus Presentation

The next decision your supervisees will need to consider is the way in which the options will be presented to the client. This decision is most important if the selected assessment format is the trial-based assessment. For the open-ended interview, the stimuli should be presented verbally, either vocally or written. For the free-operant

assessment, typically the physical stimulus items are included. The trial-based assessment can incorporate stimulus items presentation, pictorial presentation, video clip presentation, or verbal presentation (i.e., vocal or written). Included within this consideration is whether access to the selected stimulus will be provided contingent on the selection of the corresponding pictorial, video, or verbal stimulus. Researchers have demonstrated that preference can be identified using procedures with and without contingent access to the selected stimulus (Brodhead et al., 2017). Therefore, this decision should be individualized for clients.

Encourage your supervisees to consider which presentation format would be most appropriate for their client. One prerequisite for using pictures and video clips is for the client to demonstrate picture-to-object and video-to-object matching (see Brodhead et al., 2017 or Davis et al., 2021 for examples of assessment). Selecting to present stimuli vocally or in writing will require the client to have strong tact and textual repertoires.

Data Analysis

Data analysis and display differ across the different assessment formats. For open-ended interviews, data are collected on the client's self-reported responses to each of the questions. The analysis of these data will largely depend on which questions are asked. For free-operant assessments, data are collected on the duration of time allocated to each of the stimuli. These data are converted into the percentage of the session in which the client engaged with each stimulus. The data are interpreted using bar graphs and stimuli with the highest percentage of interaction are designated as high-preference stimuli. For trial-based assessment, data are collected on the selections for each trial. These data are converted into a percentage by dividing the number of selections by the number of times the stimulus was presented and multiplied by 100. The data are interpreted using bar graphs and the stimuli with the highest percentage of selections are categorized as high-preference stimuli. One of the benefits of conducting a trial-based assessment is that they allow for direct comparison between stimuli to determine a preference hierarchy.

Demand Assessments

Direct assessments are also used to identify sufficiently evocative stimuli to include during the escape condition of a functional analysis (Call et al., 2009). Although less common than preference assessments, supervisees should feel comfortable conducting demand assessments. As with preference assessments, indirect assessments can aide in the identification of demands to include within the assessment. Indirect assessments are meant to inform the direct assessment as opposed to being used as the sole source of information. The argument for conducting frequent

preference assessments is fairly clear as including preferred items within intervention can help create a positive environment. The argument for conducting a demand assessment may seem less clear. However, if the client engages in behavior maintained by escape from demands, and this function remains unidentified because the clinician failed to incorporate appropriate demands within the functional analysis, this will result in the persistence of challenging behavior.

The research base for demand assessments is far less robust than for preference assessments; however, the results of the published studies support the utility of these assessments (e.g., Zangrillo et al., 2020; Zarcone et al., 1999). In order to aide clinicians in the process of conducting demand assessments, Avery and Akers (2021) developed a decision-making guide based on the current literature. This may be a useful resource for your supervisees. Similar to preference assessments, we suggest guiding your supervisees through the process of effectively implementing demand assessments using the following steps: (a) identifying stimuli to include within the assessment, (b) selecting an assessment format, (c) determining how to present the stimuli to the client, and (d) analyzing data gathered during the assessment.

Identifying Stimuli

The first decision your supervisees will need to consider is the stimuli that will be included within the assessment. Examples of aversive stimuli include academic tasks, self-care tasks, cleaning and tidying tasks, gross motor tasks, and transitioning from one activity to another. The purpose of a demand assessment is to identify sufficiently evocative demands, thus selecting appropriate demands to include within the direct assessment is imperative. Researchers have primarily used two caregiver interviews to identify demands to include within the assessment. These interviews are the Negative Reinforcement Rating Scale (NRRS; e.g., Zarcone et al., 1999) and the Demand Assessment for Individuals with Severe Disabilities (DAISD; e.g., Zangrillo et al., 2020). The NRRS has more research supporting its use; however, the DAISD was developed based on the RAISD which has served as a useful tool for behavior analysts for many years.

Assessment Format

Then, your supervisees must determine the way in which the assessment will be conducted. That is, will it be conducted in using a paired-stimulus assessment, a latency-based assessment, or a rate-based assessment. The paired-stimulus demand assessment is similar to the paired-stimulus preference assessment in that pairs of demands will be presented, and the client will select between the two demands. A selection response will result in the presentation of the selected demand for one trial. The latency-based assessment entails continuous presentation of the demand

until the client engages in the target challenging behavior. One instance of the behavior results in the termination of the session. And the rate-based demand assessment is similar to the escape condition of the functional analysis. That is, demands are presented and removed for a brief reinforcement interval following engagement in challenging behavior. Unlike the latency-based assessment, engagement in challenging behavior does not result in the termination of the session, rather after the brief interval the demands are represented.

Stimulus Presentation

Next, your supervisees should consider the way in which the aversive stimuli will be presented. Across the studies on demand assessments, the stimuli were presented by placing the demand (e.g., "wipe off the table") or presenting stimuli that are necessary for completing the task (e.g., towel for wiping off the table). If the supervisee selects presentation of the stimulus necessary for the task, it will be important to pair the stimulus with the demand prior to conducting the assessment.

Data Analysis

Data analysis differs across the three assessment formats. For the paired-stimulus assessment, selection responses are recorded. These data are converted into a percentage by dividing the number of selections by the number of times the demand was presented and multiplied by 100. The data are interpreted using a bar graph and demands that are selected on fewer trials are categorized as high-aversive and more likely to be included within the functional analysis. For the latency-based assessments, the latency, or amount of time between the presentation of specific demands and engagement in challenging behavior, is recorded. The average latency for each demand is calculated and may be graphed using a bar graph. Demands with the shortest latency to challenging behavior are categorized as high-aversive and likely to be included within the functional analysis. For the rate-based assessment, the rate of challenging behavior for each demand is recorded. The number of instances of challenging behavior is divided by the session duration which converts the value to rate. The average rate of challenging behavior is graphed for each demand using a bar graph. Demands associated with higher rates of challenging behavior are categorized as high-aversive and likely to be included within the functional analysis.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Indirect Assessment Activity
30:00–40:00	Data Collection for Paired-Stimulus Preference Assessments
40:00–55:00	Demand Assessment Administration
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Paired-Stimulus Assessment Data Sheet*, 1 copy for each supervisee
- Selected direct assessment (e.g., RAISD, DAISD, or NRRS), 1 copy for each supervisee

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Fisher et al. (1992)
- Verriden & Roscoe (2016)
- Zangrillo et al. (2020)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with preference assessments and demand assessments including the purpose and typical procedures. The decision-making steps for both assessments include (a) identifying stimuli to include within assessments, (b) selecting an assessment format, (c) determining the presentation of the stimuli, and (d) analyzing results of different assessments. A brief summary of each is provided below, and PowerPoint slides are available to share with your group.

Preference Assessments

Review the purpose of a preference assessment with your supervisees. Discuss the distinction between preference assessments and reinforcer assessments. It is imperative that your supervisees can clearly define stimuli that are preferred versus those which function as reinforcers.

Definitions:

1. Preference: a stimulus option with which the client choses to interact more often.
2. Reinforcer: a stimulus that when applied contingently on a target response leads to an increase in that response.

Explain to your supervisees that preference assessments are employed because stimuli categorized as highly preferred tend to function as reinforcers. Because preference assessments are time and resource efficient, their use is best practice. Transition to the discussion of conducting a preference assessment.

Identifying Stimuli When determining which stimuli to include within the assessment, guide your supervisees through multiple exercises.

1. Discuss the common types of stimuli included within these assessments. Explain to your supervisees that stimuli that have been evaluated across many studies include edibles, tangible items, social interactions, and activities. This discussion should be framed around stimuli that are most appropriate for the population with whom your supervisees work.
2. Discuss ways in which your supervisees can identify appropriate stimuli for their clients.
   (a) Interview stakeholders such as caregivers and teachers to identify activities, social interactions, and items that are preferred by the client. This can be a formal interview such as the RAISD or less formal with open-ended questions.
   (b) When appropriate, ask the client for their input.
   (c) Observe the client and note the activities or types of social interactions they typically gravitate toward.
3. The final part of this discussion requires supervisees to exclude stimuli that will not be appropriate for the setting.

Assessment Format Next, review the three common assessment formats including an open-ended interview, a free-operant assessment, and a trial-based format.

1. Open-ended interview: Explain that these assessments include formally requesting information from the client regarding which stimuli they believe best motivate their behavior. This can encompass a list of open-ended questions or informal general questions (e.g., “what do you like to earn for working hard?”).

(a) This assessment is most appropriate when:

(i) The client has a strong verbal repertoire.

2. Free-operant assessment: Explain that these assessments entail allowing the client to freely engage with a select number of stimuli or an unrestricted number of stimuli during a specified amount of time. For example, the clinician presents five different toys and allows the client to interact with any of the toys, including multiple toys at a time, during a 15-minute session.

(a) This assessment is most appropriate when:

(i) The client has just started receiving services.
(ii) The client engages in challenging behavior when preferred stimuli are removed.
(iii) The client has difficulties making selections between options.

3. Trial-based assessments: This assessment format includes multiple variations; however, overall, the assessment includes multiple presentations of two or more stimuli from which the client must select.

(a) Paired-stimulus assessment: Trials include presentations of two stimuli at a time, and each stimulus is paired with every other stimulus. Typically, 6 to 16 stimuli in total are assessed. The assessment is often conducted twice before analyzing the results.
(b) Multiple stimulus without replacement assessment: Five to seven stimuli are included within the assessment. On the first trial, all the stimuli are presented. For the second trial, the selected stimulus is no longer presented in the array. Thus, each subsequent trial includes one less stimulus than the previous trial. The assessment is usually conducted three times before analyzing the results.

Explain to your supervisees that trial-based assessments are ideal because they can be conducted using several stimulus presentations, and when analyzing the data, they result in a preference hierarchy. A preference hierarchy allows for more potent reinforcers to be reserved for difficult skills.

(a) This assessment is most appropriate when:

(i) The client can select between multiple options.
(ii) A preference hierarchy is desirable.

Stimulus Presentation For the trial-based assessment, there are multiple ways in which the stimuli can be presented. Prior to implementing the preference assessment, your supervisee should determine whether the client will have access to the stimuli after the selection. For some clients, the assessment may be less effective if the selection is not followed with access to the stimuli, whereas for other clients, the results may be the same either way. Research has demonstrated mixed findings regarding this topic (e.g., Brodhead et al., 2017; Higbee et al., 1999); thus, careful planning for the individual client should be conducted prior to assessment.

1. Stimulus items: The simplest presentation is to present the actual stimuli such as the toys, activities, or edible items. Upon selection, the client can interact with the item for a brief period of time or consume the edible item.
2. Pictures: Presentation can also incorporate pictures or icons of the corresponding stimuli.
   (a) Prerequisite skills: Picture-to-object matching
3. Video clips: Similar to pictures, video clips can be used to present the stimuli. These can be particularly useful for activities and social interactions.
   (a) Prerequisite skills: Video-to-object matching
4. Vocal: The stimuli can also be presented vocally. For example, if the therapist is conducting a paired-stimulus preference assessment they could ask, "would you rather have a ball or a puzzle?" for one trial and "would you rather have a shape sorter or a doll?" for another trial.
   (a) Prerequisite skills: Vocal verbal skills, strong tact repertoire
5. Written: Finally, the stimuli can be presented in written form. That is, all the stimuli can be written on index cards, and the index cards can be presented to the client.
   (a) Prerequisite skills: Verbal skills, strong textual repertoire

Data Analysis In order to determine which stimuli are more likely to function as reinforcers, data must be collected and analyzed for each of the assessment formats. Explain the different data collection and analysis methods to your supervisees.

1. Open-ended interview: The data collected for this assessment format are the client's self-reported responses to the questions. The analysis of these data will largely depend on what questions are asked.
2. Free-operant assessment: The data collected for this assessment format are the duration in which the client engages with each stimulus. The client is free to interact with multiple stimuli at a time; however, the data recorded should be separately for each individual stimulus. These data are converted into the percentage of the session in which the client engaged with each stimulus. Stimuli with the highest percentages are identified as the high-preference items.
3. Trial-based assessment: Data on selections are collected for this assessment format. These data are converted into a percentage by dividing the number of selections by the number of times the item was presented and multiplied by 100. Stimuli with the highest percentage of selections are categorized as high-preference items/activities/interactions.

Demand Assessments

Discuss the purpose of conducting demand assessments with your supervisees and clearly define the conditions under which they should conduct one. Stress to your supervisees the importance of incorporating sufficiently evocative demands during the escape condition of the functional analysis. Failing to identify an escape function when one exists will lead to ineffective treatment, which can have detrimental effects that last for many years. Transition to the discussion of conducting a demand assessment.

Identifying Stimuli When determining which stimuli to include within the assessment, guide your supervisees through the following considerations.

1. Discuss the common demand categories included within these assessments. These categories include academic tasks, self-care tasks, cleaning and tidying tasks, gross motor tasks, and transitioning from one activity to another. This discussion should be framed around demands that are most appropriate for the population with whom your supervisees work.
2. Discuss the indirect assessments commonly used to identify demands to include within the direct assessments. This can be a formal interview such as the NRRS or the DAISD. If neither of these include questions that would be appropriate for the population who receive services from your supervisees, encourage your supervisees to develop more appropriate interview questions.
3. The final part of this discussion requires supervisees to exclude demands that will not be appropriate for the setting.

Assessment Format Next, review the three common assessment formats including a paired-stimulus assessment, a latency-based assessment, and a rate-based assessment.

1. Paired-stimulus demand assessment: Explain that this assessment format is similar to the paired-stimulus preference assessment and entails multiple trials of demand presentations. Trials include the presentation of two demands at a time, and each demand is paired with every other demand. A selection response results in the client completing one instance of the selected task. For example, the implementer might say "wipe the counter or pick up blocks," and if the client selected wipe the counter, they would be required to wipe the counter once. Five to eight demands are assessed, and each demand pairing is presented two or three times before analyzing the results.

   Explain to your supervisees that this assessment format may be preferred because it does not require multiple exposures to the high-aversive demands as the client can avoid them by selecting less aversive demands.

   (a) This assessment is most appropriate when:

      (i) The client can select from two options.

(ii) The client engages in high rates of challenging behavior.

2. Latency-based assessment: Explain that each trial entails the presentation of the same demand until the client engages in challenging behavior or the session time (e.g., 5 minutes) has elapsed. The first instance of challenging behavior results in access to escape and termination of the session. Typically, 10 demands are assessed, and each demand is presented three times before analyzing the results.

   (a) This assessment is most appropriate when:

      (i) The client cannot select from two options.
      (ii) The client engages in high rates of challenging behavior.

3. Rate-based assessment

   Explain that this assessment format mirrors that of the escape condition of the functional analysis. That is, sessions continue for the entire duration (e.g., 5 minutes), and challenging behavior results in a brief escape interval (e.g., 30 seconds). At the end of the escape interval, the demand is represented. Typically, 6 to 12 demands are assessed, and each demand is presented twice before analyzing the results.

   (a) This assessment is most appropriate when:

      (i) The client cannot select from two options.
      (ii) The client does not engage in high rates of challenging behavior.

Stimulus Presentation Review the two ways in which stimuli are presented within a demand assessment. These include presenting the actual demand (e.g., "pick up toys") and presenting stimuli associated with the demand (e.g., toys to be picked up). If the supervisee selects presenting stimuli associated with the demand, remind them that they must present adequate pairing trials between the stimulus and the demand. Provide several examples of stimuli associated with demands that would be most appropriate for your supervisees.

Data Analysis In order to determine which demands are more likely to evoke challenging behavior, data must be collected and analyzed for each of the assessment formats. Explain the different data collection and analysis methods to your supervisees.

1. Paired-stimulus assessment: Selection responses are recorded for this assessment format. These data are converted into a percentage by dividing the number of selections by the number of times the demand was presented and multiplied by 100. Demands with the lowest percentage of selections are categorized as high aversive.
2. Latency-based assessment: The data collected for this assessment format are the length of time between the presentation of the demand and the client's engagement in challenging behavior. The average latency across implementations of each demand is calculated and graphed. Demands associated with shorter latencies to challenging behavior are categorized as high aversive.

3. Rate-based assessment: The data collected for this assessment format are the client's rate of challenging behavior for each demand. The average rate across implementation of each demand is calculated and graphed. Demands associated with higher rates of challenging behavior are categorized as high aversive.

Indirect Assessment Activity

For this activity, select an interview to identify stimuli to include within a preference assessment or demand assessment for your supervisees to practice implementing. Use one of the developed interviews (e.g., RAISD, DAISD, or NRRS) or develop one of your own for this activity. Have your supervisees read through the interview and determine the wording which they will use to conduct the interview. Then have your supervisees practice interviewing one another. Your supervisees should then use the information gathered in the interview to specify at least six stimuli that they would include in the preference assessment or six demands which they would include in the demand assessment.

(a) The NRRS can be found in Zarcone et al., (1999); the DAISD can be found in Zangrillo et al., 2020; and the RAISD can be found at https://www.dshs.wa.gov/sites/default/files/DDA/dda/documents/F.%20Module%205%20Handout%202.pdf

Paired-Stimulus Preference Assessment Activity

For this activity, use the *Paired-Stimulus Assessment Data Sheet* (see Appendix A). Identify six items to include in the assessment. Use the stimulus presentation (e.g., pictures, written words) that is most appropriate for the population with whom your supervisees work. Model implementation of the preference assessment for the first 15 trials. Then ask one of your supervisees to volunteer to conduct the second round of 15 trials. Use Appendix A to guide administration of the assessment. For example, if you have included a ball as item A and a car as item B, on the first trial you would present the ball on the left and the car on the right. Then give the instruction, "pick one," and wait for a selection to be made. You and your supervisees should collect data using the *Paired-Stimulus Assessment Data Sheet*. After a selection is made, circle the corresponding letter on the data sheet. Your supervisees will need to graph the data and identify the preference hierarchy as homework. You can review their analysis during the individual meeting without a client.

Paired-Stimulus Demand Assessment Activity

For this activity, ask your supervisees to identify four demands that can easily be placed within the setting in which you are meeting. Some examples include wipe the table, stack the papers, or erase the board. You should model the implementation of the paired-stimulus demand assessment. Using Table 8.2, insert your selected demands and present the trials in the suggested order. Present the two demands and instruct the supervisee playing the role of the client to select one. Once a demand is selected, require the supervisee to complete the task once. Circle the letter that corresponds to the selected demand for each trial. Encourage your supervisees to pose questions that arise during the demonstration. Following this meeting, your supervisees will need to review Zangrillo et al. (2020) and develop a protocol (i.e., task analysis) for conducting a demand assessment using this format. They should come prepared to individual supervision with the protocol all relevant materials including the *Paired-Stimulus Assessment Data Sheet* (Appendix A) and stimuli required to complete the demands.

Table 8.2 Demand assessment trials

Demands	Trials
A:	1. A B
B:	2. C D
C:	3. B C
D:	4. D A

Knowledge Check

1. Explain the purpose and procedures of a preference assessment.
2. Explain the purpose and procedures of a demand assessment.
3. What are the four steps for establishing procedures for a preference or demand assessment?
4. When is an open-ended interview format most appropriate? When is a free-operant assessment most appropriate? When is a trial-based assessment most appropriate?
5. What type of stimuli can be included in preference assessments? What type of stimuli can be included in demand assessments?

Homework for Individual Supervision without a Client

1. Graph paired-stimulus preference assessment data collected during group supervision and identify which stimuli are most and least preferred.
2. Create a protocol for conducting a paired-stimulus demand assessment.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 45-minute meeting with an individual supervisee. If it is possible to shift the demand assessment to supervision with a client, that is a preferable course of action. However, we recognize that the clients your supervisees are providing services to or the setting in which they are working may impede the implementation of a demand assessment with a client. Therefore, we include it within the supervision without a client meeting.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Preference Assessment Activities
15:00–30:00	Demand Assessment Activities
30:00–45:00	Client-Directed Activities

Materials Needed

- Graph of data collected during group supervision
- Protocol for paired-stimulus demand assessment
- Appendix A: *Paired-Stimulus Assessment*
- Appendix B: *Graph Component Checklist*

Preference Assessment Activities

Review the paired-stimulus preference assessment data sheet and graph that your supervisee completed on the assessment conducted during the group supervision. Examine your supervisee's graphs and evaluate their accuracy of graphing. Once you have determined that the graph is an accurate depiction of the data, review the quality of the graph using the *Graph Component Checklist* (see Appendix B). Provide specific feedback to your supervisee on how they can improve their future graphs. Based on the graphed data, ask your supervisee to describe the preference hierarchy and identify which stimuli would likely function as the most potent

reinforcer. Compare your data with your supervisee's data to assess for IOA. Discuss and resolve any discrepancies. If IOA is less, the 80% consider reconducting the assessment and modeling data collection for the first 5 trials and allowing your supervisee to independently collect data on the final 10 trials. Provide guidance and feedback as needed.

Now present a hypothetical situation and have your supervisee respond to the questions. (The underlined portions can be altered to better suit the population to whom your supervisee provides services).

Pablo is a young child with intellectual disability, and his therapist is targeting five goals with him. These five goals include independent toileting, tacting objects, finishing patterns, two-word mands, and following one-step instructions. Pablo's therapist conducted a paired-stimulus preference assessment and developed the preference hierarchy. The preference hierarchy was the following:

1. Tablet—high-preference
2. Ball—moderate-preference
3. Play dough—moderate-preference
4. Drawing—low-preference

In Table 8.3, the goals are arranged in the order of most challenging to least challenging for Pablo. Ask your supervisee to identify which preferred stimulus should be provided contingent upon correct responding for each goal. The information in parentheses should be removed when discussing with your supervisee. We hope this discussion will aide your supervisee in their direct use of the information obtained from preference assessments.

Table 8.3 Goal and preference level

Goal	Preferred stimulus
Independent toileting	*(High-preference item)*
Tacting objects	*(High- or moderate-preference item)*
Following one-step instructions	*(Moderate-preference item)*
Two-word mands	*(None—Should be a characteristic reinforcer)*
Finishing patterns	*(Moderate-preference item)*

Demand Assessment Activities

Review the protocol and data sheet developed by your supervisee. Ensure they have included all of the necessary steps for conducting the assessment. Play the role of the client and ask your supervisee to conduct the assessment. Use the protocol as a tool to assess for fidelity of their implementation. Following the assessment, ask your supervisee to analyze the data and identify two or three demands that they would include in the function analysis. Provide behavior-specific feedback regarding your supervisee's implementation and interpretation of the results.

Client-Directed Activities

Discuss an appropriate preference assessment for the supervisee's client. If your supervisee regularly conducts one type of preference assessment (e.g., multiple stimulus without replacement assessment) and it is appropriate for them to conduct a different assessment (e.g., paired-stimulus assessment), consider asking your supervisee to implement the assessment that differs from the one they typically conduct. Proceed through the four steps: (a) identify appropriate stimuli, (b) select an assessment format, (c) determine the presentation of the stimuli, and (d) discuss how data should be collected and analyzed. During this meeting, you and your supervisee should develop a procedural fidelity checklist that you can use to evaluate your supervisee's performance when implementing the assessment with their client. Following the meeting, your supervisee should finalize the *Preference Assessment Procedural Fidelity Checklist* (Appendix C) and develop a data sheet for collecting data on the client's behavior during the assessment (e.g., selections or engagement duration). They should have both data sheets prepared for you to collect data to evaluate their fidelity of implementation and IOA for data collection.

Homework for Individual Supervision without a Client
1. Prepare data sheets for conducting a preference assessment.
2. Finalize the *Preference Assessment Procedural Fidelity Checklist* (Appendix B).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision with a Client Agenda

Time	Activity
0:00–15:00	Stimulus Preference Assessment Administration
15:00–30:00	Session Procedures
30:00–45:00	Performance Feedback

Materials Needed

- Appendix C: *Preference Assessment Procedural Fidelity Checklist*
- Data sheet for preference assessment, 2 copies
- Materials included within the preference assessment
- *Supervision Observation Form*

Preference Assessment Administration

Prior to your meeting with your supervisee, they should have finalized the *Preference Assessment Procedural Fidelity Checklist* and their data sheet for the preference assessment and provided you with a copy of each. Observe their administration of the preference assessment and collect data simultaneously. Use the fidelity checklist to assess your supervisee's accurate administration of the assessment.

Session Procedures

Following your supervisees administration of the preference assessment, continue to observe your supervisee target other goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist. Provide both praise for accurate implementation and corrective feedback for components that were implemented incorrectly. Finally, end this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the preference assessment with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role-play and feedback.

Future Growth

- ☐ Observe your supervisee conduct an interview with a caregiver to determine which stimuli to include within a preference assessment or a demand assessment.
- ☐ Observe your supervisee provide feedback to another trainee on their administration of a preference assessment.

Appendix A: Paired-Stimulus Assessment: 6 Items/Demands

Item A: _____
Item B: _____
Item C: _____
Item D: _____
Item E: _____
Item F: _____

Item A selected: _____ trials
Item B selected: _____ trials
Item C selected: _____ trials
Item D selected: _____ trials
Item E selected: _____ trials
Item F selected: _____ trials

Date:	
Child:	
Teacher:	
Trial #	**Item selection**
1.	A B
2.	C A
3.	A D
4.	E A
5,	A F
6.	B C
7.	D B
8.	B E
9.	F B
10.	C D
11.	E C
12.	C F
13.	D E
14.	F D
15.	E F

Date:	
Child:	
Teacher:	
Trial #	**Item selection**
1.	A B
2.	C A
3.	A D
4.	E A
5,	A F
6.	B C
7.	D B
8.	B E
9.	F B
10.	C D
11.	E C
12.	C F
13.	D E
14.	F D
15.	E F

1. **Highest preferred items:**
2. **Moderately preferred items:**
3. **Lowest preferred items:**

1. **Highest preferred demands:**
2. **Moderately preferred demands**:
3. **Lowest preferred demands:**

Appendix B: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizonal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix C: Preference Assessment Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Avery, S., & Akers, J. S. (2021). The use of demand assessments: A brief review and practical guide. *Behavior Analysis in Practice, 14*, 410–421. https://doi.org/10.1007/s40617-020-00542-8

Brodhead, M. T., Abston, G. W., Mates, M., & Abel, E. A. (2017). Further refinement of video-based brief multiple-stimulus without replacement preference assessments. *Journal of Applied Behavior Analysis, 50*(1), 170–175. https://doi.org/10.1002/jaba.358

Butler, C., & Graff, R. B. (2021). Stability of preference and reinforcing efficacy of edible, leisure, and social attention stimuli. *Journal of Applied Behavior Analysis, 54*(2), 684–699. https://doi.org/10.1002/jaba.807

Call, N. A., Pabico, R. S., & Lomas, J. E. (2009). Use of latency to problem behavior to evaluate demands for inclusion in functional analyses. *Journal of Applied Behavior Analysis, 42*(3), 723–728. https://doi.org/10.1901/jaba.2009.42-723

Carr, J. E., Nicholson, A. C., & Higbee, T. S. (2000). An evaluation of a brief multiple-stimulus preference assessment in a naturalistic context. *Journal of Applied Behavior Analysis, 33*(3), 353–357. https://doi.org/10.1901/jaba.2000.33-353

Davis, T., Weston, R., Hodges, A., & Gerow, S. (2021). Comparison of picture- and video-presentation preference assessments for social interactions. *Journal of Behavioral Education.* https://doi.org/10.1007/s10864-020-09402-5

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment to enhance reinforcer identification. *American Journal on Mental Retardation, 101*(1), 15–25.

Fisher, W. W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis, 25*, 491–498.

Guerin, N. A., Rodriguez, K. E., Brodhead, M. T., & O'Haire, M. E. (2017). Assessing preferences for animals in children with autism: A new use for video-based preference assessment. *Frontiers in Veterinary Science, 4*(29). https://doi.org/10.3389/fvets.2017.00029

Herrnstein, R. J. (1961). Relative and absolute strength of response as a function of frequency of reinforcement. *Journal of the Experimental Analysis of Behavior, 4*(3), 267–272. https://doi.org/10.1901/jeab.1961.4-267

Higbee, T. S., Carr, J. E., & Harrison, C. D. (1999). The effects of pictorial versus tangible stimuli in stimulus-preference assessments. *Research in Developmental Disabilities, 20*(1), 63–72. https://doi.org/10.1016/S0891-4222(98)00032-8

Horrocks, E., & Higbee, T. S. (2008). An evaluation of a stimulus preference assessment of auditory stimuli for adolescents with developmental disabilities. *Research in Developmental Disabilities, 29*(1), 11–20.

Kang, S., Lang, R. B., O'Reilly, M. F., Davis, T. N., Machalicek, W., Rispoli, M. J., & Chan, J. M. (2010). Problem behavior during preference assessments: An empirical analysis and practical recommendations. *Journal of Applied Behavior Analysis, 43*(1), 137–141. https://doi.org/10.1901/jaba.2010.43-137

Pierce, W. D., & Cheney, C. D. (2017). *Behavior analysis and learning: A biobehavioral approach* (6th ed.). Routledge.

Resetar, J. L., & Noell, G. H. (2008). Evaluating preference assessments for use in the general education population. *The Journal of Applied Behavior Analysis, 41*(3), 447–451. https://doi.org/10.1901/jaba.2008.41-447

Skinner, B. F. (1953). *Science and human behavior*. Macmillan.

Verriden, A. L., & Roscoe, E. M. (2016). A comparison of preference-assessment methods. *Journal of Applied Behavior Analysis, 49*(2), 265–285. https://doi.org/10.1002/jaba.302

Vicars, S. M., Miguel, C. F., & Sobie, J. L. (2014). Assessing preference and reinforcer effectiveness in dogs. *Behavioural Processes, 103*, 75–83. https://doi.org/10.1016/j.beproc.2013.11.006

Wilder, D. A., Wilson, P., Ellsworth, C., & Heering, P. W. (2003). A comparison of verbal and tangible stimulus preference assessment methods in adults with schizophrenia. *Behavioral Interventions, 18*, 191–193. https://doi.org/10.1002/bin.136

Zangrillo, A. N., Simmons, C. A., Fisher, W. W., & Owen, T. M. (2020). Use of a paired-stimulus demand analysis to evaluate demands for inclusion in functional analyses. *Journal of Applied Behavior Analysis, 53*(2), 665–677. https://doi.org/10.1002/jaba.651

Zarcone, J. R., Crosland, K., Fisher, W. W., Worsdell, A. S., & Herman, K. (1999). A brief method for conducting a negative-reinforcement assessment. *Research in Developmental Disabilities, 20*(2), 107–124. https://doi.org/10.1016/S0891-4222(98)00036-5

Chapter 9
Functional Analysis, Part 1

Topics Covered Within This Chapter

Topics
Functional Analysis Procedure
Interpreting Functional Analysis Results
Advantages and Limitations of Functional Analysis

The purpose of a functional behavior assessment is to identify the reinforcement maintaining challenging behavior so that this information can be used to develop effective, individualized interventions. The identification of the specific consequences positively or negatively reinforcing target challenging behavior will allow supervisees to design interventions to teach alternative, socially acceptable behaviors to access the same reinforcers. Additionally, this allows supervisees to minimize access to reinforcing consequences upon the future occurrences of the challenging behavior. As a result, your supervisees will need to be proficient in implementing and interpreting a number of functional behavior assessment methodologies, including indirect assessments, direct assessments, and experimental functional analyses. While indirect and direct assessments allow clinicians to develop hypotheses regarding the environmental events maintaining challenging behavior, the functional analysis is the only approach to experimentally evaluate those hypotheses. The functional analysis is the most reliable and valid functional behavior assessment methodology. Needless to say, functional analyses have become the bread and butter among behavior analysts because of their utility.

Iwata et al. (1994) first developed this approach to identify the functional properties of self-injurious behavior. Since then, functional analyses have become a staple assessment among behavior analysts, used to assess a myriad of topographies of

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_9].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_9

challenging behavior. A functional analysis is designed to mimic the naturally occurring environmental variables that may occasion for and reinforce challenging behavior. Functional analyses provide the opportunity to systematically manipulate environmental events similar to those in the client's natural environment in order to determine if they have functional relation with the target challenging behavior.

Functional Analysis Procedure

At a minimum, a functional analysis contains at least one test and one control condition in order to compare challenging behavior under each condition. However, functional analyses can be conducted with multiple test conditions and control conditions.

Conditions are comprised of three components: motivating operations, discriminative stimuli, and consequences. First, functional analysis conditions manipulate motivating operations so the reinforcer effectiveness of the stimuli associated with the condition are elevated. Second, each condition contains stimuli that signal the availability of reinforcement associated with that condition. Finally, each condition is associated with a specific, potentially reinforcing, consequence delivered on a dense schedule of reinforcement contingent upon instances of challenging behavior. Supervisees who grasp the basic framework of a test condition will have the skills to develop conditions that are tailored to the unique environmental events hypothesized to have a functional relation with challenging behavior among their clients.

Iwata et al. (1994) conducted three test conditions and a control condition. Today, the most common test conditions include *attention*, *escape*, *tangible*, and *alone* or *ignore*; yet, the possibilities for functional analysis conditions are endless, and many studies have included other conditions (Beavers et al., 2013; Rispoli et al., 2014; Van Camp et al., 2000). See Chap. 10 for a further review of additional conditions that have been included in functional analyses.

The attention condition begins with the implementer interacting with the client for a short period of time and then diverting their attention to another activity, such as reading a book. It is common to make low preference toys or leisure activities available during the attention condition. Contingent upon challenging behavior, the implementer delivers attention. As with all conditions, implementers should mimic the individual's natural environment; in other words, deliver attention in a manner that is similar to how those in the client's natural environment would deliver attention contingent upon challenging behavior. For example, if the client's caregivers report responding to challenging behavior with redirecting statements use similar redirecting statements in the attention condition. On the other hand, if the client's parents deliver back rubs to calm the client engaging in challenging behavior, back rubs should be delivered within the attention condition. Different forms of attention may affect the outcomes of a functional analysis; therefore, developing an individualized methodology, particularly in regard to the topography of attention, is important (e.g., Fisher et al., 1996).

The escape condition begins with the implementer instructing the client to complete nonpreferred tasks, such as academic tasks, and then delivering prompts in a least-to-most prompting hierarchy. Contingent upon challenging behavior, the implementer removes the demands, typically by both removing materials and orienting their body away from the client for a short duration of time. The selection of tasks is a critical step in developing an escape condition because insufficiently evocative demands could lead to a false negative conclusion. Supervisees should conduct demand assessments (see Chap. 8).

Prior to the start of a tangible session, the implementer gives the client access to a highly preferred item, such as a toy. When the session begins, the implementer removes the item out of reach, but keeps the item in the client's line of sight, when possible. Contingent upon challenging behavior, the implementer returns the item for a short duration. The selection of the item is a critical feature of this condition. If the implementer selects a low preferred item, it is likely that its removal will not evoke challenging behavior to the same extent as the removal high preferred item, thus producing a false negative result. As a result, supervisees should implement preference assessments (Avery & Akers 2021) (see Chap. 8).

In addition to developing specific condition protocols, supervisees must decide (a) how many topographies to evaluate in a single functional analysis, (b) the duration of sessions, (c) number of sessions per condition to conduct, (d) how to measure challenging behavior, and (e) the experimental design. Individuals with intellectual and developmental disabilities who engage in challenging behavior may engage in multiple topographies (Derby et al., 1994; Derby et al., 2000). In deciding to test multiple versus a single topography during a functional analysis, clinicians must balance the need for efficiency with the possibility of invalid results. In many cases, individual topographies of challenging behavior are maintained by unique consequences; therefore, evaluating multiple topographies in a single functional analysis may preclude the clinician from accurately identifying the functions of each topography of challenging behavior.

Session duration may vary, but most commonly, functional analysis sessions are 5–15 minutes (Beavers et al., 2013). The benefit of a shorter session duration is an overall decreased assessment duration. This amounts to less time in which challenging behavior may be both evoked and reinforced. Moreover, shorter assessment duration, if valid, will lead to faster access to function-based treatment. However, the decreased session duration may result in poorly discriminated contingencies across conditions; thus, ultimately delaying the ability to develop a valid function-based treatment. In many cases, it may be best to guide supervisees to first use a shorter duration and increase the duration only if a discriminated pattern of responding among the conditions does not occur.

Needless to say, the total duration of the assessment is not only influenced by the duration of sessions, but also the number of sessions conducted per condition. Functional analyses in which two of fewer exposures to each condition are considered brief functional analyses and will be discussed in Chap. 10 (Northup et al., 1991). Supervisees conducting full functional analyses should conduct at least three

exposures to each condition, but should continue administering additional sessions of a condition until a pattern of responding can be identified.

Supervisees may choose either continuous or discontinuous data collection during a functional analysis, as both approaches are well established in the literature (Beavers et al., 2013). The most commonly used continuous measurement is a frequency measure, often converted to a rate, while the most commonly used discontinuous measure is partial interval recording. See Chap. 5 for further discussion on the benefits of various approaches to measurement.

Finally, supervisees must identify an experimental design to employ within the functional analysis. A multielement design is by far the most widely used design, but research has supported the use of additional designs such as an ABAB design or a combination of designs (Beavers et al., 2013).

Interpreting Functional Analysis Results

Supervisees must not only know how to conduct the functional analysis, but also how to interpret the results. As with all single-case experimental designs, supervisees must hone visual inspection skills. Please refer to Chap. 6 for a more thorough discussion of visual inspection. In order to analyze functional analysis results, the supervisee must identify the conditions in which challenging behavior occurred at consistently higher levels in comparison to the control condition. It is our experience that supervises frequently and erroneously identify the condition with the highest level of challenging behavior as the maintaining function without considering additional conditions in which challenging behavior is elevated relative to the control condition, but not elevated as high as another condition. Conditions associated with higher levels of challenging behavior relative to the control condition suggest that variables associated with that test condition maintain that challenging behavior. It is possible for a challenging behavior to serve two or more functions. In such cases, challenging behavior will be elevated in multiple conditions relative to the control. Automatically maintained challenging behavior may present two unique patterns. First, challenging behavior occurs most frequently in the alone or ignore condition relative to all other conditions. Second, challenging behavior remains high across conditions, suggesting that variables associated with each condition have little effect on the challenging behavior. Finally, in some instances, the results of the functional analysis may be undifferentiated. That is, levels of challenging behavior are variable across conditions. This may occur because challenging behavior failed to come under control of the discriminative stimuli within the conditions and perhaps more salient stimuli would resolve this issue. It is also possible that motivating operations were not sufficiently manipulated so that the stimuli associated with the condition temporarily failed to serve as reinforcers during the analysis; therefore, motivating operations could be more appropriately manipulated. Finally, it is possible that the unique reinforcers maintaining challenging behavior were simply not presented in the functional analysis (see Carr et al., 1996; Rispoli et al., 2014

for examples). As supervisees become proficient at implementing functional analyses, it is important for them also to develop skills in troubleshooting undifferentiated functional analysis results.

Advantages and Limitations of Functional Analysis

Supervisees must also recognize the advantages and limitations of functional analyses in order to make sound judgments about when to conduct a functional analysis. The most obvious advantage of a functional analysis is that it produces valid conclusions regarding the function of challenging behavior, allowing clinicians to develop function-based interventions. However, there are disadvantages that supervisees must also recognize and consider. First, functional analyses require resources, particularly time and effort of highly skilled behavior analysts. There may be situations in which supervisees should allocate time and resources that would be needed to conduct a functional analysis to other activities to best serve the client. Additionally, it is possible that a functional analysis may, temporarily, strengthen challenging behavior. If the challenging behavior persists in the client's natural environment, it is clear that the challenging behavior is being reinforced in some capacity outside of the functional analysis; however, it is important to recognize the possibility of strengthening a maladaptive behavior. Preliminary research suggests that in many cases, a functional analysis does not affect levels challenging behavior outside of the functional analysis setting (Davis et al., 2014), but further research is warranted. Finally, within a functional analysis, we expect to observe high levels of challenging behavior, which increases the risk of injury to the client and implementers. Appropriate measures should be taken to mitigate this risk as much as possible. For a more thorough summary of risk mitigation practices, see safety measures described in the following resources and studies: Iwata et al. (1994), Kahng et al. (2015), Lalli et al. (1995), Marcus et al. (2001), Matson (2012), Poling et al. (2012), Wallace et al. (1999), Weeden et al. (2010), and Wiskirchen et al. (2017).

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–40:00	Develop Functional Analysis Protocol
40:00–55:00	Interpret Functional Analysis Results Graphs
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Developing Functional Analysis Test and Control Conditions*, 1 copy per supervisee
- Appendix B: *Functional Analysis Procedural Fidelity Checklist*, 1 copy per supervisee
- Appendix C: *Interpreting Functional Analysis Graphs*, 1 copy per supervisee
- Appendix D: *Functional Analysis Data Sets,* 1 copy per supervisee

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Beavers et al. (2013)
- Hagopian et al. (1997)
- Iwata et al. (1994)

Review Major Concepts

Begin your group supervision meeting by reviewing major concepts associated with conducting and interpreting functional analyses. Begin the conversation with identifying what constitutes a functional analysis and reasons for conducting a functional analysis. Next discuss the components of a test and a control condition. Finally, lead a discussion on how to make decisions regarding: (a) number of topographies to assess in a single functional analysis, (b) data collection method, (c) session duration, (d) number of sessions per condition, and (e) experimental design. Below is a summary to guide those discussions and PowerPoint slides are available to share with your supervisees.

Ask supervisees to define a functional analysis. Within their definition, ensure that they identify the following features of a functional analysis:

- It is an experimental evaluation of how specific variables influence challenging behavior.
- It is the most sophisticated, reliable, and valid functional behavior assessment tool.
- It allows clinicians to identify antecedents and consequences associated with a target behavior.
- The results of a functional analysis can inform a function-based intervention.

Ask supervisees to discuss why they may wish to conduct a functional analysis. Be sure that if supervisees plan to implement a function-based intervention, they

must first conduct a functional analysis. This conversation may also include a discussion of specific clients because functional analysis considerations are made on a case-by-case basis. Various case-specific considerations may be discussed such as topography of challenging behavior, context in which challenging behavior occurs, the ability to mitigate risk to the client and implementer, the supervisee's experience and expertise, caregiver or stakeholder preference, and much more.

It is critical that supervisees develop a deep understanding of how a functional analysis operates. Encourage your supervisees to avoid the urge to simply read and memorize a protocol provided in a journal article or by an employer. Instead, guide your supervisees to grasp the logic behind the procedures. To facilitate this understanding, use the *Developing Functional Analysis Test and Control Conditions* (Appendix A) to identify the three major components (establishing operation, discriminative stimuli, and reinforcer) of the four most frequently implemented test conditions: attention, escape, tangible, and ignore, as well as control condition(s). It is best to begin with the test portion; for example, (a) asking your supervisees to identify how they could manipulate the environment in order to facilitate an establishing operation for attention, (b) what stimuli would signal the availability of attention, and (c) how to deliver attention as a reinforcer. After identifying the main components of the test condition, it is easier to develop the control condition because this is essentially the opposite of the test condition. After completing all four conditions, discuss the fact that a traditional functional analysis (Iwata et al., 1994) consists of a single control condition that combines the abolishing operations, S^{Δ}, and extinction procedures associated with all three control conditions they developed. Engage your supervisees in a discussion of the benefit of the combined single control condition as opposed to three unique control conditions.

Finally, discuss how to make decisions regarding: (a) number of topographies to assess in a single functional analysis, (b) session duration, (c) number of sessions per condition, (d) data collection method, and (e) experimental design. In discussing each of the five items, communicate to supervisees that clear-cut guidelines simply do not exist. Rather, they must use their knowledge of functional analysis combined with their knowledge of the needs and wishes of client and the client's caregivers to identify the best methods for each individual case. In other words, 5-minute session duration may be the best choice for one client, while designing 15-minute sessions is best suited for another client. Therefore, this discussion should be focused on factors to consider rather than rules to follow.

In determining the number of topographies to assess in a single functional analysis, the supervisees should consider the likelihood of inconclusive results if multiple topographies are to be assessed simultaneously. If two or more topographies serve two or more functions, but are assessed simultaneously, it is likely that the results will not accurately identify the function for each individual topography; rather, it is likely that the results will appear to be inconclusive. In some cases, anecdotal evidence gathered through indirect and nonexperimental direct functional behavior assessments indicate a likelihood of a similar function among two or more topographies, thus providing a stronger case for a analyzing the topographies simultaneously. Nonetheless, we recommend that you encourage your supervisees to limit

functional analyses to a single topography until they gain more experience. After gaining more experience, they may be able to successfully identify cases in which a functional analysis on multiple topographies could prove successful, but it is unlikely that they would be able to make this distinction early in their careers.

As with other procedural decisions, session duration decisions should be made on a case-by-case basis. You should guide supervisees to identify factors to consider. These factors include, but are not limited to, the client's prior history in discriminating contingencies and frequency of challenging behavior. Clients who need longer exposure to facilitate discriminated responding will necessitate longer session duration. This may also include the frequency of challenging behavior, with more frequently occurring challenging behavior being better suited for shorter sessions and less frequent challenging behavior necessitating longer sessions. You may discuss other factors that that you as well. A good rule of thumb to communicate to supervisees is, unless otherwise indicated, to begin with a shorter duration and only increase if discriminated responding failed to occur or if few or no instances of challenging behavior occurred.

The decisions related to selecting a data collection method gives the supervisor the opportunity to review content introduced in Chap. 5. Use this opportunity to assess for maintenance of those skills and reteach as necessary. Similarly, determination of experimental design selection and how many sessions to conduct per condition provides an excellent opportunity for the supervisor to review concepts of experimental design and visual analysis introduced in Chap. 6.

Develop a Functional Analysis Protocol

Assign your supervisees to groups of three or four. Instruct the groups to create a protocol for a traditional functional analysis that will contain the following conditions: (a) attention, (b) tangible, (c) escape, (d) ignore, and (e) a control condition. They should create their protocols for each condition on the *Functional Analysis Protocol and Procedural Fidelity Checklist* (Appendix B). We recommend that they create their protocols electronically so that they can easily share the completed document with for use an upcoming role-play.

Allow your supervisees at least 15 minutes to develop their protocol, but provide them with a 3-minute incremental signal so that they can devote the same amount of time to each condition. Once they have finished their protocols, use the last 5 minutes to review them carefully. We recommend you require each team to send you an electronic version as they complete them so you can begin to edit one condition at a time. They will use these protocols for their next role-play activity; therefore, any errors need to be identified before they are practiced. Once each small group has a supervisor-approved set of functional analysis protocols, be sure each of the group has a copy. Please note that if your supervisees are in a field experience placement that uses a specific functional analysis protocol, your supervisees can use that protocol, rather than the one developed in the group, during the upcoming role-play.

Interpret Functional Analysis Graphs

Distribute the *Interpreting Functional Analysis Graphs* (Appendix C). The graphs are also incorporated into the PowerPoint slides for ease. For the first eight graphs, vocally describe to your supervisees how to interpret the graphs. For the last seven graphs, have them interpret the graphs independently. When supervisees indicate they completed their analysis, ask them to share with the group. We recommend the following steps to interpreting the functional analysis graphs, which are loosely based on procedures outlined by Hagopian et al. (1997) and Roane et al. (2013). However, you may consider adopting the exact procedures outlined by these authors. The rigorous procedures outlined by Hagopian et al. and Roane et al. are most likely to produce accurate conclusions. However, for most clearly differentiated results, the following procedures are likely to produce accurate results, which, in addition to their ease of implementation, make them appropriate for most functional analysis interpretations. Therefore, we recommend utilizing the procedures described in Table 9.1 for interpreting most functional analysis graphs and adopting the Hagopian et al. and/or Roane et al. procedures with less clearly differentiated results and any other situation in which you feel this will improve accuracy of functional analysis result interpretation.

Table 9.1 Steps to interpreting functional analysis results

1. Identify the control condition data path.
2. Identify a single test condition. If the majority of the test condition data points are above the control condition data path, considered this differentiated. If not, consider this undifferentiated. Repeat for each condition.
3. If any of the following apply, conclude the behavior is maintained by automatic reinforcement: (a) behavior is highest in the ignore condition and differentiated from the control condition, (b) behavior is high across all conditions, or (c) behavior is higher in conditions with less external stimulation (ignore, attention, and tangible) and lower in conditions with high external stimulation (demand and control).
4. If there is a data path from a test condition with a downward trend, do not consider this differentiated unless the downward trend is toward an efficient rate of responding (e.g., if the tangible item is provided for 30 seconds contingent upon target challenging behavior, efficient responding is two behaviors per minute).
5. If two or more conditions are differentiated, consider this multiply maintained, unless the highest differentiated condition is the ignore condition, which should be interpreted as an automatic function.
6. If three or more conditions are differentiated, but one of these is the ignore condition, which is not the highest, do not interpret the behavior to be automatically maintained, but do interpret the other two conditions to maintain challenging behavior.
7. If two conditions are differentiated, but one of these is the ignore condition, which is the highest, interpret the behavior to be multiply maintained by automatic reinforcement and the other condition.

Knowledge Check

1. Explain what a functional analysis is as if you were explaining it to a client's caregiver.
2. Name one reason you may want to conduct a functional analysis.
3. Name one reason you may not want to conduct a functional analysis.
4. How many topographies of challenging behavior should be assessed within a functional analysis? Why?
5. What are the three components manipulated in a functional analysis condition? Give an example of how they are manipulated in the attention, tangible, or escape condition.

Homework for Individual Supervision without a Client

1. Graph three functional analysis data sets (provided in Appendix D). Interpret the results.
2. Review and practice the functional analysis protocol. The protocol should be that developed in the group supervision meeting or one that is used in the field experience placement setting.
3. Print the selected functional analysis procedural fidelity checklist (see Appendix B as an example).
4. Develop a data sheet that corresponds to the functional analysis protocol.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 1-hour meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review Functional Analysis Graph and Interpretation Homework
10:00–60:00	Role-Play Functional Analysis and Performance Feedback

Materials Needed

- Appendix E: *Graph Component Checklist*, 3 copies
- Supervisee-developed functional analysis procedural fidelity checklist, one copy of each condition

Review Functional Analysis Graph and Interpretation Homework

Review your supervisee's graphs using the *Graph Component Checklist* (Appendix E). It is helpful for your supervisee to watch you analyze the graph according to this checklist. As you do so, provide specific praise to your supervisee for inclusion of the components and provide both specific feedback and rationale for any components that are not incorporated into the graph. After checking for the components of each graph, ask your supervisee to share their interpretation of the results (i.e., function maintaining challenging behavior). Again, deliver specific praise for correct interpretations. In response to errors, model for the supervisee how to determine the correct function of challenging behavior, providing a rationale for each step in the interpretation process. Correct interpretations of the functional analysis data sets are found in Table 9.2.

Table 9.2 Functional analysis interpretation activity: Correct interpretation

Data set number	Correct interpretation of results
1	Maintained by access to attention
2	Maintained by escape
3	Maintained by automatic reinforcement

Role-Play Functional Analysis and Performance Feedback

The final portion of your individual supervision meeting will involve a role-play of all functional analysis conditions. Role-play each condition in the following order: (a) attention, (b) escape, (c) tangible, (d) ignore, and (e) control. Prior to beginning the role-play, ask your supervisee to provide you with the protocols, if they have not done so already. Quickly read the protocols aloud together to ensure that you both have the same protocols and that all clarifications have been made prior to the role-play activity.

You will role-play as a client and your supervisee will implement a functional analysis. We suggest you select a challenging behavior topography that the

supervisee is likely to encounter at their field experience placement as opposed to a confederate topography (e.g., tapping the table) that is not authentically challenging. That being said, the intensity of the behavior should be modified so there is no risk of injury to either you or the supervise. For example, touching one's nose should not be considered as a challenging behavior for the role-play because this is not an authentic topography of challenging behavior. On the contrary, you may choose self-injury as the target challenging behavior due to its authenticity. However, if you selected head hitting as the target topography during role-play, engage in head hitting with an open hand and no force so that in reality you are only tapping your head. We also suggest that you maintain a moderate frequency of target challenging behavior and only occasionally engage in nontarget challenging behavior. You want to role-play a realistic functional analysis, but one that is relatively easy to implement. You want your supervisee to be successful during this initial role-play. As you observe your supervisee's success, you can begin to emit behaviors that would increase implementation difficulty. Some examples of ways to increase difficulty of accurate implementation include: (a) increasing the frequency of the target behavior, (b) engaging in nontarget challenging behavior, (c) continuing to engage in challenging behavior when accessing the condition-specific consequence (e.g., continuing to hit your own head even when you have access to the tangible item), and (d) other scenarios that have threated your own fidelity of implementation that you have experienced as a clinician.

Your supervisee will role-play as the implementer. During the role-play, do your best to refrain from coaching your supervisee. Instead, hold your comments to the end of the condition. Of course, use your best judgment regarding when to support a faltering supervisee mid-role-play. Ideally, you would measure procedural fidelity as you are simultaneously playing the role of the client. In reality, measuring procedural fidelity while simultaneously role-playing the client may be distracting or impossible. Therefore, if it is impossible to record procedural fidelity live during the role-play, simply review the procedural fidelity checklist with your supervisee immediately after the session. For the sake of efficiency, we recommend engaging in a 5-minute role-play condition, followed by 5 minutes of feedback, utilizing the procedural fidelity checklist. With five conditions, each requiring 10 minutes for role-play and subsequent feedback, this entire activity should take about 50 minutes.

At the end of the role-play, be sure to emphasize again the steps your supervisee completed correctly. Also review the steps the supervisee needs to practice again. If procedural fidelity was below 80% of steps correct for any condition, we recommend that you ask your supervisee to schedule a second role-play opportunity for those condition(s). Encourage your supervisee to role-play with peers in preparation for this second opportunity. We highly encourage you not to allow any supervisee to implement a functional analysis with clients until the supervisee can complete at least 80% of steps correctly across all conditions, regardless of the amount support that will be in place for your supervisee's first attempt in implementing a functional analysis.

Homework for Individual Supervision without a Client

1. If needed, revise procedural fidelity checklist.
2. Provide the supervisor with an up-to-date procedural fidelity checklist for all conditions to be used at the next meeting. Be sure to specify to your supervisee if you prefer a hard copy or electronic copy.
3. Develop data sheets or any other relevant data collection measurement system (e.g., electronic data collection) to be used for a functional analysis implemented in the next supervision meeting.
4. Develop a template to graph the results of the functional analysis to be used during the next supervision session. Be sure to approve the graphing software to be used (e.g., Microsoft Excel).
5. Observe a functional analysis at the supervisee's field experience placement (optional).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 50-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Review Procedural Fidelity Checklist and Data Collection Procedure
10:00–50:00	Conduct Functional Analysis with Support

Materials Needed

- Supervisee-developed functional analysis procedural fidelity checklist, 1 copy of each condition
- Supervisee-developed data sheets, same number as sessions to be conducted
- Computer to graph results

Review Procedural Fidelity Checklist and Data Collection Procedure

During this meeting, you will support your supervisee in implementing a functional analysis. Prior to conducting the functional analysis, review the procedural fidelity checklists and data collection procedures with your supervisee. You can conduct this review any time prior to conducting the functional analysis, not necessarily immediately prior to the functional analysis.

Conduct Functional Analysis with Support

It is quite possible that your supervisee is not currently working with a client in need of a functional analysis at the exact timing of this supervision session. If that is the case, we encourage you to solve this with one of two options: (a) determine if a client at your supervisee's field experience placement is in need of a functional analysis and if your supervisee can volunteer to assist in implementation, or (b) role-play a functional analysis that is more authentic than the previous supervision meeting with the assistance of additional supervisees. We highly recommend the first option because it is a more authentic learning experience. Additionally, the second option precludes the ability for this session to take place with a client; therefore, additional supervision meetings in which you observe your supervisee working with a client will be necessary. If you choose the second option, conduct the role-play with three supervisees. One will implement the functional analysis, one will play the role of a client, and the other will collect data. As a supervisor, you will collect data to evaluate IOA with the data collector as well as complete procedural fidelity checklists during implementation. You may increase the difficulty of implementation relative to the prior supervision session with strategies discussed in the previous section.

Ideally, your supervisee will implement a functional analysis with a client. During this implementation, client safety and accurate implementation are key. Therefore, include individuals with sufficient experience to implement the functional analysis. Do not consider the supervisee as an implementer in determining staffing ratio because the supervisee is still in a learning phase and likely to make mistakes and need support. In other words, if an evaluation team previously determined that two implementers would need to be present during the functional analysis, then maintain two implementers and the supervisee would serve as the third. You may wish to serve as one of the implementers or only observe the implementation. This decision is yours to make as to your comfort level in both simultaneously implementing and providing feedback should be considered.

Ask the supervisee to implement functional analysis procedures for at least 25 minutes. You may want to extend the length of observation, particularly if the functional analysis consists of 10- or 15-minute sessions. During this session, ensure that your supervisee serves as the lead implementer. Do not expect that your supervisee could implement as well as collect data or self-evaluate procedural fidelity. As a new skill, the supervisee should only focus on correct implementation. During this time, encourage all implementers, including yourself, to provide immediate feedback to the supervisee, when appropriate. Errors should be corrected immediately during the session. This both ensures the validity of the functional analysis results and prevents the supervisee from practicing errors.

At the end of the observation, ask your supervisee to leave the assessment setting and visit briefly with you about the implementation. Share procedural fidelity data you gathered and specifically praise steps your supervisee implemented correctly and provide a detailed description of errors committed during implementation.

When discussing errors, provide suggestions for improving implementation and a rationale as to why such improvements need to be made.

Mastery Criteria

In order to progress from this lesson, your supervisee must conduct a functional analysis in which they (a) accurately collect data with at least 80% agreement and (b) conduct the all conditions of the functional analysis with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Observe your supervisee conducting additional functional analysis conditions, particularly if you have not had the opportunity to observe them implement all conditions.
- ☐ Observe your supervisee provide instruction to another individual implementing a functional analysis (e.g., another trainee, a caregiver, a teacher).

Appendix A: Developing Functional Analysis Test and Control Conditions

Attention		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**

Escape		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**

Tangible		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**

Ignore		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**

Developing Functional Analysis Test and Control Conditions

*Supervisor Answer Sheet**

**The Supervisor Answer Sheet provides the conceptually correct response, but answers that vary slightly may still be correct. The supervisor should use the best judgement in responding to supervisees' responses.*

Attention		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Brief delivery of attention followed by removal of attention.	Adult present in the room	Delivery of attention in the form of vocal statements (e.g., "You need to play quietly) and/or physical contact (e.g., pat on the back) contingent upon the targeted challenging behavior
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**
Non-contingent (i.e., time-based) delivery of attention.	No adult present to deliver attention.* **It is important to note that this could be perceived as incompatible to the manipulation of the motivating operation; however, rather than conceptualizing this as "no adult present in the assessment setting", conceptualize as no adult present with the ability to deliver attention because the only adult present are already delivery attention on a regular basis.*	Withhold attention contingent upon the targeted challenging behavior.

Escape		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Delivery of task demands.	Materials associated with task demands.	Removal of task demands contingent upon the targeted challenging behavior.
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**
No task demands present.	No materials associated with task demands present.	No removal of task demands contingent upon the targeted challenging behavior.* **It is important to note that true extinction would be persistence of tasks demands contingent upon challenging behavior; however, due to the manipulation of the motivating operations requiring that task demands are presented, no task demands can be continued contingent upon targeted challenging behavior. However, it is important to note that no task demand removal of any kind should occur contingent upon the targeted challenging behavior.*

Tangible		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Brief delivery of tangible access followed by removal of the tangible item.	Tangible item in sight, but out of reach.	Delivery of access to the tangible item.
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**
Non-contingent (i.e., time-based) delivery of tangible item access..	No tangible item in sight, but inaccessible.	Withhold access to the tangible item contingent upon the targeted challenging behavior.

Ignore		
Test Condition		
Establishing Operation	**S^D**	**Reinforcer**
Lack of an enriched environment (e.g., access to stimuli and activities, lack of interaction with others).	In some cases, access to objects utilized for the targeted topography (e.g., a string to shake, a toy to spin).	Not Applicable because the potential reinforcer is not mediated by the practitioner.
Control Condition		
Abolishing Operation	**S-Delta**	**Extinction**
Enriched environment	In some cases, lack of access to objects utilized for the targeted topography.* **It is important to note while lack of access to objects necessary to emit the behavior would serve S^Δ this is not a recommended procedure. This is referenced only to build an understanding of the concept of manipulating discriminative stimuli. In practice, a control condition that prevents a client from emitting a behavior would falsely skew the results. That is, if the behavior could not occur during the control condition, then it is useless to compare those results to those of the test condition. Behavior differences among such conditions should be attributed to physical ability rather than the influence of programmed antecedents and consequences.*	Not Applicable because the potential reinforcer is not mediated by the practitioner.

Appendix B: Functional Analysis Procedural Fidelity Checklist

Attention	
Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Escape	
Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Tangible	
Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Ignore	
Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Control	
Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix C: Interpreting Functional Analysis Graphs (Figs. C.1, C.2, C.3, C.4, C.5, C.6, C.7, C.8, C.9, C.10, C.11, C.12, C.13, C.14, and C.15)

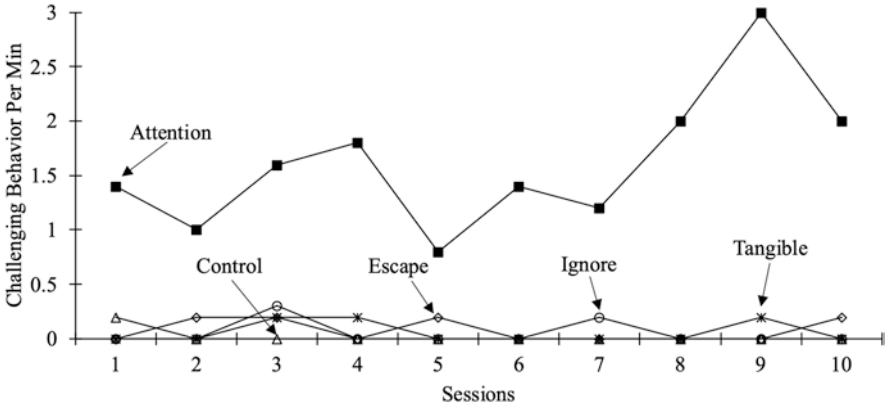


Fig. C.1 Functional analysis results for Client A. Conducted with 5-minute sessions

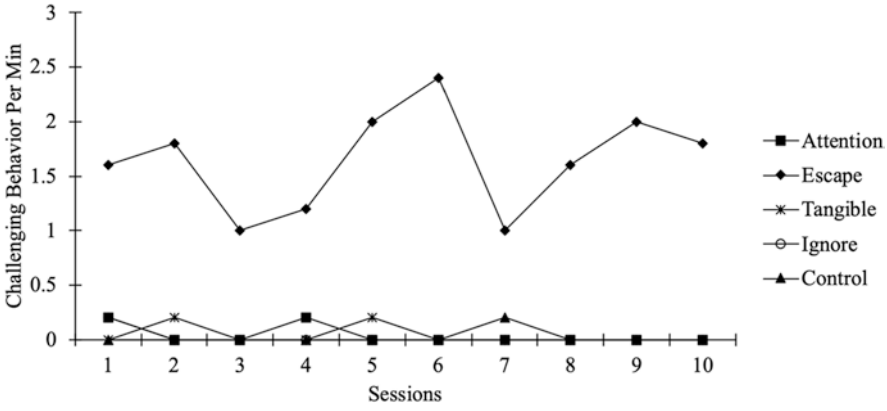


Fig. C.2 Functional analysis results for Client B. Conducted with 5-minute sessions

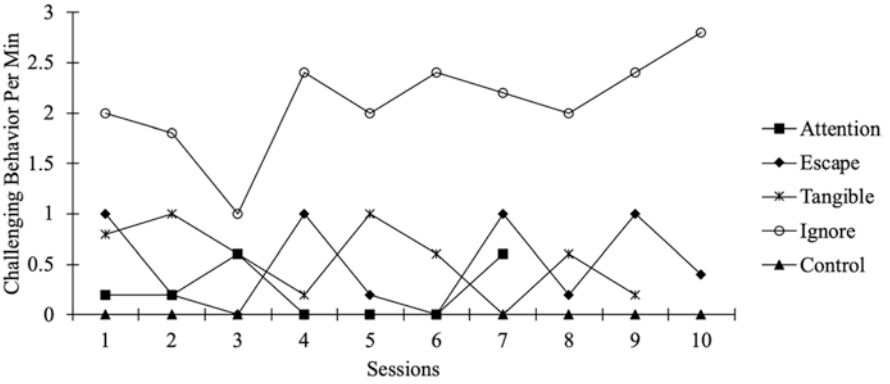


Fig. C.3 Functional analysis results for Client C. Conducted with 5-minute sessions

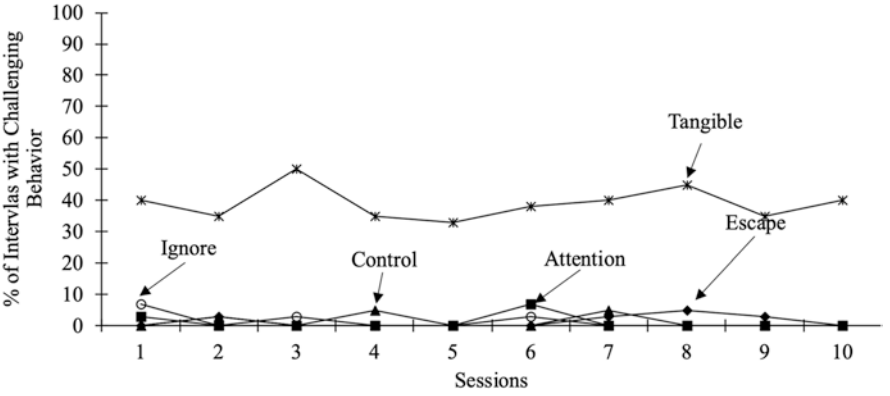


Fig. C.4 Functional analysis results for Client D. Conducted with 15-minute sessions

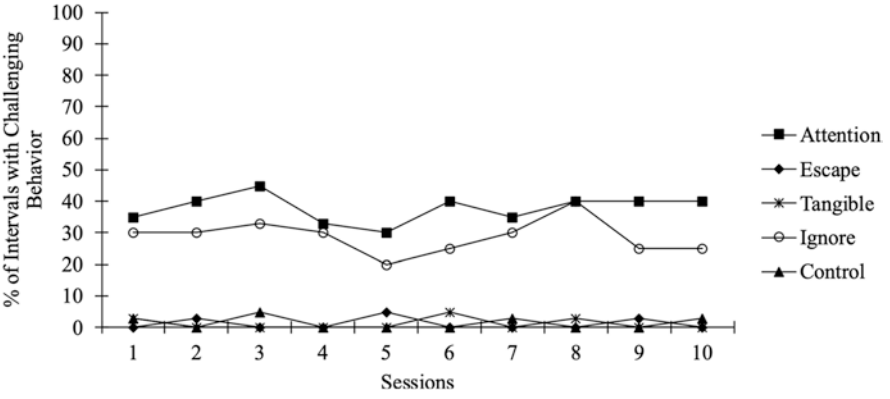


Fig. C.5 Functional analysis results for Client E. Conducted with 15-minute sessions

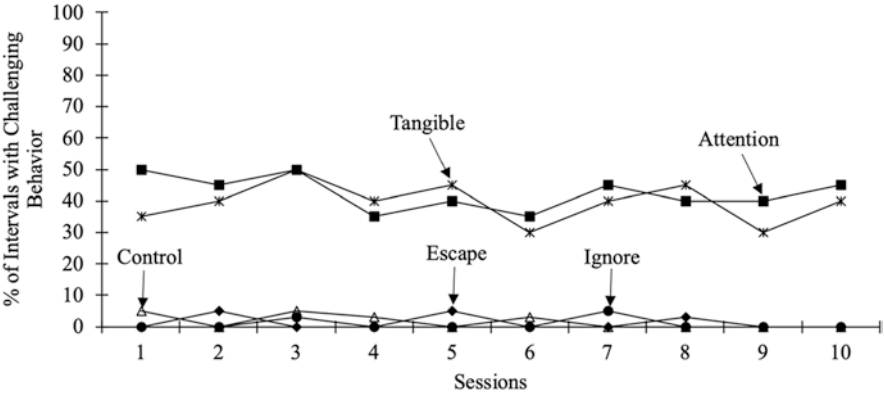


Fig. C.6 Functional analysis results for Client F. Conducted with 15-minute sessions

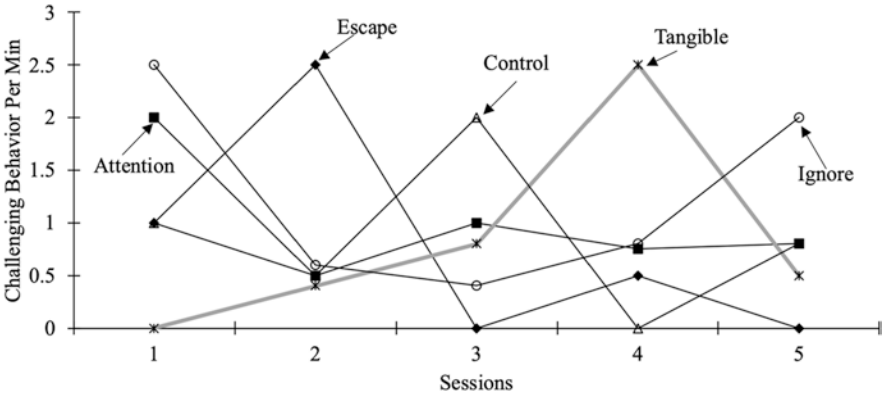


Fig. C.7 Functional analysis results for Client G. Conducted with 5-minute sessions

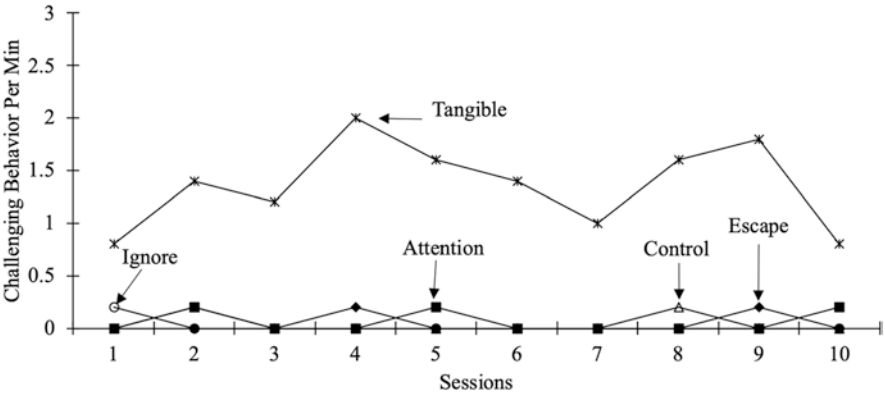


Fig. C.8 Functional analysis results for Client H. Conducted with 5-minute sessions

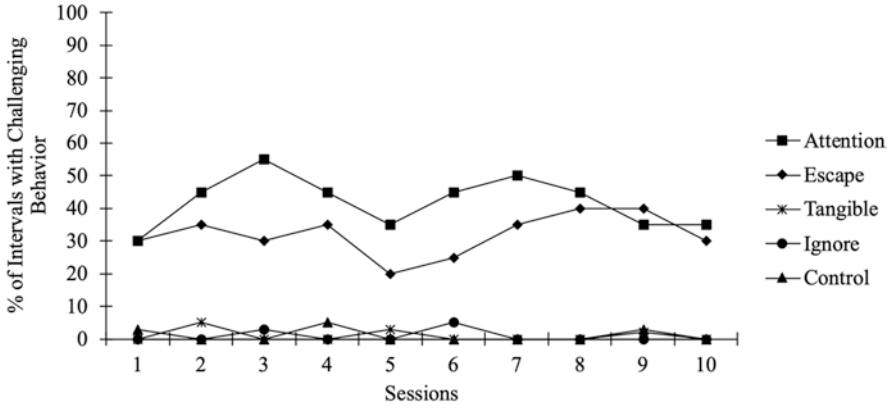


Fig. C.9 Functional analysis results for Client I. Conducted with 10-minute sessions

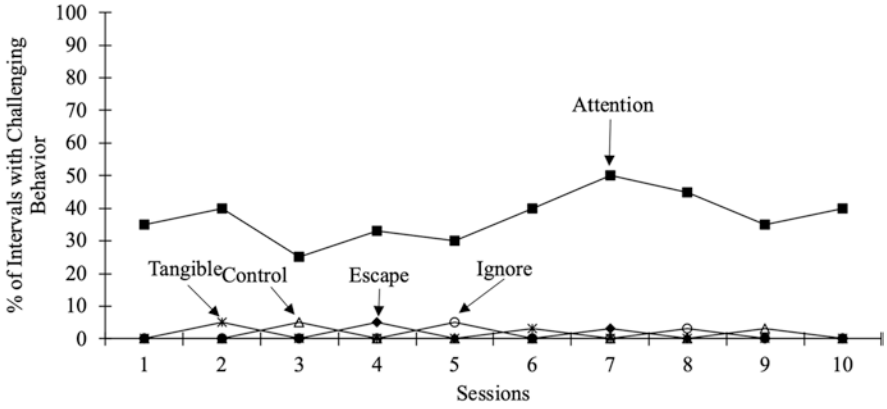


Fig. C.10 Functional analysis results for Client J. Conducted with 10-minute sessions

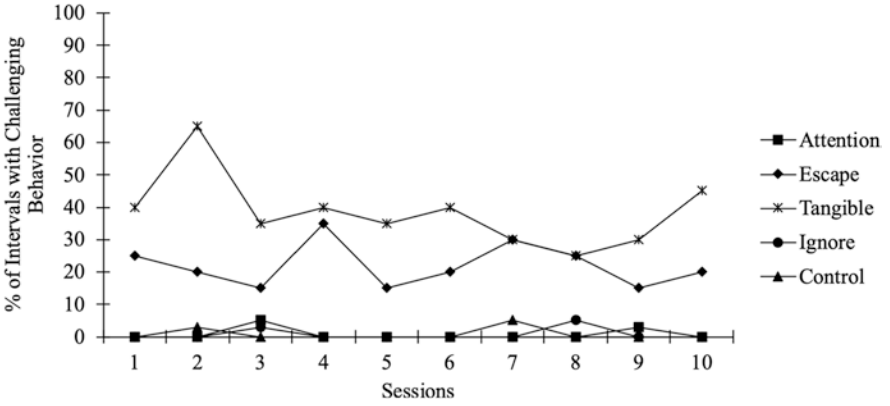


Fig. C.11 Functional analysis results for Client K. Conducted with 10-minute sessions

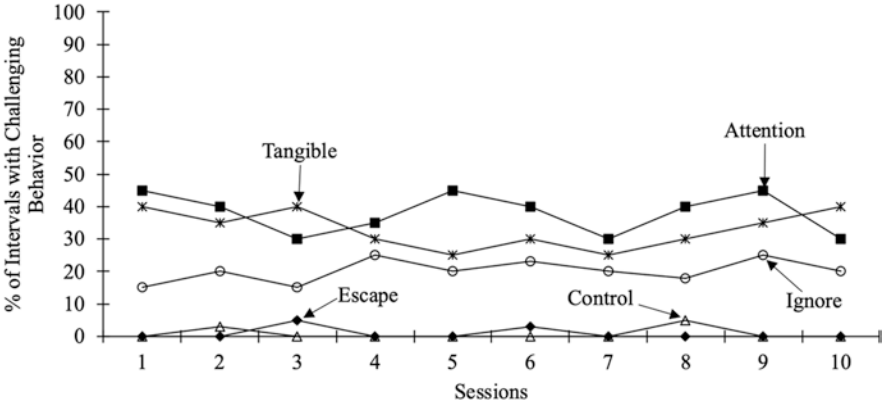


Fig. C.12 Functional analysis results for Client L. Conducted with 10-minute sessions

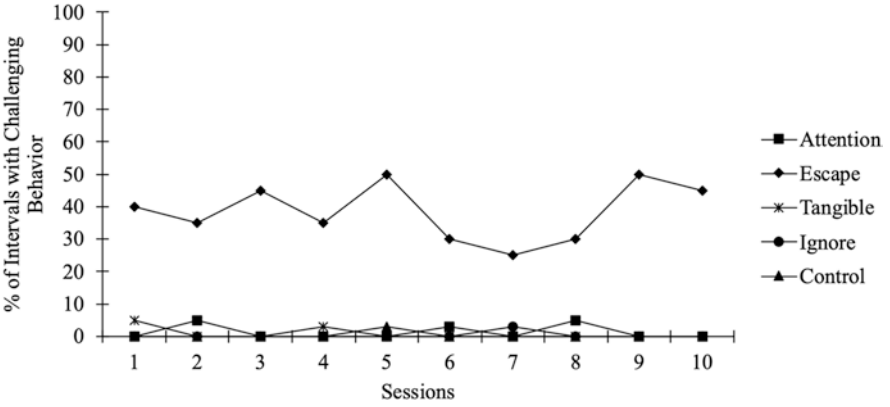


Fig. C.13 Functional analysis results for Client M. Conducted with 10-minute sessions

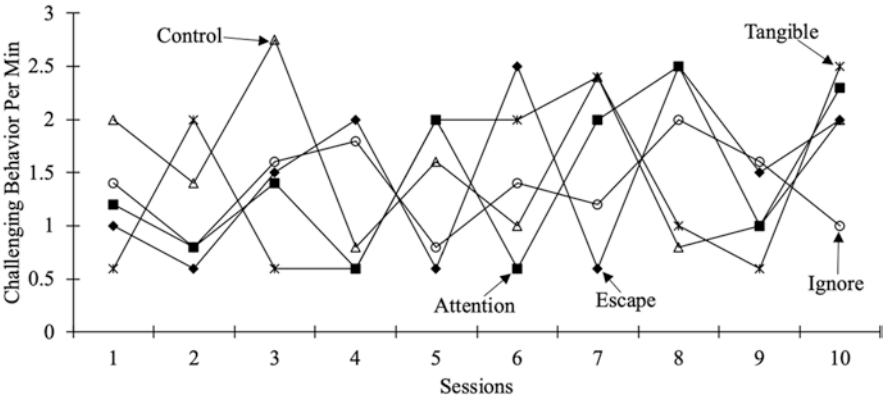


Fig. C.14 Functional analysis results for Client N. Conducted with 15-minute sessions

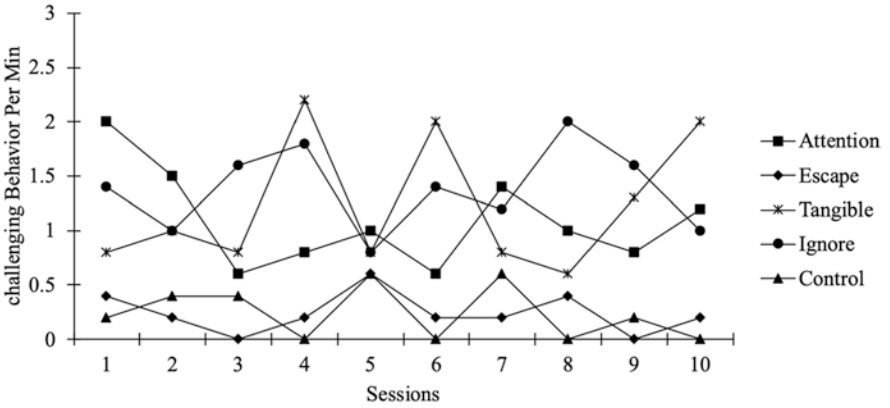


Fig. C.15 Functional analysis results for Client O. Conducted with 15-minute sessions

Appendix D: Functional Analysis Data Sets

Data Set 1 15-min Sessions			
Session Number	**Condition**	**Frequency**	**Rate**
1	Attention	15	
2	Escape	1	
3	Tangible	2	
4	Control	0	
5	Ignore	5	
6	Escape	0	
7	Tangible	0	
8	Control	2	
9	Attention	28	
10	Ignore	0	
11	Control	0	
12	Attention	30	
13	Ignore	3	
14	Escape	0	
15	Tangible	0	
16	Escape	0	
17	Attention	18	
18	Tangible	2	
19	Ignore	0	
20	Control	0	
21	Attention	25	
22	Control	1	
23	Escape	0	
24	Ignore	2	
25	Tangible	0	
26	Ignore	2	
27	Tangible	1	
28	Control	3	
29	Attention	24	
30	Escape	3	

Data Set 2 5-min Sessions			
Session Number	**Condition**	**Frequency**	**Rate**
1	Ignore	0	
2	Tangible	0	
3	Control	1	
4	Attention	0	
5	Escape	5	
6	Escape	8	
7	Tangible	1	
8	Control	0	
9	Attention	1	
10	Ignore	0	
11	Control	0	
12	Attention	0	
13	Ignore	0	
14	Escape	10	
15	Tangible	0	
16	Attention	1	
17	Control	1	
18	Escape	7	
19	Ignore	0	
20	Tangible	2	
21	Attention	0	
22	Control	0	
23	Escape	7	
24	Tangible	0	
25	Ignore	0	
26	Escape	13	
27	Tangible	1	
28	Control	1	
29	Attention	0	
30	Ignore	0	
31	Attention	0	
32	Escape	8	
33	Tangible	1	
34	Control	0	
35	Ignore	0	

Data Set 3 10-min Sessions			
Session Number	**Condition**	**Frequency**	**Rate**
1	Escape	10	
2	Tangible	12	
3	Attention	9	
4	Ignore	12	
5	Control	15	
6	Attention	15	
7	Control	10	
8	Escape	14	
9	Ignore	17	
10	Tangible	21	
11	Tangible	23	
12	Ignore	22	
13	Attention	10	
14	Escape	16	
15	Control	18	
16	Attention	17	
17	Tangible	22	
18	Control	19	
19	Escape	20	
20	Ignore	23	
21	Tangible	18	
22	Control	17	
23	Escape	19	
24	Attention	23	
25	Ignore	22	
26	Escape	20	
27	Tangible	15	
28	Control	14	
29	Attention	18	
30	Ignore	19	
31	Control	21	
32	Attention	25	
33	Tangible	17	
34	Escape	18	
35	Ignore	19	

Functional Analysis Data Sets
Supervisor Answer Sheet

- Data Set 1: Maintained by Access to Attention
- Data Set 2: Maintained by Escape
- Data Set 3: Maintained by Automatic Reinforcement

Appendix E: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizonal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

References

Avery, S. K., & Akers, J. S. (2021). The use of demand assessments: A brief review and practical guide. *Behavior Analysis in Practice, 14*, 1–12.

Beavers, G. A., Iwata, B. A., & Lerman, D. C. (2013). Thirty years of research on the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 46*(1), 1–21.

Davis, T. N., Durand, S., Fuentes, L., *Dacus, S., & *Blenden, K. (2014). Effects of a school-based functional analysis on subsequent classroom behaviors. *Education and Treatment of Children, 37,* 95–110.

Carr, J. E., Taylor, C. C., Wallander, R. J., & Reiss, M. L. (1996). A functional-analytic approach to the diagnosis of a transient tic disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 27*(3), 291–297.

Derby, K. M., Wacker, D. P., Peck, S., Sasso, G. A. R. Y., De Raad, A., Berg, W., … Ulrich, S. (1994). Functional analysis of separate topographies of aberrant behavior. *Journal of Applied Behavior Analysis, 27*(2), 267–278.

Derby, K. M., Hagopian, L., Fisher, W. W., Richman, D., Augustine, M., Fahs, A., & Thompson, R. (2000). Functional analysis of aberrant behavior through measurement of separate response topographies. *Journal of Applied Behavior Analysis, 33*(1), 113–117.

Fisher, W. W., Ninness, H. C., Piazza, C. C., & Owen-DeSchryver, J. S. (1996). On the reinforcing effects of the content of verbal attention. *Journal of Applied Behavior Analysis, 29*(2), 235–238.

Hagopian, L. P., Fisher, W. W., Thompson, R. H., Owen-DeSchryver, J., Iwata, B. A., & Wacker, D. P. (1997). Toward the development of structured criteria for interpretation of functional analysis data. *Journal of Applied Behavior Analysis, 30*(2), 313–326.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*(2), 197–209.

Kahng, S., Hausman, N. L., Fisher, A. B., Donaldson, J. M., Cox, J. R., Lugo, M., & Wiskow, K. M. (2015). The safety of functional analyses of self-injurious behavior. *Journal of Applied Behavior Analysis, 48*(1), 107–114.

Lalli, J. S., Mace, F. C., Wohn, T., & Livezey, K. (1995). Identification and modification of a response-class hierarchy. *Journal of Applied Behavior Analysis, 28*(4), 551–559.

Marcus, B. A., Vollmer, T. R., Swanson, V., Roane, H. R., & Ringdahl, J. E. (2001). An experimental analysis of aggression. *Behavior Modification, 25*(2), 189–213.

Matson, J. L. (2012). *Functional assessment for challenging behaviors*. Springer.

Northup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook, J., & DeRaad, A. (1991). A brief functional analysis of aggressive and alternative behavior in an outclinic setting. *Journal of Applied Behavior Analysis, 24*(3), 509–522.

Poling, A., Austin, J. L., Peterson, S. M., Mahoney, A., & Weeden, M. (2012). Ethical issues and considerations. In *Functional assessment for challenging behaviors* (pp. 213–233). Springer.

Roane, H. S., Fisher, W. W., Kelley, M. E., Mevers, J. L., & Bouxsein, K. J. (2013). Using modified visual-inspection criteria to interpret functional analysis outcomes. *Journal of Applied Behavior Analysis, 46*(1), 130–146.

Rispoli, M., Camargo, S., Machalicek, W., Lang, R., & Sigafoos, J. (2014). Functional communication training in the treatment of problem behavior maintained by access to rituals. *Journal of Applied Behavior Analysis, 47*(3), 580–593.

Van Camp, C. M., Lerman, D. C., Kelley, M. E., Roane, H. S., Contrucci, S. A., & Vorndran, C. M. (2000). Further analysis of idiosyncratic antecedent influences during the assessment and treatment of problem behavior. *Journal of Applied Behavior Analysis, 33*(2), 207–221.

Wallace, M. D., Iwata, B. A., Zhou, L., & Goff, G. A. (1999). Rapid assessment of the effects of restraint on self-injury and adaptive behavior. *Journal of Applied Behavior Analysis, 32*(4), 525–528.

Weeden, M., Mahoney, A., & Poling, A. (2010). Self-injurious behavior and functional analysis: Where are the descriptions of participant protections? *Research in Developmental Disabilities, 31*(2), 299–303.

Wiskirchen, R. R., Deochand, N., & Peterson, S. M. (2017). Functional analysis: A need for clinical decision support tools to weigh risks and benefits. *Behavior Analysis: Research and Practice, 17*(4), 325.

Chapter 10
Functional Analysis, Part 2

Topics Covered Within This Chapter

Topics
Alternative Conditions and Idiosyncratic Variables
Brief Functional Analysis
Trial-Based Functional Analysis
Latency-Based Functional Analysis
Synthesized Functional Analysis
Functional Analysis of Precursor Behavior

A functional analysis is not a set protocol, rather it is any experimental manipulation to identify reinforcement maintaining challenging behavior. With that, the specific conditions and methodology can be catered to meet the needs of the client, while still maintaining the experimental control that allows clinicians to identify reinforcement maintaining challenging behavior in order to develop effective treatments (Lydon et al., 2012). This chapter discusses some common variations of the traditional functional analysis procedure, but it is also important for your supervisees to know that this is a sampling of common variations. There is no limit to how procedures can be modified to meet the needs of their client.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_10].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_10

Alternative Conditions and Idiosyncratic Variables

In many cases, a traditional functional analysis yields clear results about the antecedents and consequences controlling challenging behavior. In other cases, the results are undifferentiated. Undifferentiated results certainly do not suggest that this particular behavior fails to abide by the laws governing behavior. Rather, it suggests that the specific environmental determinants associated with the target challenging behavior were not properly included and manipulated in the functional analysis. Clinicians have modified functional analysis conditions in several ways to capture the specific antecedents and consequences that maintain challenging behavior.

Iwata et al. (1994) included three test conditions, social disapproval, academic demand, and alone, as well as a control condition, unstructured play. Yet many clinicians have incorporated alternative conditions into functional analyses. For example, Rispoli et al. (2014a) included a condition in which experimenters blocked access to rituals, such a watching only one television program, but reinstated access to rituals contingent upon challenging behavior. Results indicated challenging behavior was maintained by access to rituals, allowing for the experimenters to develop a successful functional communication training intervention. Owens et al. (2020) conducted an analysis to determine if challenging behavior was maintained by caregiver's compliance with mands. Prior to both test and control conditions, they asked the participant what they wanted to do and how they would like to do it and then complied with all of the participant's mands for the next 2 minutes. This compliance continued across the control condition. During the test condition, they informed the participant that they wanted to play a different way (i.e., not complying with the participant's mands). Contingent upon challenging behavior, the experimenter resumed compliance with the participant's mands. The experimenters were able to develop effective function-based interventions based upon the clear, differentiated results produced by this mand analysis.

In some cases, the traditional functional analysis conditions are used, but need to be altered slightly to include relevant antecedents and consequences influencing challenging behavior. For example, a client's challenging behavior may be maintained by attention, but the traditional attention condition in which the clinician engages in an independent activity (e.g., reading a book) may not serve as a putative establishing operation for attention; therefore, this condition does not evoke challenging behavior. On the other hand, the clinician diverting attention to another individual, rather than to a solo activity, evokes challenging behavior (e.g., Call et al., 2005). There are many idiosyncratic variables that, when manipulated, may improve the clarity of functional analysis results, and ultimately lead to a more effective function-based intervention. We recommend you and your supervisees review Schlichenmeyer et al. (2013) for a more comprehensive review of idiosyncratic variables influencing functional analysis results.

Brief Functional Analysis

A brief functional analysis is conducted similarly to a traditional functional analysis except only one or two sessions of each condition are implemented (Northup et al., 1991). With fewer sessions, often a contingency reversal in which the putative reinforcer is delivered contingent upon appropriate behavior, such as a mand, can be conducted to further verify the functional relation between environmental variables and the target behaviors. A brief functional analysis may be an excellent option for supervisees who have limited time to conduct a functional analysis or supervisees working with clients who engage in severe problem behavior that may pose a risk of injury to self or others if repeated in a traditional functional analysis. Moreover, if brief functional analysis results are inconclusive, your supervisee can easily transition to a traditional functional analysis to further analyze the challenging behavior.

Trial-Based Functional Analysis

The trial-based functional analysis (TBFA) was designed to be implemented as single trials interspersed throughout the client's ongoing natural activities (Sigafoos & Saggers, 1995). Each trial consists of at least a test and control component, typically each 1-minute in duration. During the test component, the establishing operation is manipulated and contingent upon challenging behavior, the condition-specific reinforcer is delivered for the remainder of the 1-minute trial. During the control condition, the abolishing operation is manipulated. For example, during an attention test condition, attention is withdrawn (establishing operation) and delivered contingent upon challenging behavior and during an attention control condition, attention is delivered noncontingently (abolishing operation). As with all functional analyses, procedural variations exist. The duration of trials ranges from 2 to 6 minutes, the number of trials conducted per condition ranges from 3 to 20, and the order of component presentation (test then control or control then test) vary across studies (Rispoli et al., 2014b). During each trial, the implementer notes if challenging behavior did or did not occur. Those data are often displayed in a bar graph, which precludes analysis of within-condition patterns. We recommend you and your supervisees review Rispoli et al. (2014b) for a comprehensive review of TBFAs.

Latency-Based Functional Analysis

Latency-based functional analyses include conditions similar to those in a traditional functional analysis; however, a session is terminated contingent upon the first instance of the target challenging behavior (Thomasen-Sassi et al., 2011). A session continues until the target challenging behavior is emitted or a predetermined session

duration has lapsed. Rather than measuring the frequency or rate of challenging behavior as with a traditional functional analysis, the latency from the onset of the establishing operation to the occurrence of problem behavior is measured. The latency-based functional analysis may be beneficial for supervisees conducting functional analyses with clients whose challenging behavior poses such a high risk of injury to a degree that it would be unethical to conduct an assessment that relies on repeated occurrences of that behavior (e.g., traditional functional analysis). Latency-based FAs may also be well-suited for challenging behaviors in which occasioning for repeated occurrence is associated with other drawbacks, such the introduction of confounding variables. Davis et al. (2013) conducted a latency-based functional analysis for a participant who engaged in elopement. A traditional functional analysis poses challenges because participant retrieval is necessary for repeated occurrences, but this retrieval introduces the confounding variable of contingent attention. Latency-based FAs have drawbacks supervisees should consider, including that the client is exposed to the contingency only once per session, which may require more sessions to observe stable responding, thus, negating the predominant benefit of the latency functional analysis.

Synthesized Functional Analysis

A synthesized functional analysis contains test conditions in which multiple contingencies are evaluated simultaneously. For example, contingent upon challenging behavior in a synthesized test condition, a participant may receive both escape from demands and access to tangibles. Hanley et al. (2014) describe the interview-informed synthesized contingency analysis in which a caregiver interview informs the synthesized conditions to evaluate. Research on the efficacy of the IISCA is ongoing; therefore, supervises should consider evaluating synthesized conditions after a traditional functional analysis fails to produce differentiated results. Moreover, with emerging literature on this analysis, encourage your supervisees to closely follow upcoming research.

Functional Analysis of Precursor Behaviors

In some cases, challenging behavior is reliably preceded by another behavior. For example, an individual who engages in aggression may first pace the room before kicking or hitting. In situations in which your supervisee's clients engage in a challenging behavior that presents a significantly high risk of injury and this behavior is reliably preceded by another behavior, they may consider conducting a functional analysis of the precursor behavior rather than the target challenging behavior. A precursor behavior must be empirically validated prior to being selected for the functional analysis. An anecdotal report of a precursor behavior is not sufficient

enough to justify the functional analysis of the precursor behavior in lieu of the target challenging behavior. Borrero and Borrero (2008) validated precursors to challenging behavior using both comparative probability analyses and lag-sequential analyses. A functional analysis on both the precursor and target challenging behavior confirmed the two behaviors served the same function, supporting the notion of utilizing the results of a functional analysis of precursor behavior to inform a function-based intervention of the target challenging behavior.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–35:00	Supervisee Presentations
35:00–55:00	Interpret Functional Analysis Graphs
55:00–60:00	Knowledge Check

Materials Needed

- Electronic or hard copies of the journal articles listed below, to be distributed to supervisees prior to the meeting
- Timer
- Stimuli to signal time remaining during supervisee presentations
- Appendix A: *Interpreting Brief Functional Analysis Graphs,* 1 copy per supervisee
- Appendix B: *Interpreting trial-based Functional Analysis Graphs*, 1 copy per supervisee
- Appendix C: *Interpreting latency Functional Analysis Graphs*, 1 copy per supervisee
- Appendix D: *Trial-based Functional Analysis Data Sets*, 1 copy per supervisee
- Appendix E: *Alternative FA Procedural Fidelity Checklist*, 1 copy per supervisee

Reading Assignments

At least 1 week prior to your group supervision meeting, assign your supervisees to read about additional functional analyses procedures. We recommend that all supervisees read each of these articles. Additionally assign each supervisee to be responsible for summarizing one article during the group supervision meeting. This prior assignment will allow them to be prepared for this summary presentation.

Considering there are six articles below and your group supervision meeting may have fewer than six supervisees, you can take on the responsibility of any unassigned articles. On the other hand, if your group supervision meeting contains more than six supervisees, include two supervisees for the following topics, listed in order of priority for assignment of two or more supervisees: trial-based functional analysis, functional analysis of precursor behavior, latency-based functional analysis, and idiosyncratic variables affecting functional analysis results.

Inform your supervisees that they will be responsible for a 4-minute presentation on their selected topic. The presentation should involve a 1-minute summary explaining the defining features of the assigned functional analysis, a 1-minute explanation of special considerations when considering the assigned functional analysis, then a 2-minute summary of the specific article.

- Schlichenmeyer et al. (2013): Idiosyncratic variables affecting functional analysis results.
- Tincani et al. (1999): Brief functional analysis
- Rispoli et al. (2014b): Trial-based functional analysis
- Lambert et al. (2017): Latency-based functional analysis
- Hanley et al. (2014): Synthesized functional analysis
- Herscovitch et al. (2009): Functional analysis of precursor behavior

Supervisee Presentations

Your supervisees should have taken time to prepare for the presentation prior to this meeting. Therefore, you do not need to allocate time for them to read their assigned article and plan their presentation. However, we suggested allocating the first 8 minutes of the group supervision meeting to refresh their memory on their article and presentation, and when applicable, collaborate with their topic partner to finalize the logistics of their 4-minute presentation.

When the supervisee or supervisee pair presents, listen carefully to their description of the functional analysis. Listen for information that should be corrected so the group of supervisees are not mislead by an erroneous presentation. Also publicly praise accurate presentations. At the end of the 4-minute presentation, add any important information that was omitted by the supervisee so that all supervisees get an accurate and complete summary of each of the six functional analysis approaches.

We highly encourage you to use a timer to keep presentations within the time constraints. Four minutes is a very short amount of time and it is likely that, if not prompted, your supervisees will use more time than allotted. We recommend sitting behind all of your supervisees during the presentations so that you can signal to the presenter(s) without distracting the audience. A good approach is to use signal cards or paper, such as a yellow card that indicates there is 2 minutes remaining and a red card that indicates there is 30 seconds remaining. This will help keep supervisees on time and the 2-minute and 30-second remaining signals will ensure that they were not caught by surprise about the end of the presentation, leaving important information at the end of their presentation omitted.

Interpret Functional Analysis Graphs

Of the six variations to the traditional functional analysis presented in this chapter, the results are graphed and visually analyzed in the same general approach as the traditional functional analysis for three variations: idiosyncratic variables and/or alternative conditions, synthesized functional analysis, and functional analysis of precursor behavior. On the contrary, the results of a brief functional analysis, trial-based functional analysis, and latency-based functional analysis are visually displayed in a format with which your supervisees may be unfamiliar. Therefore, the next 20 minutes will be used to teach supervisees how to graph and evaluate results from these variations.

Interpret Brief Functional Analysis Graphs

Begin with teaching supervisees how to evaluate brief functional analysis graphs. Distribute the *Interpreting Brief Functional Analysis Graphs* handout (Appendix A) either electronically, via hard copy, or present the graphs in the PowerPoint slides for this group supervision meeting. For the first one to two graphs, vocally describe for your supervisees how to interpret the graphs. After you draw a conclusion (e.g., this behavior is maintained by access to tangibles), inform your supervisees what you would recommend be the next course of action based solely on the results of the graph. Specifically, would you recommend that the clinician begin treatment based on a specific function? Or do you recommend continuing to conduct sessions so that the brief functional analysis is transitioned to a full traditional functional analysis? Or perhaps you recommend verifying the results with a contingency reversal? Or do you recommend modifying the functional analysis in another way? It is important to remind your supervisees that in real life, treatment decisions will be made based on more than just brief functional analysis results, but the purpose of this activity is to both to learn how analyze the data and also how to use them to inform your decisions.

After vocally interpreting the first one or two graphs, ask your supervisees to interpret the remaining graphs. If presenting graphs on PowerPoint, present each graph for about 30 seconds, then ask for a supervisee to volunteer to report their conclusion regarding the function of the behavior. Then ask another supervisee to make a recommendation on how to proceed with this client, based solely on this result. As with all activities, provide specific praise for correct responses. Correct errors by not only providing the accurate response, but also providing a rationale for the accurate response. Regardless if a response is correct or incorrect, always praise supervisees for volunteering to respond and contribute to the group's growth and learning.

Unlike the traditional functional analysis, no resources are available to guide supervisees in the analysis of brief functional analysis graphs. We adapted the procedures outlined by Hagopian et al. (1997) and Roane et al. (2013) for interpreting traditional functional analysis graphs to be better suited for brief functional

analyses; see Table 10.1. While we hope this will be a helpful resource for you and your supervisees, these analysis procedures have not been validated.

Table 10.1 Guide for interpreting brief functional analysis results

Steps to interpreting brief functional analysis results
1. Identify the control session data point.
2. Identify the single test session for each condition. If the test condition data point is above the control condition data point, considered this differentiated. If not, consider this undifferentiated. Repeat for each condition.
3. If any of the following apply, conclude the behavior is maintained by automatic reinforcement: (a) behavior is high across all sessions or (b) behavior is higher in sessions with less external stimulation (attention and tangible) and lower in conditions with high external stimulation (demand and control).
4. If two or more conditions are differentiated, consider this multiply maintained.

Interpret Trial-Based Functional Analysis Graphs

Next, you will teach supervisees how to evaluate trial-based functional analysis graphs. Distribute the *Interpreting trial-based functional analysis Graphs* handout (Appendix B) either electronically, via hard copy, or present the graphs in the PowerPoint slides for this group supervision meeting. Similar to the activity for interpreting brief functional analysis graphs, vocally describe for your supervisees how to interpret the first one to three trial-based functional analysis graphs. Again, this includes both drawing a conclusion regarding function and informing your supervisees what you would recommend as the next steps to treating this challenging behavior. This includes, but is not limited to, (a) utilizing the results to develop a function-based treatment, (b) continuing more trials of the trial-based functional analysis, perhaps with modifications, or (c) utilizing a different functional analysis procedure.

Next, instruct your supervisees to independently interpret the remaining graphs in a fashion similar to their independent analysis of brief functional analysis graphs. That is, present each graph for about 30 seconds, call for a supervisee to volunteer their interpretation of the graph and another supervisee to volunteer their recommendation for the next step in treating this challenging behavior. Continue to effectively use specific praise and error correction techniques described above.

Unlike the traditional functional analysis, no resources are available to guide supervisees in the analysis of trial-based functional analysis graphs, so we developed the guide below. See Table 10.2. While we hope this will be a helpful resource for you and your supervisees, these analysis procedures have not been validated. They should be used with caution and supplemented with sound professional judgment.

Interpret Latency-Based Functional Analysis Graphs

Finally, you will teach supervisees how to evaluate latency-based functional analysis graphs. Distribute the *Interpreting Latency-based functional analysis Graphs* handout (Appendix C) either electronically, via hard copy, or present the graphs in

Table 10.2 Guide for interpreting trial-based functional analysis results

Steps to interpreting trial-based functional analysis results
1. Identify the bar graphs for the attention control and the attention test condition. If challenging behavior occurred in notably more attention test trials relative to attention control trials, conclude this behavior is maintained by attention.
2. Identify the bar graphs for the tangible control and the tangible test condition. If challenging behavior occurred in notably more tangible test trials relative to tangible control trials, conclude this behavior is maintained by access to tangible items.
3. Identify the bar graphs for the escape control and the escape test condition. If challenging behavior occurred in notably more escape test trials relative to escape control trials, conclude this behavior is maintained by access to escape.
4. If any of the following apply, conclude the behavior is maintained by automatic reinforcement: (a) behavior occurs across a high percentage of ignore trials (either or both segments) or (b) behavior occurs fairly evenly across all control and test trials.

the PowerPoint slides for this group supervision meeting. Follow the same process as outlined with the previous two results interpretation activities, vocally describe how to interpret the first one or two graphs and then directing them analyze and interpret results independently.

Unfortunately, no resources are available to guide supervisees in the analysis of latency-based functional analysis graphs either. We adapted the procedures outlined by Hagopian et al. (1997) and Roane et al. (2013) for interpreting traditional functional analysis graphs to be better suited for latency-based FAs. See Table 10.3. As with our other newly developed guides, this guide should not replace experience, expertise, and professional judgment as this has yet to be validated.

Table 10.3 Guide for interpreting latency-based functional analysis results

Steps to interpreting latency-based functional analysis results
1. Identify the control condition data path.
2. Identify a single test condition. If the majority of the test condition data points are below the control condition data path, considered this differentiated. If not, consider this undifferentiated. Repeat for each condition.
3. If any of the following apply, conclude the behavior is maintained by automatic reinforcement: (a) behavior occurs with the shortest latency in the ignore condition and is differentiated from the control condition, (b) behavior occurs with a short latency across all conditions, or (c) behavior occurs with a shorter latency in conditions with less external stimulation (ignore, attention, and tangible) and with a longer latency in conditions with high external stimulation (demand and control).
4. If there is a data path from a test condition with an upward trend, do not consider this differentiated.
5. If two or more conditions are differentiated, consider this multiply maintained, unless the lowest differentiated condition is ignored, which should be interpreted as an automatic function.
6. If three or more conditions are differentiated, but one of these is the ignore condition, which is not the lowest, do not interpret the behavior to be automatically maintained, but do interpret the other two conditions to maintain challenging behavior.
7. If two conditions are differentiated, but one of these is the ignore condition, which is lowest, interpret the behavior to be multiply maintained by automatic reinforcement and the other condition.

Knowledge Check

1. Explain the major differences between a brief functional analysis and a traditional functional analysis.
2. Name one reason you may want to conduct a trial-based functional analysis as opposed to a traditional functional analysis.
3. Name one reason you may want to conduct a latency-based functional analysis as opposed to a traditional functional analysis.
4. Give three examples of idiosyncratic variables that may affect functional analysis outcomes.
5. What is one strength and one limitation of a functional analysis of precursor behavior?

Homework for Individual Supervision without a Client

1. Graph three trial-based functional analysis data sets (provided in Appendix D). Interpret the results.
2. Choose one of the functional analysis methodologies discussed in this chapter to implement with a client. Develop a procedural fidelity checklist for that functional analysis using Appendix E.
3. Develop a data sheet that corresponds to the functional analysis protocol.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 50-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review Functional Analysis Graph and Interpretation Homework
10:00–50:00	Role-Play Functional Analysis with Feedback


Materials Needed


- Appendix E: *Graph Component Checklist*, 1 copy per supervisee Supervisee-developed procedural fidelity checklists, sufficient copies of sessions for role play activity
- Materials necessary for functional analysis role play (e.g., preferred items, demand tasks)

Homework Review

Review your supervisee's graphs using the *Graph Component Checklist* (Appendix F). It is helpful for your supervisee to watch you analyze the graph according to these checklists. As you do so, provide specific praise to your supervisee for inclusion of the components and provide both specific feedback and rationale for any components that are not incorporated into the graph. After checking for the components of each graph, ask your supervisee to share their interpretation of the results (i.e., function maintaining challenging behavior). Again, deliver specific praise for correct interpretations. In response to errors, model for the supervisee how to determine the correct function of challenging behavior, providing a rationale for each step in the interpretation process.

The graphed data are available on the final two pages of Appendix D (do not distribute those pages to your supervisees). You can use this to quick gauge accuracy of the graph. Correct interpretations of the functional analysis data sets are found in Table 10.4.

Table 10.4 Functional analysis interpretation activity: Correct interpretation

Data set number	Correct interpretation of results
1	Escape function
2	Attention function
3	Automatic function

Role Play

The final portion of your individual supervision meeting will involve a role play of the functional analysis conditions that your supervisee developed as their homework assignment. The specific number of conditions to role play will be determined on the type of functional analysis they selected; therefore, the duration of this activity could vary significantly. Prior to beginning the role play, ask your supervisee to provide you with the protocols, if they have not done so already. You should read the

protocols aloud to ensure that you have the correct protocol and any potential typos or easy-to-misunderstand content can be identified and rectified prior to the role play.

For the role-play activity, you will role-play as a client and your supervisee will implement a functional analysis. Similar to the last chapter, we suggest you select a challenging behavior topography that the supervisee is likely to encounter at their field experience placement for an authentic experience, but modify the intensity of the behavior to eliminate risk of injury to either you or your supervisee. We also suggest that you maintain a moderate frequency of target challenging behavior and only occasionally engage in nontarget challenging behavior. While you want an authentic experience, you also want to set your supervisee up for success in their initial role play. As your supervisee demonstrates success in implementing procedures with fidelity, feel free to being throwing curve balls, so to speak, as the confederate client (e.g., engaging in challenging behavior when the establishing operation is no longer in place, engaging in nontarget challenging behavior).

Your supervisee will role-play as the implementer. Similar to the traditional functional analysis role play, deliver feedback after completing each condition. Use your best judgment as when to support a faltering supervisee, but doing so mid-role play compromises the ability to provide an accurate measure of procedural fidelity, which can be very helpful in your supervisee's skill development. Ideally, you would measure procedural fidelity as you are simultaneously playing the role of the client, but this is not always feasible. Alternatively, you can video record the role-play activity, giving you and your supervisee the opportunity to measure the procedural fidelity simultaneously.

When the role play is complete, summarize the steps your supervisee completed correctly and those that need to be practiced to improve fidelity. If procedural fidelity was below 80% of steps correct for any condition, we recommend you schedule another role-play activity and only give your approval for your supervisee to implement this functional analysis methodology until they reach at least 80% procedural fidelity across all conditions.

Homework for Individual Supervision with a Client

1. If needed, revise procedural fidelity checklist.
2. Provide the supervisor with an up-to-date procedural fidelity checklist for all conditions to be used at the next meeting. Be sure to specify to your supervisee if you prefer a hard copy or electronic copy.
3. Develop data sheets or any other relevant data collection materials (e.g., electronic data collection) to be used with the functional analysis to be implemented in the next supervision meeting.
4. Develop a template to graph the results of the functional analysis to be implemented during the next supervision session. Be sure to approve the graphing software your supervisee will use (e.g., Microsoft Excel).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Review Procedural Fidelity Checklist and Data Collection Procedure
10:00–45:00	Conduct Functional Analysis with Support

Materials Needed

- Procedural fidelity checklist in supervisor's preferred format (hard copy or electronic)
- Materials necessary for functional analysis role play (e.g., preferred items, demand tasks)

Review Procedural Fidelity Checklist and Data Collection Procedure

During this session, you will support your supervisee in implementing the functional analysis methodology they selected. Prior to implementation, review the updated protocol and procedural fidelity checklist. You may wish to do this well before actual implementation so that your supervisee's attention is fully directed to this activity rather than divided between this and working with a client.

Conduct a Functional Analysis

Your supervisee will conduct the selected functional analysis methodology with a client. In the event you supervisee is not working with a client who would benefit from a functional analysis you could remedy this by the following: (a) identify a client at your supervisee's field experience placement that is in need of a functional analysis and ask if your supervisee can volunteer to assist in implementation or (b) role-play a functional analysis that is more authentic than the previous supervision meeting with the assistance of additional supervisees.

We highly recommend the first option. If you cannot complete the recommended activity, note that additional supervision meetings with the client may be necessary to meet current BACB® field experience requirements. Moreover, the role-play option will require an additional volunteers play various roles. Your supervisee will implement the functional analysis, another individual will play the role of a client, and the last individual will collect data. You will measure procedural fidelity. We encourage you to instruct the volunteer role

playing as the client to increase the difficulty of implementation during this role play in order to advance your supervisee's skills beyond the activity of the previous meeting.

During your supervisee's functional analysis implementation, client safety and accurate implementation are key. Therefore, a sufficient number of experienced BCBAs should be present. We recommend that during this experience, you maintain a higher staff-to-client ratio than the agency would recommend during normal administrations of a functional analysis. You may prefer to serve as one of the implementers or focus all of your attention to supporting your supervisee. The decision is yours to make, but keep in mind that the staffing ratio will need to be adjusted accordingly.

Your supervisee will implement the selected functional analysis for at least a 35-minute observation. This observation may be divided into multiple sessions if necessary. To ensure your supervisee's success, limit them to implementation only. Do not allow them to simultaneously collect data on the client's challenging behavior or self-evaluate procedural fidelity during implementation. This will allow them to focus on the development of their implementation skillset. You and other experienced BCBAs in the session are encouraged to provide immediate feedback to the supervisee, when appropriate. In order to prevent invalidating the functional analysis, correct errors immediately during the session. If this 35-minute observation was not sufficient to provide feedback to all conditions and/or for your supervisee to meet an acceptable level of implementation fidelity, schedule additional observations. Moreover, you should repeat observations until your supervisee reaches 80% procedural fidelity with all trials or conditions of the selected functional analysis methodology. Under no circumstances should a supervisee be allowed to lead the implementation of a functional analysis methodology prior to meeting this criterion.

At the end of the observation, share the procedural fidelity data you collected on their implementation. Provide this feedback in a quiet and distraction free setting. As you review errors they committed, provide a rational for the accurate implementation. As always, deliver sufficient specific praise so that you deliver a balance of feedback between praise and correction.

Mastery Criteria

In order to progress from this lesson, your supervisee must conduct and the selected functional analysis methodology and (a) accurately collect data with at least 80% agreement and (b) conduct the assessment with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Observe your supervisee provide instruction to another individual implementing this functional analysis methodology (e.g., another trainee, a caregiver, a teacher).
- ☐ Observe your supervisee conduct a different functional analysis methodology.

Appendix A: Interpreting Brief Functional Analysis Graphs

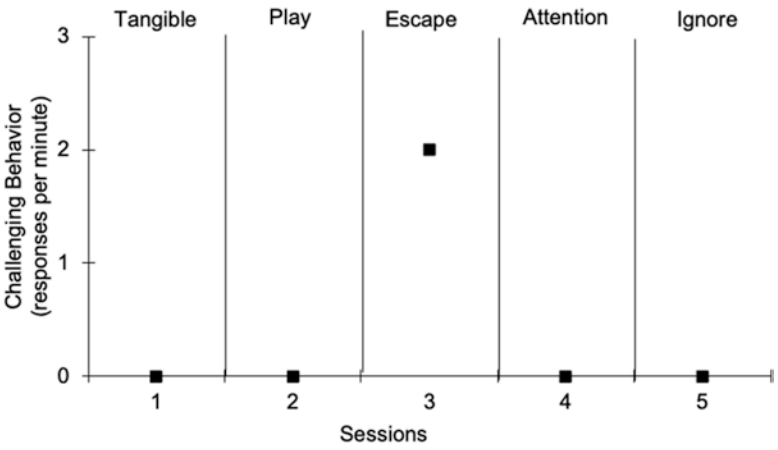


Fig. A.1 Brief functional analysis results for Client A

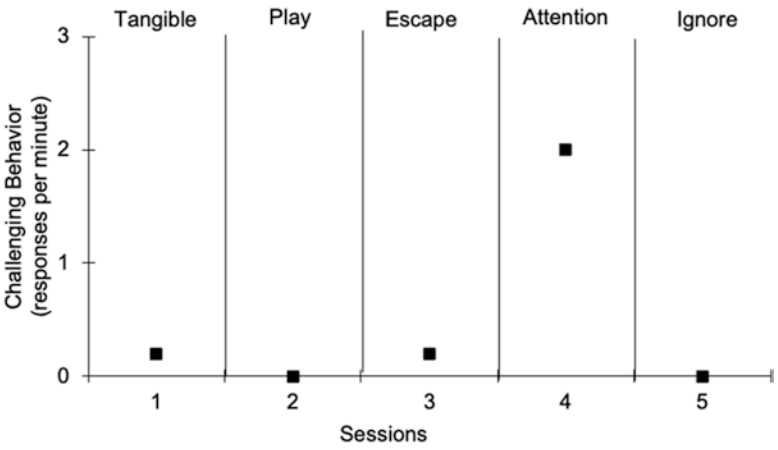


Fig. A.2 Brief functional analysis results for Client B

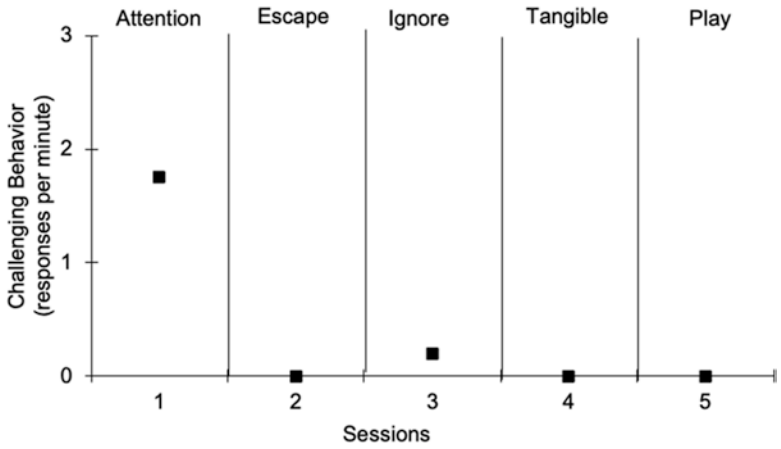


Fig. A.3 Brief functional analysis results for Client C

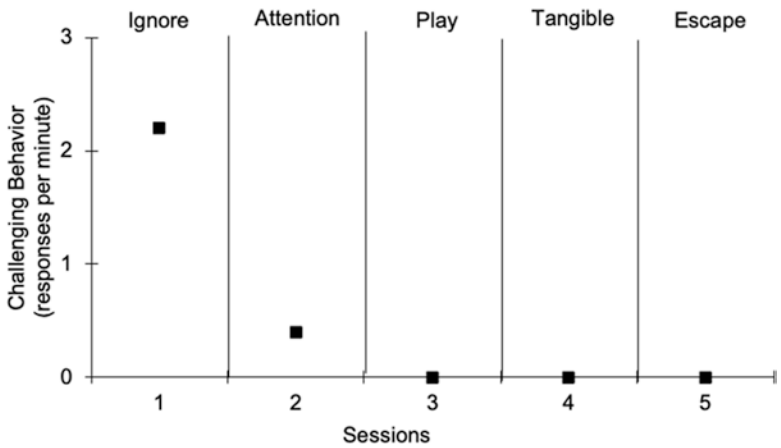


Fig. A.4 Brief functional analysis results for Client D

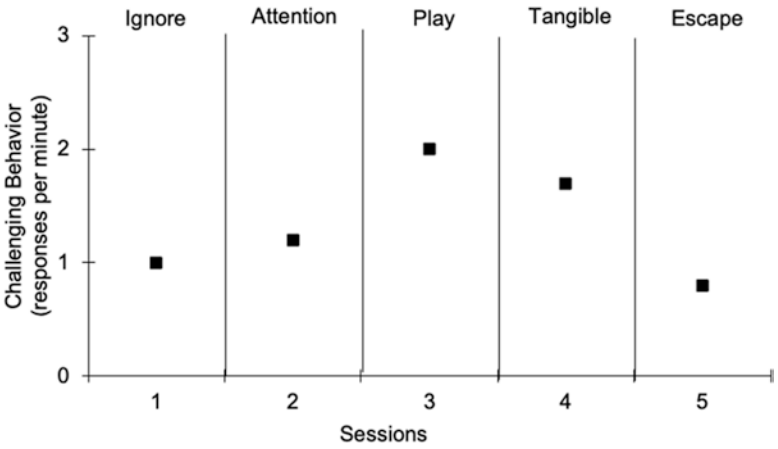


Fig. A.5 Brief functional analysis results for Client E

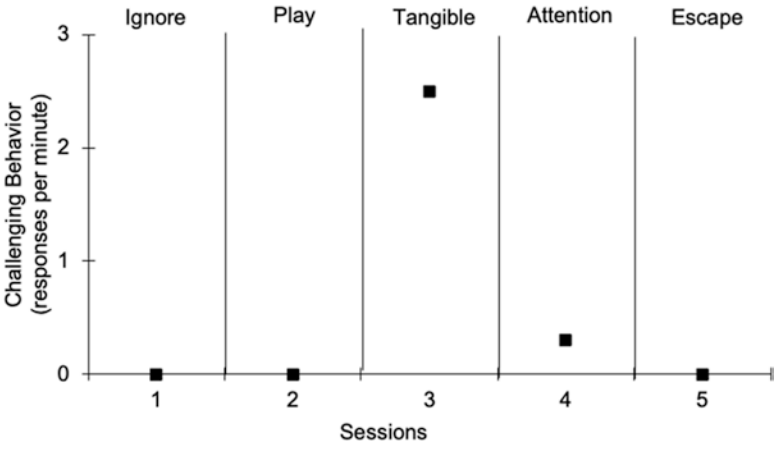


Fig. A.6 Brief functional analysis results for Client F

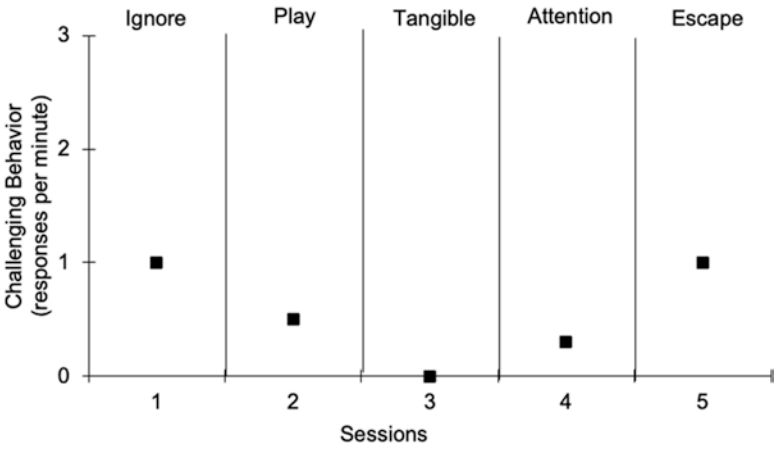


Fig. A.7 Brief functional analysis results for Client G

Interpreting Brief Functional Analysis Graphs

Supervisor Answer Sheet

- Figure A.1: Maintained by Escape
- Figure A.2: Maintained by Attention
- Figure A.3: Maintained by Attention
- Figure A.4: Maintained by Automatic Reinforcement
- Figure A.5: Maintained by Automatic Reinforcement
- Figure A.6: Maintained by Tangible
- Figure A.7: Undifferentiated Results

Appendix B: Interpreting Trial-Based Functional Analysis Graphs

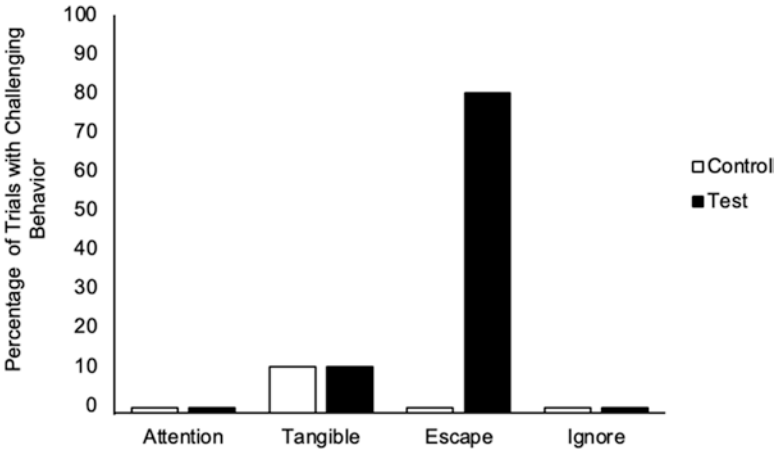


Fig. B.1 TBFA results for Client A

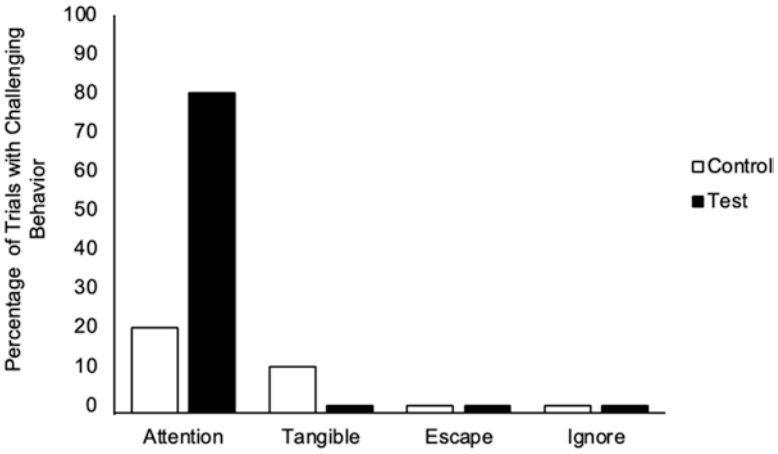


Fig. B.2 TBFA results for Client B

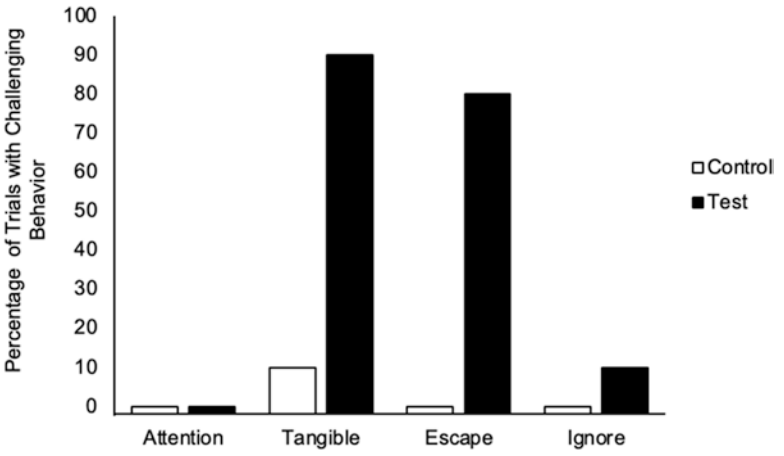


Fig. B.3 TBFA results for Client C

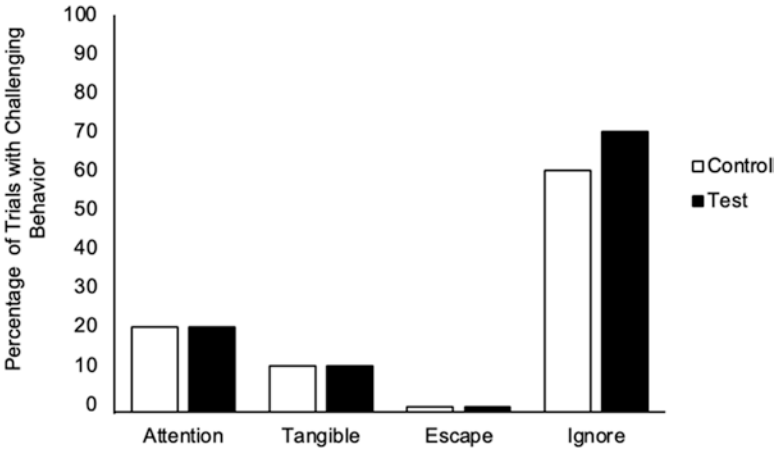


Fig. B.4 TBFA results for Client D

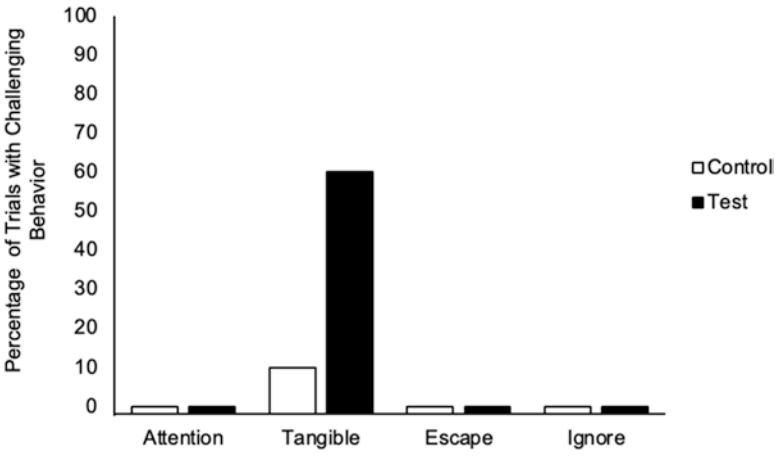


Fig. B.5 TBFA Brief functional analysis results for Client E

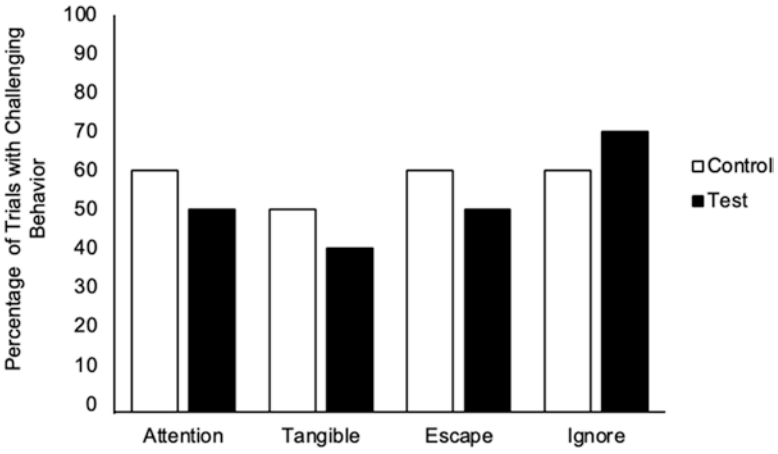


Fig. B.6 TBFA results for Client F

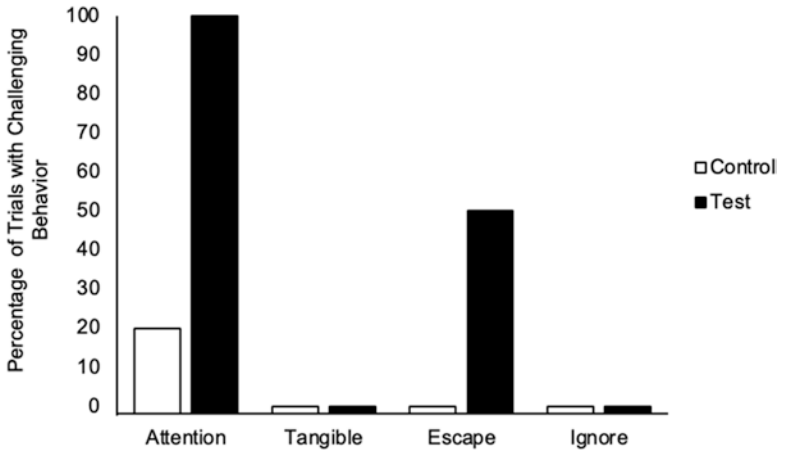


Fig. B.7 TBFA results for Client G

Interpreting Trial-Based Functional Analysis Graphs

Supervisor Answer Sheet

- Figure B.1: Maintained by Escape
- Figure B.2: Maintained by Attention
- Figure B.3: Maintained by Tangible and Escape
- Figure B.4: Maintained by Automatic Reinforcement
- Figure B.5: Maintained by Tangible
- Figure B.6: Maintained by Automatic Reinforcement
- Figure B.7: Maintained by Attention and Escape

Appendix C: Interpreting Latency Functional Analysis Graphs

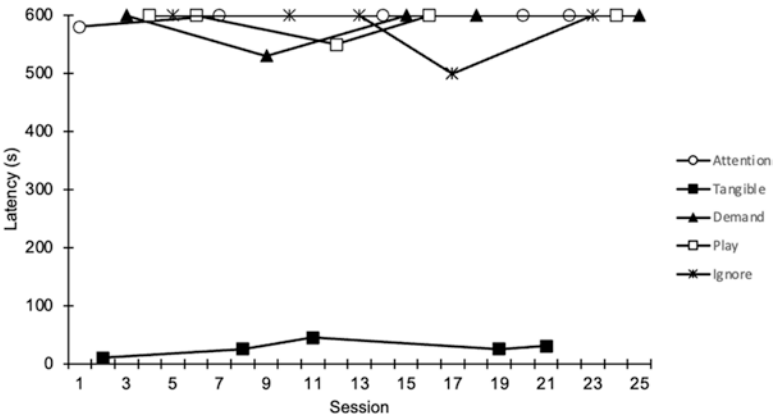


Fig. C.1 Latency functional analysis results for Client A

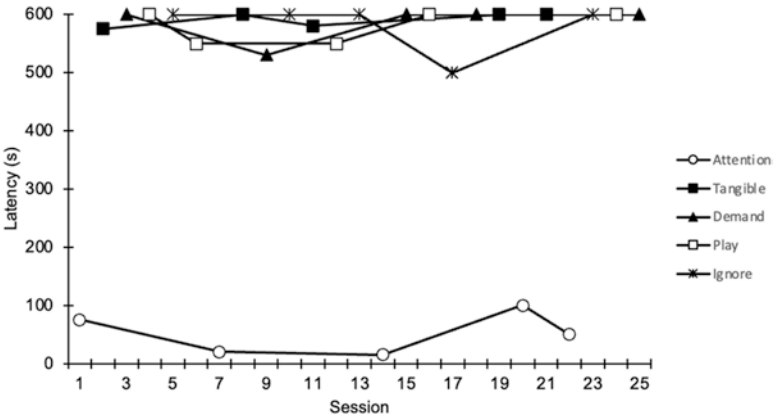


Fig. C.2 Latency functional analysis results for Client B

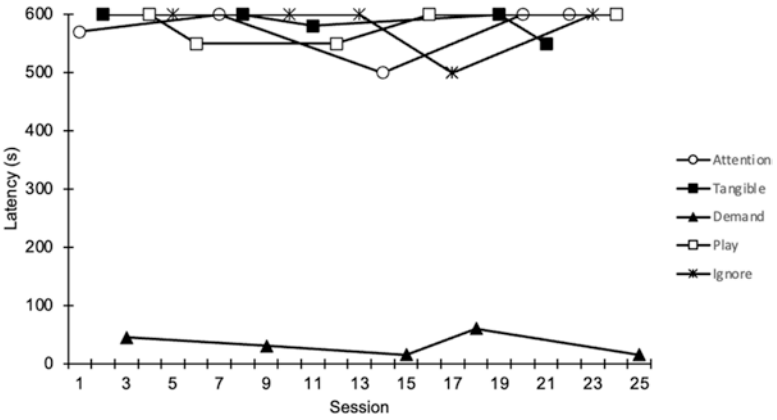


Fig. C.3 Latency functional analysis results for Client C

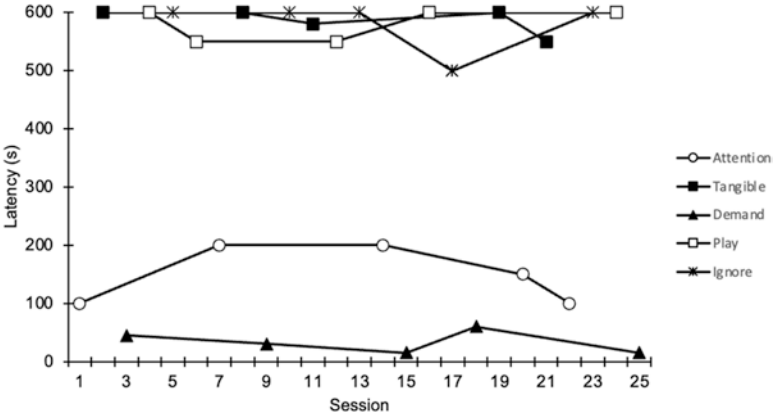


Fig. C.4 Latency functional analysis results for Client D

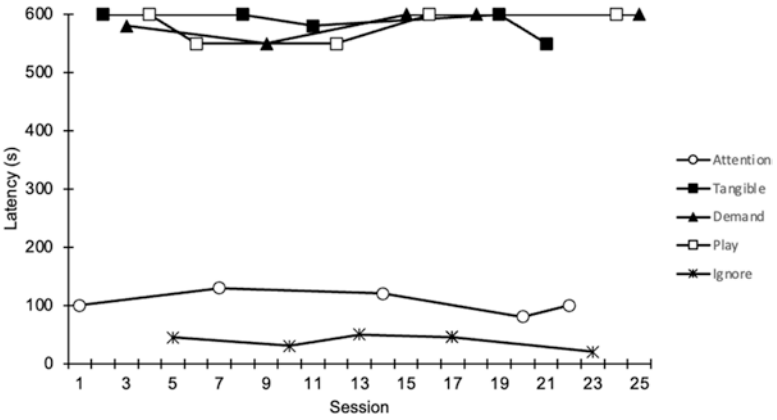


Fig. C.5 Latency functional analysis results for Client E

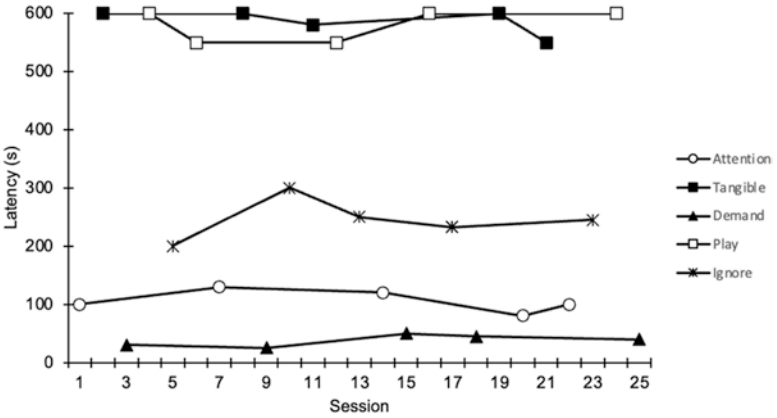


Fig. C.6 Latency functional analysis results for Client F

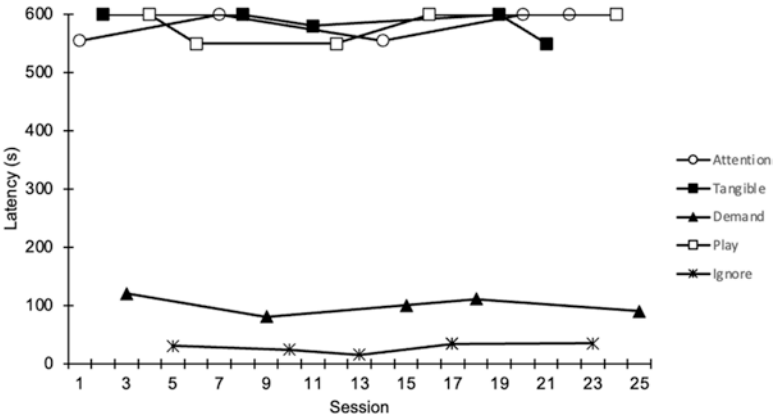


Fig. C.7 Latency functional analysis results for Client G

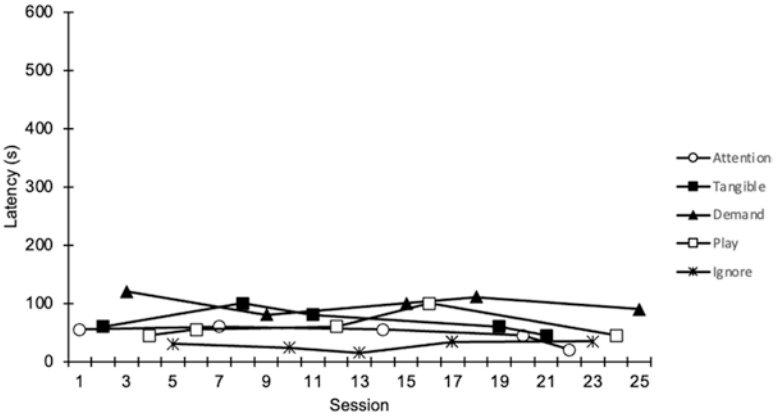


Fig. C.8 Latency functional analysis results for Client H

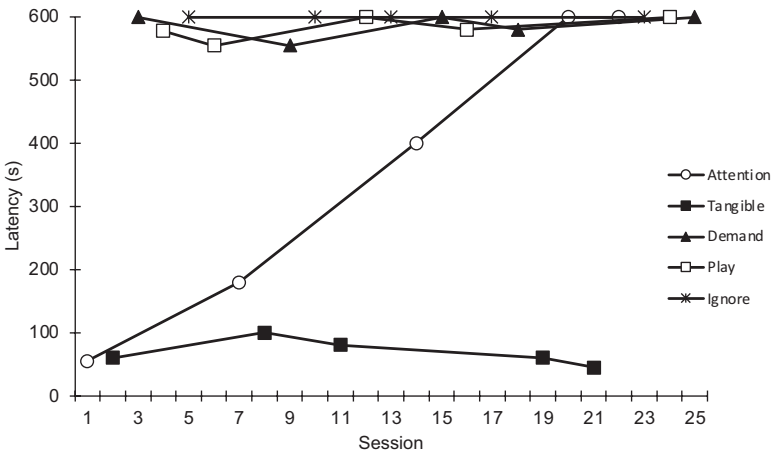


Fig. C.9 Latency functional analysis results for Client I

Interpreting Latency Functional Analysis Graphs

Supervisor Answer Sheet

- Figure C.1: Maintained by Tangible
- Figure C.2: Maintained by Attention
- Figure C.3: Maintained by Escape
- Figure C.4: Maintained by Attention and Escape
- Figure C.5: Maintained by Automatic Reinforcement
- Figure C.6: Maintained by Attention and Escape
- Figure C.7: Maintained by Automatic Reinforcement and Escape
- Figure C.8: Maintained by Automatic Reinforcement
- Figure C.9: Maintained by Tangible

Appendix D: TBFA Data Sets

Data Set 1			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
1	Attention	Control	−
2		Test	−
3	Escape	Control	−
4		Test	+
5	Tangible	Control	−
6		Test	−
7	Ignore	Control	−
8		Test	+
9	Tangible	Control	−
10		Test	−
11	Attention	Control	−
12		Test	−
13	Ignore	Control	−
14		Test	−
15	Escape	Control	−
16		Test	−
17	Ignore	Control	−
18		Test	−
19	Escape	Control	−
20		Test	+
21	Attention	Control	−
22		Test	−
23	Tangible	Control	−
24		Test	−
25	Escape	Control	−
26		Test	+
27	Ignore	Control	−
28		Test	−
29	Attention	Control	−
30		Test	−
31	Tangible	Control	−
32		Test	−
33	Attention	Control	−
34		Test	−
35	Escape	Control	−
36		Test	+
37	Tangible	Control	−
38		Test	−
39	Ignore	Control	−
40		Test	−

Data Set 1			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
41	Ignore	Control	−
42		Test	−
43	Escape	Control	−
44		Test	+
45	Attention	Control	−
46		Test	−
47	Tangible	Control	−
48		Test	−
49	Tangible	Control	−
50		Test	+
51	Attention	Control	−
52		Test	−
53	Ignore	Control	−
54		Test	−
55	Escape	Control	−
56		Test	+
57	Tangible	Control	−
58		Test	−
59	Escape	Control	−
60		Test	+
61	Ignore	Control	−
62		Test	−
63	Attention	Control	−
64		Test	−

Data Set 2			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
1	Attention	Control	+
2		Test	+
3	Escape	Control	−
4		Test	−
5	Tangible	Control	−
6		Test	−
7	Ignore	Control	−
8		Test	−
9	Tangible	Control	−
10		Test	−
11	Attention	Control	−
12		Test	+
13	Ignore	Control	−
14		Test	−
15	Escape	Control	−
16		Test	−
17	Ignore	Control	−
18		Test	−
19	Escape	Control	−
20		Test	−
21	Attention	Control	−
22		Test	+
23	Tangible	Control	−
24		Test	−
25	Escape	Control	−
26		Test	−
27	Ignore	Control	−
28		Test	−
29	Attention	Control	−
30		Test	−
31	Tangible	Control	+
32		Test	−
33	Attention	Control	−
34		Test	+
35	Escape	Control	−
36		Test	+
37	Tangible	Control	−
38		Test	−
39	Ignore	Control	−
40		Test	−

Data Set 2			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
41	Ignore	Control	−
42		Test	−
43	Escape	Control	−
44		Test	−
45	Attention	Control	−
46		Test	+
47	Tangible	Control	−
48		Test	−
49	Tangible	Control	−
50		Test	−
51	Attention	Control	−
52		Test	+
53	Ignore	Control	−
54		Test	−
55	Escape	Control	−
56		Test	−
57	Tangible	Control	−
58		Test	−
59	Escape	Control	−
60		Test	−
61	Ignore	Control	−
62		Test	−
63	Attention	Control	−
64		Test	+

Data Set 3			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
1	Attention	Control	+
2		Test	+
3	Escape	Control	−
4		Test	−
5	Tangible	Control	−
6		Test	−
7	Ignore	Control	+
8		Test	+
9	Tangible	Control	−
10		Test	−
11	Attention	Control	−
12		Test	−
13	Ignore	Control	+
14		Test	+
15	Escape	Control	−
16		Test	−
17	Ignore	Control	+
18		Test	+
19	Escape	Control	+
20		Test	+
21	Attention	Control	−
22		Test	−
23	Tangible	Control	−
24		Test	−
25	Escape	Control	−
26		Test	−
27	Ignore	Control	+
28		Test	+
29	Attention	Control	−
30		Test	−
31	Tangible	Control	−
32		Test	−
33	Attention	Control	−
34		Test	−
35	Escape	Control	−
36		Test	
37	Tangible	Control	+
38		Test	+
39	Ignore	Control	+
40		Test	+

Data Set 3			
Trial Number	Condition	Segment	Occurrence + = Occurred − = Did not occur
41	Ignore	Control	+
42		Test	+
43	Escape	Control	−
44		Test	−
45	Attention	Control	−
46		Test	−
47	Tangible	Control	−
48		Test	−
49	Tangible	Control	−
50		Test	−
51	Attention	Control	−
52		Test	−
53	Ignore	Control	+
54		Test	+
55	Escape	Control	−
56		Test	−
57	Tangible	Control	−
58		Test	−
59	Escape	Control	−
60		Test	−
61	Ignore	Control	+
62		Test	+
63	Attention	Control	−
64		Test	−

Functional Analysis Data Sets

Supervisor Answer Sheet

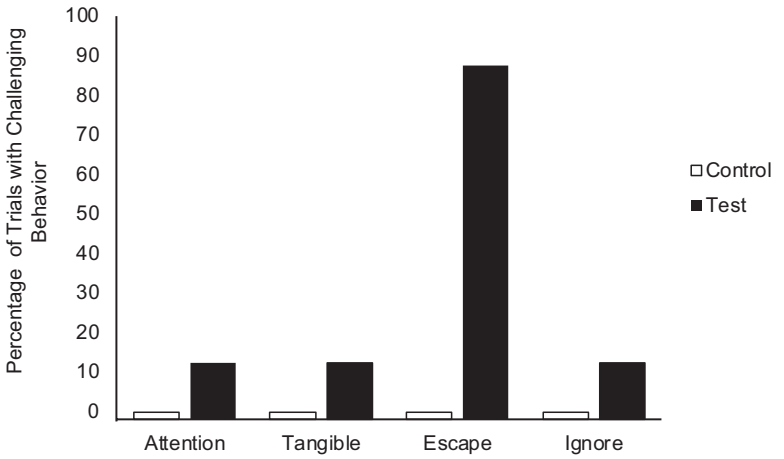


Fig. D.1 Data Set 1: Maintained by Escape

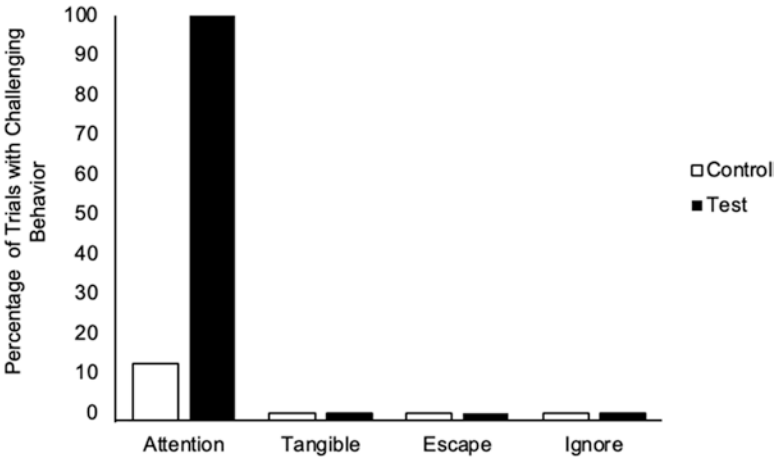


Fig. D.2 Data Set 2: Maintained by Attention

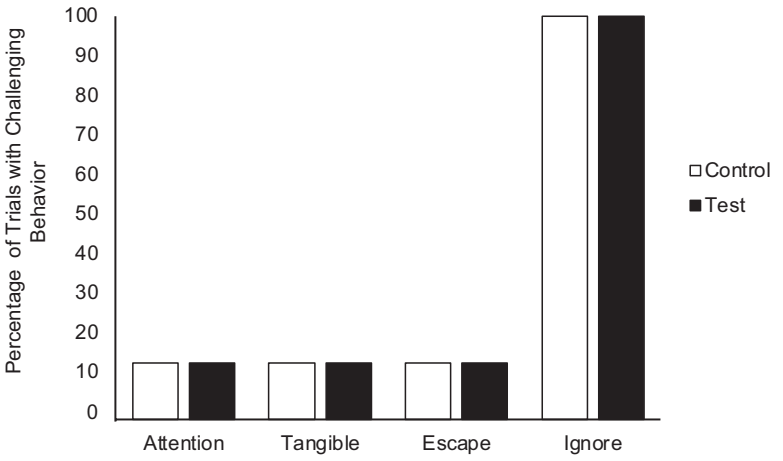


Fig. D.3 Data Set 3: Maintained by Automatic Reinforcement

Appendix E: Idiosyncratic Variables, Brief, Latency, or Precursor FA Procedural Fidelity Checklist

Attention	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Escape	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Tangible	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Ignore	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Control	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

TBFA Protocol and Procedural Fidelity Checklist

Attention - Control	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Attention – Test	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Escape - Control	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Escape – Test	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Tangible – Control	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Tangible – Test	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Ignore – Both Segments	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Synthesized Protocol and Procedural Fidelity Checklist

[Insert Condition Name]	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Step

[Insert Condition Name]	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

[Insert Condition Name]	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

[Insert Condition Name]	
Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix F: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizontal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

References

Borrero, C. S., & Borrero, J. C. (2008). Descriptive and experimental analyses of potential precursors to problem behavior. *Journal of applied Behavior analysis, 41*(1), 83–96.

Call, N. A., Wacker, D. P., Ringdahl, J. E., & Boelter, E. W. (2005). Combined antecedent variables as motivating operations within functional analyses. *Journal of Applied Behavior Analysis, 38*(3), 385–389.

Davis, T. N., Durand, S., Bankhead, J., Strickland, E., Blenden, K., Dacus, S., … Machalicek, W. (2013). Brief report: Latency functional analysis of elopement. *Behavioral Interventions, 28*(3), 251–259.

Hagopian, L. P., Fisher, W. W., Thompson, R. H., Owen-DeSchryver, J., Iwata, B. A., & Wacker, D. P. (1997). Toward the development of structured criteria for interpretation of functional analysis data. *Journal of Applied Behavior Analysis, 30*(2), 313–326.

Hanley, G. P., Jin, C. S., Vanselow, N. R., & Hanratty, L. A. (2014). Producing meaningful improvements in problem behavior of children with autism via synthesized analyses and treatments. *Journal of Applied Behavior Analysis, 47*(1), 16–36.

Herscovitch, B., Roscoe, E. M., Libby, M. E., Bourret, J. C., & Ahearn, W. H. (2009). A procedure for identifying precursors to problem behavior. *Journal of Applied Behavior Analysis, 42*(3), 697–702.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of applied behavior analysis, 27*(2), 197–209.

Lambert, J. M., Staubitz, J. E., Roane, J. T., Houchins-Juárez, N. J., Juárez, A. P., Sanders, K. B., & Warren, Z. E. (2017). Outcome summaries of latency-based functional analyses conducted in hospital inpatient units. *Journal of Applied Behavior Analysis, 50*(3), 487–494.

Lydon, S., Healy, O., O'Reilly, M. F., & Lang, R. (2012). Variations in functional analysis methodology: A systematic review. *Journal of Developmental and Physical Disabilities, 24*(3), 301–326.

Northup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook, J., & DeRaad, A. (1991). A brief functional analysis of aggressive and alternative behavior in an out clinic setting. *Journal of Applied Behavior Analysis, 24*(3), 509–522.

Owen, T. M., Fisher, W. W., Akers, J. S., Sullivan, W. E., Falcomata, T. S., Greer, B. D., … Zangrillo, A. N. (2020). Treating destructive behavior reinforced by increased caregiver compliance with the participant's mands. *Journal of Applied Behavior Analysis, 53*(3), 1494–1513.

Rispoli, M., Camargo, S., Machalicek, W., Lang, R., & Sigafoos, J. (2014a). Functional communication training in the treatment of problem behavior maintained by access to rituals. *Journal of Applied Behavior Analysis, 47*(3), 580–593.

Rispoli, M., Ninci, J., Neely, L., & Zaini, S. (2014b). A systematic review of trial-based functional analysis of challenging behavior. *Journal of Developmental and Physical Disabilities, 26*(3), 271–283.

Roane, H. S., Fisher, W. W., Kelley, M. E., Mevers, J. L., & Bouxsein, K. J. (2013). Using modified visual-inspection criteria to interpret functional analysis outcomes. *Journal of Applied Behavior Analysis, 46*(1), 130–146.

Schlichenmeyer, K. J., Roscoe, E. M., Rooker, G. W., Wheeler, E. E., & Dube, W. V. (2013). Idiosyncratic variables that affect functional analysis outcomes: A review (2001–2010). *Journal of Applied Behavior Analysis, 46*(1), 339–348.

Sigafoos, J., & Saggers, E. (1995). A discrete-trial approach to the functional analysis of aggressive behaviour in two boys with autism. *Australia and New Zealand Journal of Developmental Disabilities, 20*(4), 287–297.

Thomason-Sassi, J. L., Iwata, B. A., Neidert, P. L., & Roscoe, E. M. (2011). Response latency as an index of response strength during functional analyses of problem behavior. *Journal of Applied Behavior Analysis, 44*(1), 51–67.

Tincani, M. J., Castrogiavanni, A., & Axelrod, S. (1999). A comparison of the effectiveness of brief versus traditional functional analyses. *Research in Developmental Disabilities, 20*(5), 327–338.

Chapter 11
Strengths/Deficits Assessment

Topics Covered Within This Chapter

Topics
Purpose of Assessment
Assessment Types
Assessment Analysis

Purpose of Assessment

Within the field of behavior analysis, assessments are used to establish preintervention levels of responding. That is, they are used to evaluate the extent to which an individual engages in specific responses (e.g., requesting a variety of items, spelling words) prior to the introduction of intervention. The foundation of behavior analysis is an emphasis on collecting and analyzing data. Therefore, the comparison of behavior preintervention to postintervention is of the upmost importance.

Once a client is accepted into a behavior analytic program, the first step is to identify their strengths and deficits to develop an appropriate and effective intervention plan. Identifying client strengths is important because building on skills with which the client is successful increases the likelihood of future success. In a learning environment, individuals who are successful access more reinforcement, whereas individuals who are less successful tend to access less reinforcement and, in some instances, may contact extinction. Therefore, clinicians must ensure the intervention plan that they develop is linked to the client's strengths. Deficits refer to skills that the client is currently not displaying. For example, if the client does not

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_11].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_11

independently write their own name, we would refer to this as a deficit. Assessments are typically developed with the goal of identifying deficits. This is because clinicians are committed to identifying skills that need to be addressed within intervention. If the client does not exhibit any deficits, intervention is probably not necessary. Clinicians must strike a balance when selecting assessments and analyzing assessment results to identify and highlight both client strengths and deficits.

Assessment Types

Clinicians gather information on client strengths and deficits using two different types of assessments: indirect assessments and direct assessments. Indirect assessments often include interviews and questionnaires. Many initial interviews include questions posed to a client or their caregiver regarding areas for improvement. For example, a clinician might ask a caregiver, "what are some things you would like [client name] to be able to do that she is currently not able to do?" Stress to your supervisees the importance of including questions to gather information about the client's strengths as well. For example, "what is [client name]'s favorite thing to do?" or "what are some things that [client name] is good at doing?" These initial interviews are important for gathering information about the client but also to build rapport with the client and/or caregiver. Only focusing on deficits and challenging behavior during the initial interview can have a negative impact on rapport building and the caregiver–clinician relationship.

The second category of assessments are direct assessments. Direct assessments can include direct observations, probing for specific skills, and commercially available assessments. Direct observations entail observing the client and recording behavior that is relevant to strengths and deficits. Observing behaviors that the client engages in within the natural environment is an important exercise for clinicians. Clinicians should not assume that client responding during assessments conducted in the instructional context is always representative of the client's skill repertoire. For example, perhaps after conducting several probe trials a clinician concludes that Jason is unable to identify colors; however, then the clinician observes him tact the color of the cars while playing with a peer. This would suggest an issue with motivation during the assessment as opposed to a skill deficit. Therefore, direct observations should be employed even though they cannot provide concrete information about preintervention responding.

Probing for skills is important for identifying whether specific responses are in the individual's repertoire. Probe trials are distinct from baseline sessions because there are fewer trials conducted. Usually, at most, probe trials will include two presentations of a specific skill whereas a baseline session is likely to include five to 20 presentations of the skill. Therefore, probe trials should be considered the first step in determining whether a goal should be written, and baseline data collected. Probe trials can be conducted in the teaching environment or in the natural environment during ongoing activities. Each probe trial will follow baseline procedures in that

there will be no prompts or differential consequences. Stress to your supervisees the importance of building in opportunities for their clients to contact reinforcement for other behaviors during probe trials.

There are several commercially available assessments used within the field of behavior analysis. Examples include The Assessment of Basic Language and Learning Skills-Revised (ABLLS-R; Partington, 2010), The Assessment of Functional Living Skills (AFLS; Partington & Mueller, 2012), Essential for Living (EFL; McGreevy & Fry, 2013), Promoting the Emergence of Advanced Knowledge Comprehensive Assessment (PCA; Dixon, 2019), and the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2014). This is not an exhaustive list of assessments; therefore, seek out additional information related to assessments that evaluate skills that are relevant to the population with whom your supervisees work. Before suggesting for your supervisee to conduct a commercially available assessment, obtain the following information, including any credentials that one needs to conduct the assessment, the type of skills being assessed, the target population, and the time required for the assessment. Many of these commercially available assessments include information regarding specific guidelines for conducting the assessment and these guidelines should be used as the default. However, if the following information is not included in the assessment guidelines, you will need to determine (a) if correct responses to items on the assessment will result in reinforcement, (b) if mastered trials will be interspersed during the assessment, (c) if reinforcement will be provided for unrelated behavior (e.g., sitting at the table, attending), (d) how many consecutive assessment trials will be conducted, and (e) where the assessment should be conducted.

Assessment Analysis

Once the clinician has gathered all the assessment data, they will need to develop a summary of the results usually in the form of a report. This report will often include results from the assessments described in this chapter and the assessments described in Chaps. 7, 8, 9, and 10. The purpose of a comprehensive report that outlines behavioral excesses and behavioral deficits is to provide the basis for developing an intervention plan. In Chap. 32, we provide guidance for how to select appropriate interventions. Step one of our guide is to *gather and consider relevant information about the client and their behavior*. Therefore, the information provided in this chapter will aide your supervisees in completing the first step in the guide. Within a summary report, it is important to include graphs and other forms of visuals to display the data collected during the assessment. For example, the ABLLS-R, PCA, and VB-MAPP have fillable charts that can be color coded to display progress from one administration of the assessment to the next. In addition to the visual displays of data, written text describing each visual should be included. This text should be written using language appropriate to the intended audience and include (a) a description of the purpose of the assessment, (b) an orientation to the visual, (c) an

explanation of how to interpret the visual, (d) an analysis of the visual, (e) a description of the meaning of the analysis, and (f) the potential courses of action based on the data. We provide an example on page 2 of the *Summary of Assessment Results* document (Appendix A).

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–35:00	Probe Trials Practice
35:00–55:00	Practice Assessment Analysis
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Summary of Assessment Results*, 1 copy for each supervisee
- Appendix B: *Probe Trials Practice*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Armstrong et al. (2021)
- Padilla-Mainor and Akers (2021)
- Sutton et al. (2021)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with assessment in behavior analysis including the types of assessments and the analysis of assessment results. A brief summary of each is provided below, and PowerPoint slides are available to share with your group.

Purpose of Assessments

Review the purpose of assessments within the field of behavior analysis. Highlight how these assessments are used to establish preintervention levels of responding, meaning the extent to which an individual engages in the behavior prior to intervention. Remind your supervisees about the importance of collecting information related to both strengths and deficits throughout the assessment process. Provide several examples of strengths and deficits that are relevant for the clients with whom your supervisees work. In addition, have your supervisees provide examples of strategies for identifying both strengths and deficits.

Assessment Types

1. Indirect assessments
   (a) Interviews and questionnaires: Clients or caregivers are interviewed at the beginning of a client's admission.
      (i) Initial interviews provide an opportunity to gather important information and build rapport.
2. Direct assessments
   (a) Direct observation: Observing the client in the natural environment behaving outside of the instructional context.
   (b) Probe trials: One to two presentations of discriminative stimuli to occasion a specific skill in the absence of prompting and differential consequences.
   (c) Commercially available assessments: Examples include ABLLS-R, AFLS, PCA, and VB-MAPP.

Assessment Analysis

Transition the discussion to the importance of accurately summarizing and analyzing assessment results. Emphasize the importance of using language appropriate to the intended audience when summarizing the assessment results. The summary should include (a) a description of the purpose of the assessment, (b) an orientation to the visual, (c) an explanation of how to interpret the visual, (d) an analysis of the visual, (e) a description of the meaning of the analysis, and (f) the potential courses of action based on the data.

Probe Trials Practice

For this activity, use the *Probe Trials Practice* Sheet (Appendix B). Ask your supervisees to pair up and have each supervisee practice conducting the brief assessment. The target items were selected for ease of use; however, if you would like to include target items that are more relevant to your supervisees, please do so. The purpose of this activity is to practice conducting probe trials following the specific instructions below. This task may seem simple; however, your supervisees may find it difficult to avoid providing praise for correct responses.

Instructions:

1. Present each item twice and collect data on both trials using + for correct responses and – for incorrect responses.
2. Provide the instruction and allow 3 seconds for the *learner* to respond. Following a response, correct or incorrect, or 3 seconds without a response, move to the next trial.
3. Do not provide any reinforcement, including praise, following correct responses.
4. Do not provide feedback or prompts following incorrect responses.
5. Provide behavior specific praise for other unrelated behaviors such as attending or sitting in seat after every three to five probe trials.
6. Once all the items have been presented twice, shade in the boxes corresponding to the number of correct responses for that domain.

Practice Assessment Analysis

For this activity, you will need to identify a commercially available assessment that is relevant to the population with whom your supervisees work. You will need to complete a portion or the entire selected assessment. You will use the mock results as a prompt for your supervisees to summarize and analyze. This activity will require more effort for you to set up than other activities provided in this text because the variability across commercially available assessments is such that we could not mimic this activity in a way to ensure applicability for all readers.

Begin this activity by reviewing the selected commercially available assessment with your supervisees. Specifically review the target population for the assessment, the behaviors evaluated within the assessment, specific sections of the assessments, and an explanation about the corresponding visual for the assessment. Provide an in-depth discussion related to guidelines outlined in the assessment. This information is important for your supervisees to learn how to accurately conduct the selected assessment. Then, provide each of your supervisees with the mock assessment you have completed and Appendix A. Instruct your supervisees to complete the *Summary of Assessment Results* (Appendix A) worksheet using the mock results with which you have provided them. Depending on the assessment you have selected and/or the

amount of the assessment you have mocked, you may ask your supervisee to respond to the six questions multiple times. For example, if you mocked results for the VB-MAPP, your supervisees may need to respond to the six questions for mands and again for intraverbals. This is an activity that you can lead as a group or direct your supervisees to complete independently or in pairs. You will likely make this decision based on your supervisees level of familiarity with the assessment.

Homework

For their homework assignment, your supervisees will need to develop an interview that could be used during an initial meeting with a client or caregiver. Your supervisees should emphasize client strengths within the interview. That is, they should develop questions that would occasion responses regarding things the client does well in addition to areas that require improvement. Their interview should include at least five questions that would be appropriate for the population to whom they provide services.

Knowledge Check

1. What is the purpose of behavioral assessment?
2. What are the different types of behavioral assessment?
3. Why is it important to identify client strengths in addition to client deficits?
4. Describe the difference between probe trials and teaching trials.

Homework for Individual Supervision without a Client

1. Develop an initial interview that emphasizes strengths of a client.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Initial Interview Development
15:00–30:00	Client-Directed Activities

Materials Needed

- Initial interview prioritizing strengths
- Selected assessment protocol
- Appendix C: *Assessment Procedural Fidelity Checklist*

Initial Interview Development

Prior to this meeting, your supervisee should have developed an initial interview form that prioritizes gathering information about the client's strengths. They should bring the document to this meeting, and as a team you should review the interview. First, review the content of the interview using the following guidelines, (a) the interview is appropriate for the clients with whom your supervisee works, (b) the interview is appropriate for the type of services the client will receive (e.g., addresses topics related to job skills for a vocational program), (c) the interview includes client/caregiver friendly language, (d) the interview includes questions that are clear and easy to understand, and (e) the interview includes questions that are geared toward identifying the client's strengths. Provide specific feedback and ask your supervisee to edit the interview while you are providing feedback.

Next, have your supervisee conduct the interview with you serving the role as interviewee. You can answer the questions from your own perspective or considering the perspective of a potential client. Ensure that some of your answers require your supervisee to ask follow-up questions and problem solve in the moment. Following the mock interview, answer any questions posed by your supervisee and provide feedback on their execution of the interview. This feedback should be related to the extent to which they provided requested information, used language appropriate to the target audience, and reacted to your responses during the interview. Provide opportunities to practice delivery of specific questions if your supervisee would like additional preparation.

Client-Directed Activities

Prepare your supervisee to conduct a commercially available assessment that is appropriate to the skill level of their client. Examples of potential assessments include the VB-MAPP, PCA, ABLLS-R, and AFLs. This can be the same assessment used during group supervision or a different assessment. You and your supervisee should develop a plan for conducting the assessment that specifically addresses the following questions: (a) will correct responses to items on the assessment result in reinforcement, (b) will mastered trials be interspersed during the assessment, (c) will reinforcement be provided for unrelated behaviors (e.g., sitting at the table, attending), (d) how many consecutive assessment trials will be conducted, and (e) where should the assessment be conducted. Some assessments may specify this information within the manual and those procedures should be used as the default. The answers to these questions will serve as components for the measure of procedural fidelity. Following the meeting, your supervisee should finalize the *Assessment Procedural Fidelity Checklist* (Appendix C) and develop a data sheet for collecting data on the client's responding if one is not provided in the assessment. Prior to your observation with a client, your supervisee should have the procedural fidelity checklist and client data sheets prepared for you to collect data to evaluate their fidelity of implementation and IOA for data collection.

Homework for Individual Supervision with a Client

1. Prepare required materials for conducting the assessment.
2. Finalize *Assessment Procedural Fidelity Checklist* (Appendix C) and data sheet for client responding.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–45:00	Assessment Administration
45:00–60:00	Performance Feedback


Materials Needed

- Data sheets for client responding, 2 copies
- Appendix C: *Assessment Procedural Fidelity Checklist*
- Materials for assessment

Assessment Administration

Prior to your meeting with your supervisee, they should have finalized the *Assessment Procedural Fidelity Checklist* and a data sheet for client responding. Observe the administration of the selected assessment and collect data simultaneously. Use the *Assessment Procedural Fidelity Checklist* to ensure your supervisee conducts the assessment according to the predetermined procedures. If this is your supervisee's first experience conducting the selected assessment, provide feedback during the implementation as well as after to adequately support your supervisee.

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist. Your feedback should include references to when reinforcement was provided, if mastered trials were interspersed, and the number of consecutive trials conducted. In addition, address any assessment specific procedures that were conducted inaccurately. Answer any questions posed by your supervisee.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) conduct the assessment with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

☐ Observe your supervisee conduct a different assessment.
☐ Observe your supervisee provide feedback to another supervisee while conducting an assessment.

Appendix A: Summary of Assessment Results

1. Description of the purpose of the assessment

2. Orientation to the visual

3. Explanation of how to interpret the visual

4. Analysis of the visual

5. Description of the meaning of the analysis

6. Potential courses of action based on the data

For this example, we use the preference assessment graph in Fig. A.1.

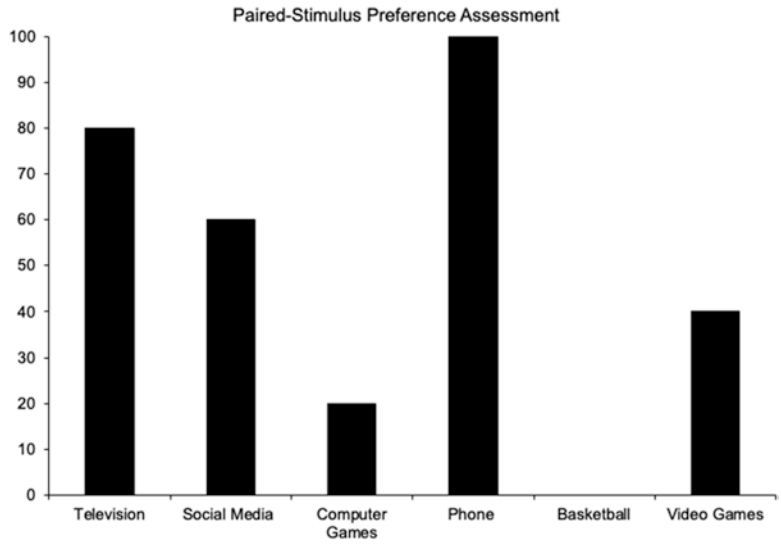


Fig. A.1 Mock paired-stimulus preference assessment data

Description of the Purpose of the Assessment
The purpose of a preference assessment is to identify things your child likes to do. We try to incorporate as many of his favorite things into his therapy sessions. During this assessment, the clinician presented your child with two of the activities and asked him to pick the one he wanted.

Orientation to the Visual
On this graph, each bar corresponds to a specific activity. You can see the name of each of the six activities on the horizontal axis. The vertical axis shows the percentage of trials that your child selected that activity.

Explanation of How to Interpret the Visual
When looking at the graph, the taller the bar is the more often the activity was selected. Each activity was presented 5 times, so the phone was selected every time it was presented (100%) of opportunities.

Analysis of the Visual
When looking at this graph the phone, television, and social media were selected on 100%, 80%, and 60% of trials, respectively.

Description of the Meaning of the Analysis
Based on these data, we can say that your child's highest preferred item is the phone, and his somewhat preferred items are television and social media. He did not show much of a preference for computer games, video games, or the basketball.

Potential Courses of Action Based on the Data
We plan to use the phone as a reward for your child finishing his math worksheets. He has a difficult time with math worksheets, so we want to save his favorite activity as a reward for working hard. We plan to use television and social media as a reward for finishing his reading and writing worksheets.

Appendix B: Probe Trials Practice

#	Item	Trial 1 (+/−)	Trial 2 (+/−)
1.	"Say *moo*"		
2.	"Say *green*"		
3.	"Do this" *clap hands*		
4.	"What letter comes after C?"		
5.	"You sweep with a____"		
6.	"What letter comes after W?"		
7.	"You drink from a____"		
8.	"Do this" *slap thigs*		
9.	"What letter comes after J?"		
10.	"Say *happy*"		
11.	"You sleep in a____"		
12.	"You eat with a____"		
13.	"Do this" *thumbs up*		
14.	"Do this" *wave*		
15.	"You read a____"		
16.	"Say *ready, set, go*"		
17.	"What letter comes after A?"		
18.	"What letter comes after Q?"		
19.	"Do this" *touch nose*		
20.	"Say *pencil*"		

	Shade in for each skill type			
100% (10/10)				
90% (9/10)				
80% (8/10)				
70% (7/10)				
60% (6/10)				
50% (5/10)				
40% (4/10)				
30% (3/10)				
20% (2/10)				
10% (1/10)				
	Echoics (1, 2, 10, 16, 20)	Gross motor imitation (3, 8, 13, 14, 19)	Letter identification (4, 6, 9, 17, 18)	Function of objects (5, 7, 11, 12, 15)

Appendix C: Assessment Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Armstrong, H., Denne, L. D., & Bailey, T. (2021). The role of key skills as a risk marker for the development of challenging behaviour in children and young people who have an intellectual disability The as children people intellectual. *International Journal of Positive Behavioural Support, 11*(2), 3–14.

Dixon, M. R. (2019). *Peak comprehensive assessment: Administration manual*. Shawnee Scientific Press.

McGreevy, P., & Fry, T. (2013). *Essential for living: A communication, behavior, and functional skills curriculum and assessment*. Patrick McGreevy, Ph.D., P.A. and Associates.

Padilla-Mainor, K. L., & Akers, J. S. (2021). Content validity for the verbal behavior milestones assessment and placement program. *Journal of Autism and Developmental Disorders, 51*, 4054–4066. https://doi.org/10.1007/s10803-020-04864-y

Partington, J. W. (2010). *The ABLLS-R—The assessment of basic language and learning skills–Revised*. Behavior Analysts.

Partington, J. W., & Mueller, M. M. (2012). *The assessment of functional living skills*. Behavior Analysts.

Sundberg, M. L. (2014). *The verbal behavior milestones assessment and placement program: The VB-MAPP* (2nd ed.). AVB Press.

Sutton, A., Pikula, A., Yi, Z., & Dixon, M. R. (2021). Evaluating the convergent validity of the PEAK Comprehensive Assessment (PCA): Intelligence, behavior challenges, and autism symptom severity. *Journal of Developmental and Physical Disabilities*, 1–22. https://doi.org/10.1007/s10882-021-09814-9

Chapter 12
Reinforcement

Topics Covered Within This Chapter

Topics
Categories of Reinforcers
Dimensions of Reinforcement
Schedules of Reinforcement

Reinforcement is a fundamental principle within the field of behavior analysis. Although the term reinforcement has other meanings outside of the field of behavior analysis, within our field we define reinforcement as a consequence that makes future engagement in the response that preceded it more likely. Skinner describes reinforcement in this way; "Events that are found to be reinforcing are two sorts. Some reinforcements consist of presenting stimuli…These we call positive reinforcers. Others consist of removing something…These we call negative reinforcers. In both cases the effect of reinforcement is the same—the probability of response is increased." (Skinner, 1953, pp. 73). Within this chapter, we will primarily focus on positive reinforcement. The specific topics we will discuss within this chapter include categories of reinforcers, dimensions of reinforcement, and schedules of reinforcement.

Categories of Reinforcers

There are several types of reinforcers including unconditioned, conditioned, automatic, social, edibles, activities, etc. We describe reinforcers according to learning history, delivery modality, and form.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_12].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_12

Learning History

The first distinction between reinforcers that we will highlight is the impact of a learning history. *Unconditioned reinforcers* are stimulus changes that increase responding without a prior learning history (Cooper et al., 2020). That is, they naturally reinforce behavior that is beneficial for survival. Reinforcers such as food, escape from extreme temperatures, and physical contact do not require explicit pairing with other reinforcers to impact behavior. In contrast, *conditioned reinforcers* are stimulus changes that increase responding due to a history of pairing with other reinforcers (Cooper et al., 2020). For example, money does not function as a reinforcer for infants, rather over time money is paired with a variety of reinforcers and eventually functions as a reinforcer due to these pairings.

Delivery Modality

The second distinction between reinforcers we will review is the delivery modality, specifically whether another person has control over when the reinforcer is delivered and withheld. *Socially mediated* contingencies are those that are controlled by another person. For example, another person can deliver attention or tangible items. In contrast, *automatic reinforcement* can be defined as contingencies that are not arranged by the social community. This describes instances in which the behavior itself results in reinforcement such as sensory stimulation. The distinction between socially mediated reinforcement and automatic reinforcement is commonly emphasized when referring to challenging behavior as the functional analysis can be used to determine whether behavior is maintained by social reinforcement or automatic reinforcement (see Chap. 9 for details). Despite the discussion focusing on challenging behavior, automatic reinforcement maintains both appropriate and inappropriate behavior. For example, Skinner describes automatic contingencies maintaining complex behavior such as perceiving and problem solving (Vaughan & Michael, 1982).

Form

The third distinction between reinforcers is the form. That is, specifying the physical differences of the various reinforcers. *Edible reinforcers* are those that the individual can orally consume such as a cookie or a cracker. *Tangible reinforcers* are those with which the individual can physically interact such as a ball or a tablet. *Activity reinforcers* are those that include a behavior that can occur for an extended period of time such as playing a game or running around the track. *Social reinforcers* are those that include an interaction with another person such as a friend saying

"hi" or a parent smiling at a child. *Sensory reinforcers* are those that engage one of the five senses in a way that is pleasing such as smelling something that is pleasant or touching something soft.

Dimensions of Reinforcement

We will now transition to the different dimensions or parameters of reinforcement. The primary dimensions of reinforcement include quality, immediacy, magnitude, and rate. These dimensions can be thought of as how good the reinforcer is (quality), how fast the reinforcer is coming (immediacy), how much of the reinforcer will be delivered (magnitude), and how often the reinforcer will be delivered (rate). These descriptions are not exhaustive, but for the purposes of this chapter they provide a good starting point. Stress to your supervisees the importance of accounting for all dimensions of reinforcement when arranging contingencies for their clients. They must consider how responding will be impacted in the event that different dimensions are manipulated. It is possible that some reinforcers will lose potency if dimensions are altered. For example, altering the reinforcement interval with a tablet from 30 seconds to 5 seconds may result in the tablet no longer serving as an effective reinforcer because the magnitude is below a certain threshold. Another example could be changing the speed of delivery from immediate to after a 10-second delay which would likely negatively impact the effectiveness of the reinforcer.

In the applied literature, the dimensions of reinforcement are often manipulated as part of a differential reinforcement procedure. Differential reinforcement used to target challenging behavior typically includes challenging behavior being placed on extinction while an alternative response (e.g., communication, compliance) results in access to the reinforcer (see Chap. 23 for additional information about DRA). There are situations in which it may not be feasible to withhold all reinforcement for challenging behavior. In these situations, researchers have evaluated the effectiveness of manipulating the dimensions of reinforcement to differentially reinforce responding. For example, Briggs et al. (2019) evaluated the impact of providing a longer break (magnitude), a break with a high-preference stimulus (quality) or a combination of the two, contingent upon compliance responses while simultaneously maintaining the length of the break contingent on challenging behavior. These researchers observed an increase in compliance and a decrease in challenging behavior when they manipulated the quality and magnitude of the reinforcer for compliance.

Different responses across individuals are sensitive to different dimensions of reinforcement. Therefore, Brown et al. (2021) developed a preassessment to determine to which dimension of reinforcement participants may be most sensitive. Then using the information gathered in the preassessment, these researchers implemented differential reinforcement of an alternative behavior in which the target behavior (i.e., simulated challenging behavior) resulted in reinforcement that was either

lower quality, delayed, or shorter magnitude. For both participants, researchers observed differentiated responding, specifically higher rates of the alternative behavior which resulted in access to the higher quality reinforcer than the target behavior which resulted in access to the lower quality reinforcer.

Schedules of Reinforcement

Basic Schedules

Finally, we will discuss schedules of reinforcement. Schedules of reinforcement are "rules that describe the relationship between responses and reinforcer deliveries…" (Cooper et al., 2020, pg. 301). There are three basic schedules of reinforcement including ratio schedules, interval schedules, and time schedules. Ratio schedules are response-based schedules in which a fixed (i.e., consistent) or variable number of responses results in reinforcement. This is the schedule with which the majority of your supervisees are likely to be familiar.

Interval schedules are based on both responding and the passage of time. That is, these schedules specify that the first response that occurs after an interval has elapsed will result in reinforcement. Many supervisees have difficulty describing interval schedules correctly, thus you will want to ensure your supervisees avoid these two common errors. First, many supervisees refer to interval schedules as reinforcement for continuous engagement in a response for a specific duration of time. For example, a supervisee might describe providing reinforcement contingent on a client sitting in their seat for 1 minute as a fixed interval (FI) 1-minute schedule. This is incorrect because for interval schedules the behavior that occurs during the interval is irrelevant and does not impact the delivery of reinforcement. Second, many supervisees describe interval schedules as time-based schedules. That is, they describe reinforcement being provided at the end of the interval regardless of responding. This is inaccurate because interval schedules require both the passage of time and responding.

Time-based schedules specify that a reinforcer is delivered after an interval of time has elapsed regardless of the behavior. This is also referred to as noncontingent reinforcement, although there is some debate as to whether that is the most appropriate description (see Poling & Normand, 1999). However, the term is based on the fact that reinforcement is provided contingent on the passage of time rather than a specific response in which the individual engages. For more information on noncontingent reinforcement, see Chap. 24.

Compound Schedules

Compound schedules include more than one basic schedule of reinforcement. Two commonly used compound schedules are multiple schedules and chain schedules. Multiple schedules and chain schedules include two or more basic schedules (i.e., components) that are associated with discriminative stimuli. For multiple schedules, the components rotate based on the passage of time and for chain schedules, the components rotate based on the completion of each basic schedule. Both multiple schedules and chain schedules operate in a variety of situations, but they are often used during schedule thinning following functional communication training.

The typical arrangement for using a multiple schedule following functional communication training is for one component to signal a fixed ratio 1 schedule for engagement in the functional communication response and the other component to signal extinction for the functional communication response. Thus, schedule thinning entails increasing the duration of the extinction component such that the individual tolerates longer periods of time in which the reinforcer is unavailable. The typical arrangement for using a chain schedule following functional communication training is for one component to signal a fixed ratio schedule for engagement in a work or academic task (e.g., cleaning up toys, completing math problems) and the other component to signal a fixed ratio 1 schedule for engagement in the functional communication response. The response requirement for the first component must be met before the second component signaling the ratio schedule for the functional communication response will become available. Therefore, schedule thinning entails increasing the response requirement for the first component. For more information on chain schedules, see Chap. 19 on chaining.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–25:00	Contingency Identification Activity
25:00–30:00	Classifying Reinforcers
30:00–40:00	Manipulating Reinforcer Dimensions
40:00–55:00	Guess That Schedule
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Manipulating Reinforcer Dimensions Activity*, 1 copy for each supervisee
- Appendix B: *Schedules of Reinforcement Activity*, 1 copy for each supervisee
- A timer
- Materials for free-operant behavior

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Briggs et al. (2018)
- Brown et al. (2021)
- Saini et al. (2016)
- Skinner (1958)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with reinforcement including the categories of reinforcers, dimensions of reinforcement, and schedules of reinforcement. A brief summary of each is provided below, and PowerPoint slides are available to share with your group.

Categories of Reinforcers

Review the different categories of reinforcers with your supervisees. The three categories we suggest using to classify reinforcers include (a) learning history, (b) delivery modality, and (c) form.

Learning History First, discuss the distinction between unconditioned and conditioned reinforcers. This distinction falls under the umbrella of learning history because conditioned reinforcers are established based on a history of being paired with other reinforcers. In contrast, unconditioned reinforcers are established without any prior learning history. Provide examples of unconditioned and conditioned reinforcers and ask your supervisees to identify additional examples.

Definitions:

1. Unconditioned reinforcer: A stimulus change that functions as a reinforcer because of the species evolutionary development (Cooper et al., 2020).
2. Conditioned reinforcer: A stimulus change that functions as a reinforcer because of prior pairing with one or more other reinforcers (Cooper et al., 2020).

Delivery Modality The next distinction is related to the mode in which reinforcement is delivered. Reinforcers can be socially mediated or automatic which refers to contingencies that are not manipulated by other people. Provide examples of socially mediated and automatic reinforcers and ask your supervisees to identify additional examples. Make sure to include examples of reinforcement for appropriate behavior rather than focusing solely on stereotypy and self-injurious behavior.

1. Socially mediated reinforcement: A contingency in which the consequence for the behavior is presented by another person (Cooper et al., 2020).
2. Automatic reinforcement: Reinforcement that occurs independent of the social mediation of others (Cooper et al., 2020).

Form Finally, discuss the different forms of reinforcers. Provide examples of edible items, social interactions, activities, and tangible items and have your supervisees identify additional examples.

Dimensions of Reinforcement

Following the discussion of categories of reinforcers, introduce the different dimensions of reinforcement with your supervisees. Discuss the importance of understanding the different dimensions and how your supervisees can leverage this information to effectively impact client behavior. Provide examples of using differential reinforcement without extinction by manipulating the different dimensions of reinforcement. The examples provided below are not exhaustive but can serve as a starting point for discussing dimensions of reinforcement.

1. Quality of reinforcement: a high preferred item versus a moderate preferred item.
2. Magnitude of reinforcement: longer access to the reinforcer versus shorter access to the reinforcer.
3. Immediacy of reinforcement: reinforcement provided immediately versus reinforcement provided after a delay.
4. Rate of reinforcement: reinforcement provided more frequently versus reinforcement provided less frequently.

Schedules of Reinforcement

Next, review the three basic schedules of reinforcement with your supervisees. It is important to start with the basic schedules because if your supervisees are having difficulty with the basic schedules, they will also have difficulty with the compound

schedules. Provide examples of ratio, interval, and time schedules and ask your supervisees to identify additional examples.

Basic schedules:

1. Ratio: A fixed or variable number of responses results in reinforcement.
2. Interval: The first response emitted after a fixed or variable interval has elapsed results in reinforcement.
3. Time: Reinforcement is delivered following a fixed or variable duration of time.

Once you are confident that your supervisees have a strong understanding of the basic schedules of reinforcement, transition to the two commonly used compound schedules of reinforcement, multiple schedules, and chain schedules. Provide examples of multiple schedules and chain schedules, and ask your supervisees to identify additional examples.

Compound schedules:

1. Multiple schedule: A compound schedule that includes two or more basic schedules of reinforcement each associated with discriminative stimuli. The components rotate based on the passage of time. Reinforcement is provided contingent upon meeting each individual component response requirement.
2. Chain schedule: A compound schedule that includes two or more basic schedules of reinforcement each associated with discriminative stimuli. The components rotate based on the completion of the response requirement for each component. Reinforcement is provided contingent upon meeting all component response requirements.

Contingency Identification Activity

Use the vignettes provided below or develop six vignettes that include three examples and three nonexamples of reinforcement. Present the vignettes one by one and have your supervisees read the vignette and determine if it is an example of reinforcement or a not an example of reinforcement. They should identify the consequence (i.e., stimulus change) and explain why it is an example or nonexample of reinforcement.

Lizzie is a dog. One day Lizzie's owners were sitting at the table eating breakfast. Lizzie sat on her hind legs and lifted her front paws. Immediately after she sat up on her hind legs, her owner placed a plate with eggs in front of Lizzie. Now, when Lizzie sees her owners eating at the table, she sits back on her hind legs and lifts her front paws.

Questions:

- What is the response Lizzie engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Riley is learning to communicate using picture cards. While sitting at a table with the clinician, he touches a card with a picture of Skittles®. The clinician gives him a Skittle®. Riley touches the card a second time and the clinician gives him another Skittle®. Now, anytime Riley sees the card displaying Skittles®, he touches the card and receives Skittles®.

Questions:

- What is the response Riley engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Leighton is playing at her neighborhood playground. She walks over to a brown dog who is walking nearby. She reaches out to pet the dog, and the dog licks her. She laughs and keeps reaching out to the dog, and the dog continues to lick her.

Questions:

- What is the response Leighton engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Dan turned in his homework 3 days early. Miss Ramos announces to the class how Dan is exceeding her expectations and publicly praised him for submitting his homework early. As a result, Dan stopped submitting his assignments before the due date.

Questions:

- What is the response Dan engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Briggs is an eight-year-old boy with a developmental disability. In the lunchroom, the students are expected to stand in a single file line while waiting for their food. On one occasion, Briggs left the line and walked around the lunchroom. His teacher verbally reprimands Briggs for leaving the line. The next day during lunch, Briggs left the line three times.

Questions:

- What is the response Biggs engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Loren is a 27-year-old woman with a TBI. Loren receives rehabilitation services in an inpatient hospital for individuals with TBI. One of Loren's goals is completing daily-living skills. For this goal, a staff member told Loren to vacuum her room. Immediately after Loren finished vacuuming her room the staff member provided Loren with a token. The next time Loren was asked to vacuum her room, she refused.

Questions:

- What is the response Loren engaged in?
- Did the response increase?
- Is this an example of reinforcement?

Classifying Reinforcers Activity

For this activity, refer to the example stimuli provided in the PowerPoint slides or identify other potential reinforcers. For each reinforcer, have your supervisees determine the probable learning history, mode of delivery, and form. There may not be a specific right or wrong answer for the stimulus; however, it is important for your supervisees to explain why they classify the reinforcers in a specific way.

- Stimuli that may potentially function as reinforcers: cheese cracker, receiving a phone call, swinging, flickering lights, board game, and cool air.

Manipulating Reinforcer Dimensions Activity

Provide each of your supervisees a copy of the *Manipulating Reinforcer Dimensions Activity* (Appendix A). Divide your supervisees into groups and have each group work through all three examples. For each case example, have your supervisees provide specific strategies for manipulating reinforcer dimensions to differentially reinforce target behavior. Then, have your supervisees present their responses to the large group. Provide guidance and feedback as needed.

Guess That Schedule

For this activity select a free operant response in which one of your supervisees can easily engage. The response should be discrete such that it is clear when one response has ended, and next response has begun. The response should be simple enough that engaging in multiple responses will not be overly taxing. Example responses might include clapping, knocking on the table, waving, etc. Remember, the response needs to be a free operant response rather than a response that is dependent on the presentation of an instruction or stimulus. The supervisee serving as the behaver during the activity should be free to engage in any rate of responding without limitation. Then, you will reveal the target basic schedule of reinforcement to one (or two) supervisees. (Two supervisees may be helpful for implementing interval and time schedules). You can identify five different basic schedules or use the following FR 3, FR 5, FI 10 seconds, FI 15 seconds, FT 15 seconds. The supervisee(s)

who are aware of the schedule will provide reinforcement to the behaver according to their assigned schedule of reinforcement. The other supervisees will observe the individual behaving and the individual(s) reinforcing the behavior of the other individual and attempt to identify the schedule of reinforcement.

Homework

Provide each supervisee with a copy of the *Schedules of Reinforcement Activity* (Appendix B). Your supervisees should review this document prior to individual supervision. They should identify any portions of the procures about which they are unsure. Your supervisees should also use preference assessment data to identify their client's top three to five preferred reinforcers. They should identify strategies for manipulating dimensions of reinforcement for each stimulus. That is, for each stimulus, they must specify how to alter the dimensions of quality, magnitude, immediacy, and rate.

Knowledge Check

1. Identify 3 to 5 examples of unconditioned and conditioned reinforcers.
2. Describe the difference between social and automatic reinforcement.
3. Identify and describe the 4 dimensions of reinforcement.
4. Describe the procedures for an FI 5-minute schedule in which the behavior is hand raising.
5. Describe the similarities and differences between multiple and chain schedules.

Homework for Individual Supervision without a Client

1. Identify their client's top 3 to 5 reinforcers. Write out how specific reinforcer dimensions can be manipulated with each reinforcer. Quality, magnitude, immediacy, and rate should be included in the dimensions.
2. Review Appendix B: *Schedules of Reinforcement Activity*.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 45-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Manipulating Dimensions of Reinforcement
10:00–30:00	Compound Schedule Practice
30:00–45:00	Client-Directed Activities

Materials Needed

- Appendix B: *Schedules of Reinforcement Activity*
- Appendix C: *Compound Schedule Procedural Fidelity Checklist*
- List of client's top reinforcers and reinforcer dimensions
- Stimuli to signal components of the compound schedule
- Picture cards (positive and negative reinforcement)
- Materials for selected work tasks
- A timer

Manipulating Dimensions of Reinforcement

Before the meeting, your supervisee should have developed a list of their client's top three to five reinforcers and potential strategies for manipulating the dimensions of these reinforcers. During your meeting, review the document and correct any errors your supervisee may have made. Discuss ways in which your supervisee can specifically use these procedures with their client for increasing appropriate behavior. These manipulations can be used to differentially reinforce responses that are prompted or independent, responses that are more or less difficult for the client, and responses that are approximations of a terminal behavior. Refer to Chap. 23 on DRA for additional information.

Compound Schedule Practice

Before the meeting, identify stimuli to use to signal the two components of the compound schedule. Some examples include a card with a different color on each side, a poster board with a different color on each side, or colored wristbands. Also, create picture cards of the "reinforcers." The reinforcer will be a tangible item for

the multiple schedule and a break from demands for the chain schedule. For the chain schedule, select a work task (e.g., identifying letters, picking up toys) that will be presented during the first component. For the purpose of this activity, the basic schedules are already specified on the *Schedules of Reinforcement Activity* document (see Appendix B). For the multiple schedule, one component will signal an FR 1 for engagement in the card exchange (i.e., S^D) and the other component will signal extinction (i.e., S^Δ). Components will rotate after 30 seconds. For the chain schedule, the first component schedule is an FR2 for the selected work task and the second component schedule is an FR1 for the card exchange. The first component will rotate to the second after the FR2 schedule is met. After engaging in the card exchange, the reinforcer should be provided for 30 seconds.

During the role-play activity, you will serve as the confederate client while your supervisee implements the procedures. Emit errors during the role play so your supervisee can practice responding to potential client errors. Examples of errors include attempting to exchange the card during the S^Δ of the multiple schedule or the first component of the chain schedule, attempting to exchange the card when you already have the reinforcer, and engaging in challenging behavior (e.g., hitting the table). In addition, delay exchanging the card after the alternation of components on some trials to ensure your supervisee alternates components at the correct time for the multiple schedule and continues presenting demands until you exchange the card during the chain schedule. After the practice session ends, provide feedback to your supervisee and continue practicing until they implement the procedures with 85% fidelity.

Client-Directed Activities

Discuss which compound schedule would be most appropriate for the supervisee's client. We will describe procedures for multiple schedules and chain schedules; however, if you prefer to use a conjunctive schedule or alternative schedule of reinforcement, consult the Cooper et al. (2020) textbook for more information. If your supervisee is already using a compound schedule with their client, consider asking your supervisee to implement a schedule that differs from the one they already use. With your supervisee, work through the following steps: (a) determine the target behavior you want to increase (e.g., communication response, compliance), (b) identify stimuli to pair with each of the schedule components (e.g., colored cards), (c) select basic schedules for the components of the compound schedule, (d) determine the length of each component, and (e) identify a work task (chain schedules only). During this meeting, you and your supervisee should develop a procedural fidelity checklist (using Appendix C) that you can use to evaluate your supervisees performance when implementing the compound schedule with their client. Following the meeting, your supervisee should finalize the *Compound Schedule Procedural Fidelity Checklist* and develop a data sheet for collecting data on the

client's behavior. They should have both data sheets prepared for you to collect data to evaluate their fidelity of implementation and IOA for data collection.

Homework for Individual Supervision with a Client

1. Prepare data sheets for implementing selected compound schedule (i.e., multiple or chain).
2. Finalize *Compound Schedule Procedural Fidelity Checklist* (Appendix C).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–20:00	Compound Schedule Administration
20:00–30:00	Session Procedures
30:00–45:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix C: *Compound Schedule Procedural Fidelity Checklist*
- *Supervision Observation Form*
- Materials for multiple schedule or chain schedule

Compound Schedule Administration

Prior to your meeting with your supervisee, they should have finalized the *Compound Schedule Procedural Fidelity Checklist* and their data sheet for the selected compound schedule and provided you with a copy of both. Observe your supervisee introduce the compound schedule with their client. Following the administration of the compound schedule, provide specific feedback according to the procedural fidelity checklist.

Session Procedures

Following your supervisee's administration of the compound schedule, continue to observe your supervisee target other goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and the supervisee's data. Then, provide feedback to your supervisee according to the *Compound Schedule Procedural Fidelity Checklist*. For each component of the procedure completed correctly, provide behavior-specific praise, and for each component of the procedure completed incorrectly, provide feedback and model the correct implementation of the component. If your supervisee expresses interest, provide role-play opportunities. Answer any questions posed by your supervisee.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol for the for the compound schedule with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback.

Future Growth

- ☐ Observe your supervisee provide feedback to another trainee on their administration of the compound schedule.
- ☐ Ask your supervisee to develop a procedural fidelity checklist for administering a different compound schedule.

Appendix A: Manipulating Reinforcer Dimensions Activity

1. Kiara is a 10-year-old female with traumatic brain injury. She engages in aggressive behavior directed toward staff who are working with her on conversation skills. The BCBA observes the aggressive behavior and determines that this behavior is likely maintained by escape from working on conversation skills. The intensity of Kiara's aggression is such that the staff cannot safely implement escape extinction. Therefore, the BCBA must develop a differential reinforcement procedure in which aggression and correct conversation skills both result in escape. The BCBA conducted a preference assessment, and the results are provided in Fig. A.1.

   Provide three strategies that the BCBA could employ to increase conversation skills while also decreasing aggression.

   Example

   Consequence for aggression: 30 second break with no additional stimuli
   Consequence for conversation skills: 1 minute break with the tablet

   Strategy #1

   Consequence for aggression:
   Consequence for conversation skills:

   Strategy #2

   Consequence for aggression:
   Consequence for conversation skills:

   Strategy #3

   Consequence for aggression:
   Consequence for conversation skills:

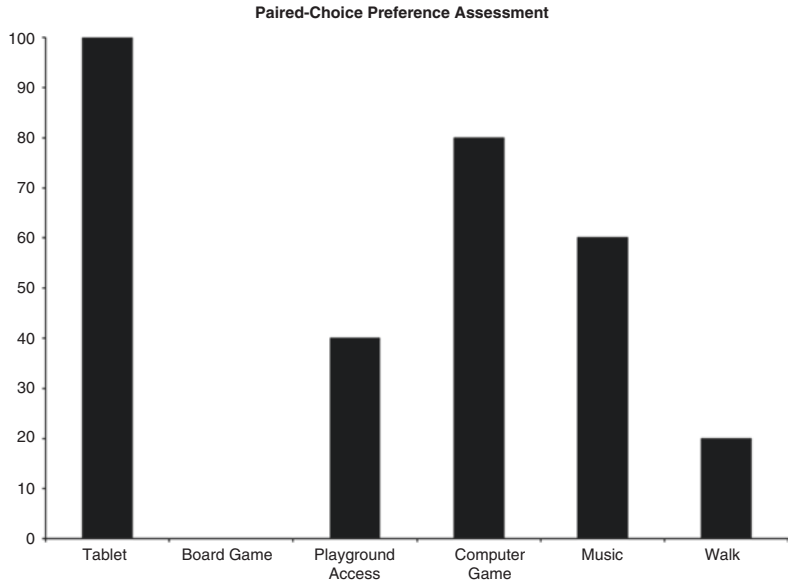


Fig. A.1 Data for Kiara's preference assessment

2. Enrique is 4-year-old male who does not have any known disabilities. His mother has consulted a BCBA because of his difficulties with the bedtime routine. Specifically, he gets out of bed multiple times during the night, and his mom ends up sleeping in his room on most evenings. His mom would like for him to stay in bed after she tucks him in. The only acceptable exception would be getting out of bed once to use the restroom. The BCBA must develop a differential reinforcement procedure in which staying in bed all night and getting up once during the night both result in reinforcement. The BCBA conducted a preference assessment, and the results are provided in Fig. A.2.

   Provide three strategies that the BCBA could employ to increase the frequency of staying in bed all night.

   Example

   Consequence for staying in bed all night: banana
   Consequence for getting out of bed once: crackers

Strategy #1

Consequence for staying in bed all night:
Consequence for getting out of bed once:

Strategy #2

Consequence for staying in bed all night:
Consequence for getting out of bed once:

Strategy #3

Consequence for staying in bed all night:
Consequence for getting out of bed once:

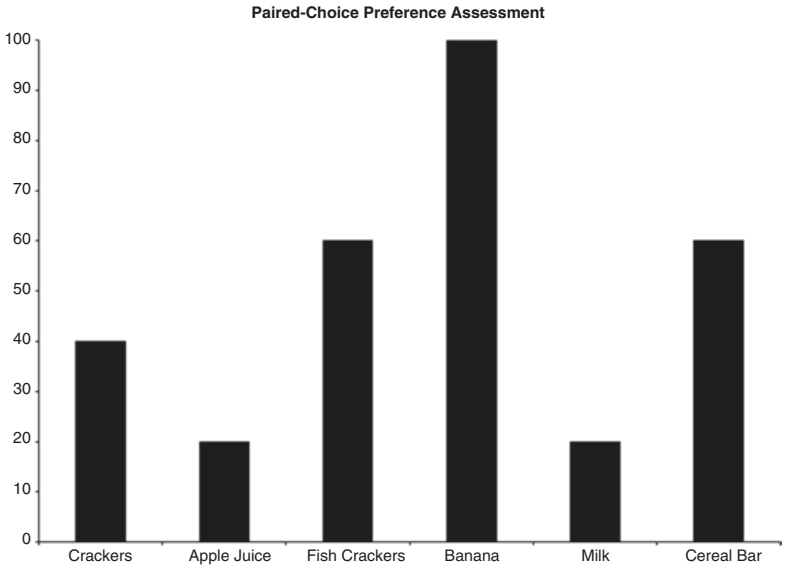


Fig. A.2 Data for Enrique's preference assessment

3. Hiromi is a 16-year-old male diagnosed with an intellectual disability. The BCBA is providing services to teach Hiromi to complete several self-care tasks including his own laundry. Hiromi has mastered all the steps required to wash and dry his clothes; however, he often leaves his clothes in the drier for multiple days and his parents have to wait to do their own laundry. The BCBA is concerned that withholding the reinforcer if Hiromi does not remove his clothes immediately will negatively impact the maintenance of the entire chain of behavior; thus, the BCBA needs to develop a differential reinforcement procedure in which removing the clothing from the drier immediately and after a delay both result in reinforcement. The BCBA conducted a preference assessment, and the results are provided in Fig. A.3.

   Example

   Removing clothes immediately: immediate access to his phone for 15 minutes
   Removing clothes after a delay: access to phone for 10 minutes after a 5 minute delay

   Strategy #1

   Removing clothes immediately:
   Removing clothes after a delay:

   Strategy #2

   Removing clothes immediately:
   Removing clothes after a delay:

   Strategy #3

   Removing clothes immediately:
   Removing clothes after a delay:

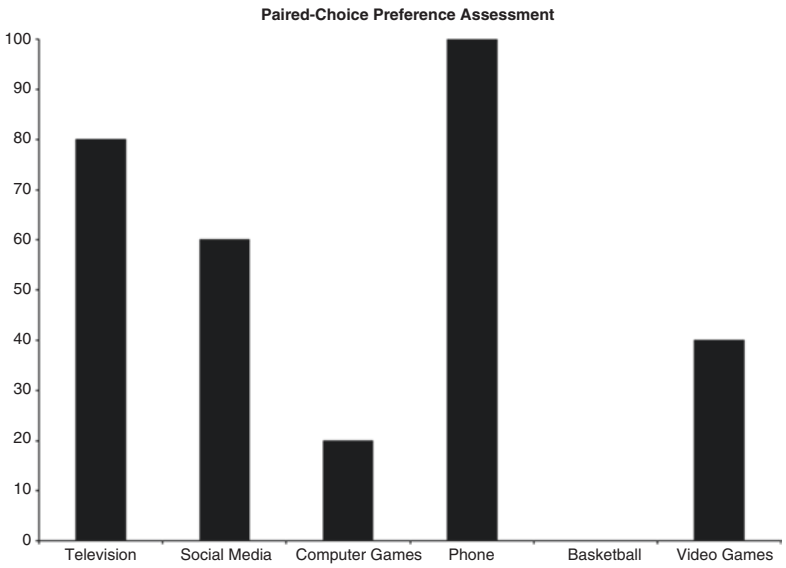


Fig. A.3 Data for Hiromi's preference assessment

Appendix B: Schedules of Reinforcement Activity

Multiple Schedule

Components:

S^D—30s—FR1 for card exchange
S^Δ—30s—EXT for card exchange

Data recorded on whether

1. The supervisee ensured the picture card was available at all times.
2. The supervisee provided access to the tangible following a correct card exchange.
3. The supervisee withheld the tangible for incorrect card exchanges.
4. The supervisee accepted and reset the picture card after attempted exchanges.
5. The supervisee allowed access to the tangible for the remainder of the 30 second interval.
6. The supervisee removed the tangible at the end of the interval.
7. The supervisee alternated from one component (e.g., S^D) to the other component (e.g., S^Δ).

Instructions for data sheet:

- ☐ The boxes that are blank should be scored with a +/−. The boxes that are grayed out are not applicable for that component. For example, during the S^Δ component the tangible is not available, so the reinforcement interval is grayed out.
- ☐ Each row represents a component of the multiple schedule.
- ☐ The first row is the S^D component.
- ☐ The second row is the S^Δ component.
- ☐ These two components rotate after every 30 seconds.

Multiple Schedule (+ if correct; − for incorrect)

Interval (in seconds)	Component schedules	Picture card available	Card exchange reinforced	Withheld tangible	Picture card reset	Reinforcement interval	Tangible removed	Alternated components
0 s–30 s	S^D FR 1							
31 s–60 s	S^Δ EXT							
61 s–90 s	S^D FR 1							
91 s–120 s	S^Δ EXT							
121 s–150 s	S^D FR 1							
151 s–180 s	S^Δ EXT							
181 s–210 s	S^D FR 1							
211 s–240 s	S^Δ EXT							
241 s–270 s	S^D FR1							
271 s–300 s	S^Δ EXT							

Chain Schedule

Components:

1st—FR 2 (work task)
2nd—FR1 (30-second break from work tasks)

Data recorded on whether

1. The supervisee ensured the client met the work requirement by completing two tasks independently or following a model prompt
2. The supervisee ensured the picture card was available at all times
3. The supervisee provided access to a break following a correct card exchange
4. The supervisee continued presenting demands for incorrect card exchanges
5. The supervisee accepted and reset the picture card after attempted exchanges
6. The supervisee allowed access to the break for 30 seconds
7. The supervisee represented work tasks at the end of the interval
8. The supervisee alternated from one component to the other component

Instructions for data sheet:

- ☐ The boxes that are blank should be scored with a +/−. The boxes that are greyed out are not applicable for that component. For example, during the EXT (extinction) component the break is not available, so the reinforcement interval is greyed out.
- ☐ Each row represents a component of the chain schedule.
- ☐ The first row is the work (EXT) component.
- ☐ The second row is the FR1 component.
- ☐ The work component transitions to the FR1 component after the learner completes 2 work tasks.

Chain Schedule (+ if correct; − for incorrect)

Exchange schedule	Task schedule	Met task requirement	Picture card available	Card exchange reinforced	Withheld break	Picture card reset	Reinforcement interval	Tasks represented	Alternated components
EXT	2 Tasks								
FR 1	----								
EXT	2 Tasks								
FR 1	----								
EXT	2 Tasks								
FR 1	----								
EXT	2 Tasks								
FR1	----								
EXT	2 Tasks								
FR1	----								

Appendix C: Compound Schedule Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Briggs, A. M., Akers, J. S., Greer, B. D., Fisher, W. W., & Retzlaff, B. J. (2018). Systematic changes in preference for schedule-thinning arrangements as a function of relative reinforcement density. *Behavior Modification, 42*, 472–497. https://doi.org/10.1177/0145445517742883

Briggs, A. M., Dozier, C. L., Lessor, A. N., Kamana, B. U., & Jess, R. L. (2019). Further investigation of differential reinforcement of alternative behavior without extinction for escape-maintained destructive behavior. *The Journal of Applied Behavior Analysis, 52*(4), 956–973. https://doi.org/10.1002/jaba.648

Brown, K. R., Zangrillo, A. N., & Greer, B. D. (2021). Development of a systematic approach to identify reinforcer dimension sensitivity. *Behavioral Development, 26*(2), 62–80. https://doi.org/10.1037/bdb0000102

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* (3rd ed.). ISBN-10: 0134752554.

Poling, A., & Normand, M. (1999). Noncontingent reinforcement: An inappropriate description of time-based schedules that reduce behavior. *The Journal of Applied Behavior Analysis, 32*(2), 237–238. https://doi.org/10.1901/jaba.1999.32-237

Saini, V., Miller, S. A., & Fisher, W. W. (2016). Multiple schedules in practical application: Research trends and implications for future investigation. *Journal of Applied Behavior Analysis, 49*(2), 421–444. https://doi.org/10.1002/jaba.300

Skinner, B. F. (1953). *Science and human behavior*. Macmillan.

Skinner, B. F. (1958). Reinforcement today. *American Psychologist, 13*(3), 94–99. https://doi.org/10.1037/h0049039

Vaughan, M. E., & Michael, J. L. (1982). Automatic reinforcement: An important but ignored concept. *Behavior, 10*(2), 217–227.

Chapter 13
Motivating Operations

Topics Covered Within This Chapter

Topics
Introduction
Distinguishing Between Discriminative Stimuli and Motivating Operations
Unconditioned and Conditioned Motivating Operations
Application of Motivating Operations

The three-term contingency of operant conditioning describes the relationship between an antecedent, behavior, and consequence. When programming and implementing skill acquisition and behavior reduction programs, we often focus our attention to the response–reinforcer relation or response–punisher relation. However, to fully understand why a behavior is or is not occurring, a clinician must also consider the influence antecedents play in the three-term contingency. Even among a stimulus that serves as a reinforcer, the value of or effectiveness of this stimulus as a reinforcer will vary across time. Skinner (1938) described this phenomenon as *drive*. For example, chocolate is a reinforcer for Lucy's behavior. If Lucy has not had a bite of chocolate all day, the value of chocolate is likely increased and in the late afternoon chocolate will serve as a highly effective reinforcer. Moreover, Lucy is likely to walk to the candy dish located on the front desk of lobby at the clinic in which Lucy is employed to retrieve a chocolate candy. On the other hand, after eating the full candy bar her best friend brought her to celebrate the start of the weekend, the value of chocolate as a reinforcer is decreased and Lucy is very unlikely to

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_13].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_13

walk through the clinic, to the front desk to retrieve more chocolate. In other words, behavior analysts should not only seek to determine what maintains a behavior, but also why any stimulus or event serves as an effective reinforcer at any given moment (McGill, 1999).

Keller and Schoenfeld (1950) coined the term *establishing operation* to describe what Skinner (1938) had previously described as *drive*. They defined establishing operations as an environmental variable that momentarily affects (a) the effectiveness of a stimulus or event as a reinforcer and (b) the current frequency of behavior that has previously contacted this specific stimulus or event as a reinforcer. Laraway et al. (2003) introduced the term motivating operation, which reflects the fact that the continuum works in both a positive and negative fashion. That is, the effectiveness of a reinforcer can be increased, but also decreased. Similarly, this could increase or decrease the frequency of behavior that has been reinforced by this stimulus or event.

Motivating operations are defined by their two effects: value-altering and behavior-altering. In regards to value-altering, an establishing operation establishes the effectiveness of a stimulus or event as a reinforcer. On the other hand, an abolishing operation abolishes the effectiveness of a stimulus or event as a reinforcer. In regards to the behavior-altering property of a motivating operation, an evocative effect evokes behavior that has been previously reinforced with the stimulus or event. An abative effect abates (decreases) behavior that has previously been reinforced with the stimulus or event.

Take water, for example. You have just completed a long, outdoor jog in warm weather, and you arrive home thirsty. The jog-induced thirst establishes water as reinforcer. This is the value-altering establishing operation. As soon as you arrive home, you walk to the refrigerator, grasp a bottle of water, and remove the lid on the bottle. This is the behavior-altering evocative effect. The jog-induced thirst evoked behaviors that have been previously reinforced with access to water. On the other hand, let's say you recently sat down to watch television with a big glass of ice water. You quickly gulp down the water and now your thirst is quenched and your stomach is full. This is the value-altering abolishing operation. In this moment, water has been abolished as a reinforcer. Moreover, you are highly unlikely to get off the couch, walk to the refrigerator, grasp a water bottle, or any other behaviors that have been previously reinforced with access to water. This is the behavior-altering abative effect. The lack of thirst and the full stomach of water abate any behaviors previously reinforced by access to water.

It is important to keep in mind that the behavior-altering effects, evocative and abative, are distinctly different than the function-altering effects. Motivating operations are temporary. In the previous example, the jog-induced thirst will evoke behaviors previously reinforced by access to water for a short time. Similarly, the stomach full of water will abate those same behaviors for a short time. Eventually, water will resume effectiveness as a reinforcer, and when this occurs, behaviors reinforced by access to water will also resume. The behavior-altering effect associated with motivating operations alters the current frequency of relevant behaviors.

On the other hand, consequences have function-altering effects. Reinforcement, punishment, and extinction affect the future frequency of a behavior (McGill, 1999).

Distinguishing Between Discriminative Stimuli and Motivating Operations

Your supervisees may initially find it difficult to distinguish between discriminative stimuli and motivating operations. After all, both are antecedent variables and both evoke or abate behavior because of their relation to reinforcement or punishment. However, a discriminative stimulus (S^D) and stimulus delta (S^Δ) evoke or abate behavior because of their correlation with differential availability of reinforcement. On the other hand, a motivating operation is correlated with the differential effectiveness of reinforcement. In other words, an S^D informs that a reinforcer is available and an establishing operation determines that the reinforcer is effective.

Let's take for example that you are on a road trip. After a few hours on the road, you begin to get hungry. About 30 minutes after your hunger strikes, you see those beautiful golden arches of McDonald's, exit the highway, and head for the drive-through. Along the first few hours of your road trip, you most likely saw several McDonald's restaurants, but you did not exit the highway and begin the process of purchasing French fries. You only exited when seeing the golden arches when you were *also* hungry. On the other hand, you did not exit the highway when the first twinge of hunger struck. In fact, you waited 30 more minutes until you saw those golden arches before you made your exit. In this scenario, the McDonald's golden arches are the S^D signaling the availability of French fries and hunger is the establishing operation that made French fries an effective reinforcer. Another way to think of this: the presence or absence of the McDonald's golden arches did not affect the effectiveness of French fries as a reinforcer. During the 30 minutes you drove with hunger pains, French fries would have been an effective reinforcer with or without the presence of a McDonald's sign. On the other hand, you did not attempt to contact reinforcement (i.e., eat French fries) at any of the McDonald's you passed in the three hours before hunger struck. At that point, French fries were not an effective reinforcer and would not evoke french-fry-seeking behavior even in the presence of a signal that French fries were available (i.e., the McDonald's golden arches sign that serves as an S^D). When attempting to distinguish between discriminative stimuli and motivating operations, your supervisees should always ask themselves, does this stimulus tell us that a reinforcer is available? If so, this stimulus is a discriminative stimulus (e.g., McDonald's golden arches). Or does this stimulus tell us that a reinforcer is effective in this moment? If so, this stimulus is a motivating operation (e.g., hunger).

Unconditioned and Conditioned Motivating Operations

Motivating operations may be classified as unconditioned or conditioned. An unconditioned motivating operation (UMO) is one that establishes or abolishes as stimulus or event as an effective reinforcer without any prior learning. For example, food deprivation establishes food as an effective reinforcer and sleep deprivation establishes sleep as an effective reinforcer without any prior learning.

There are three types of conditioned motivating operations (CMOs): surrogate CMO (CMO-S), (b) reflexive CMO (CMO-R), and (c) transitive CMO (CMO-T). A CMO-S is a stimulus that was previously neutral, but has been paired with an unconditioned motivating operation to acquire its motivating operation properties (Michael & Miguel 2020; Michael, 2007). Any easy way to think of this is that the neutral stimulus is a surrogate for the unconditioned motivating operation. For example, let's say your friend invites you to brunch. You had a big breakfast and accept the invitation to brunch, but inform your friend that you will not be eating because you are still fairly full from breakfast. You arrive at the restaurant and before you know it, you are ordering chicken and waffles. This may be the work of a CMO-S. You have a long history of pairing the sights and sounds of a restaurant with hunger, an unconditioned motivating operation that establishes food as an effective reinforcer. Now, even in the absence of hunger, the sights and sounds of the restaurant establish chicken and waffles as an effective reinforcer, evoking your behavior of ordering them when the server comes by.

A CMO-R can be thought of as a signal of an upcoming aversive event that establishes the termination of the signal itself as an effective reinforcer (Michael & Miguel 2020; Michael, 2007). Take for example Juliana who is terrified of needles. Juliana's mother takes the unsuspecting Juliana to her pediatrician for her annual flu vaccine. The moment the nurse pulls out the syringe, Juliana begins to run, scream, cry, and wiggle her way out of the room. The sight of the syringe now establishes the removal of the syringe as an effective reinforcer, evoking a myriad of behaviors previously reinforced by escape. This does so without the actual presence of the unconditioned motivating operation, the pain caused by the injection of the needle.

While CMO-R is commonly thought of as a threat stimulus that is signaling an upcoming aversive event, it can also be considered as signal of an improvement, conceptualized as a *promise* (Langthorne & McGill 2009). For example, Landon has enrolled in a very difficult, graduate-level statistics course. At the end of every class, his professor, Dr. Robins, administers a quiz. Landon has failed the quiz several times. Landon has also learned that Dr. Robins often gets sidetracked in class, particularly if a student asks a question. When this happens, they often run out of time to take the quiz. When Landon notices Dr. Robins getting sidetracked with only 30 minutes of class left, this establishes the continuation of this sidetrack conversation as a reinforcer because it is a promise that the class will not have time to complete their daily quiz. It will evoke behavior such as asking follow-up questions that have been previously reinforced with the continuation of sidetrack conversations between Dr. Robins and the class.

A CMO-T establishes another event or stimulus as a conditioned reinforcer (Michael & Miguel 2020; Michael, 2007; Sundberg; 1993). Many unconditioned motivating operations also serve as CMO-T for stimuli associated with the unconditioned reinforcer. For example, Jaylon is a 3-year-old boy who cannot yet reach snacks in the pantry. Two hours after his lunch, hunger is an unconditioned motivating operation establishing food as a reinforcer. It is also a CMO-T that establishes the presence of his mother, who can open the pantry door and retrieve snacks, as a conditioned reinforcer, evoking crying, which has a history of accessing his mother's presence and attention.

Application of Motivating Operations

Motivating operations should be considered across almost any behavior analytic program because of the relation they have with the effectiveness of reinforcement. Motivating operations can affect the outcomes of preference assessments (Gottschalk et al., 2000; McAdam et al., 2005), functional analyses (O'Reilly et al., 2009; Worsdell et al., 2000), skill acquisition programs (Rispoli et al., 2011), and challenging behavior reduction interventions (Davis et al., 2009, 2014). Motivating operations may also be manipulated to facilitate generalization of new skills. Fragale and colleagues (2012) found that skills established in one setting did not transfer to a new setting unless an establishing operation was present.

CMO-Ts are frequently manipulated to teach manding. Motivating operations are essential to evoke a mand. To facilitate mand training beyond unconditioned reinforcers such as food and water, CMO-Ts are contrived in naturalistic training. That is, the clinician contrives the situation so that the client wants something as a means to another item. For example, Mrs. Gutierrez is working to improve Darnell's mands. Darnell mands for items related to his basic needs such as food and drink, and his highest preferred toys, but Mrs. Gutierrez is hoping to expand his mand repertoire. To do so, she places his favorite toy, a light-up ball, on a high shelf that he cannot reach. When Darnell indicates interest in the ball, Mrs. Guiterrez says, "you can have the ball after you roll the play-doh (a neutral item) into a ball, which evokes Darnell's mand for play-doh." In other words, Mrs. Guiterrez established the absence of the ball as a CMO-T for the value of play-doh as a reinforcer.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Introduction to Motivating Operations
15:00–35:00	Know Your Motivating Operations!
35:00–55:00	How Can You Manipulate Motivating Operations Now?
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Motivating Operation Examples*, 1 copy per supervisee
- Appendix B: *Unconditioned and Conditioned Motivating Operation Examples*, 1 copy per pair of supervisees
- Appendix C: *Know Your Motivating Operations!*, print one copy, cut out, and follow instructions to post on a blank wall to play Jeopardy!-style game
- Tape

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Langthorne & McGill (2009)
- Michael (1993)
- Sundberg (1993)

Introduction to Motivating Operations

Begin by asking your supervisees to identify the three-term contingency of operant conditioning (antecedent, behavior, consequence). Then ask them to describe how consequences affect behavior. They should discuss reinforcement, punishment, and extinction and their related effects. Next ask them how antecedents affect behavior. We expect that they may discuss discriminative stimuli and also motivating operations, but not have as sound technical knowledge about how antecedents impact behavior relative to their knowledge about how consequences affect behavior. If this is the case, provide your supervisees with a definition of motivating operations and explain why it is important to understand and manipulate motivating operations.

Introduce the two effects of motivating operations: value-altering and behavior-altering. Define establishing operations, evocative effect, abolishing operations, and abative effect. Give an example of each. Then divide your supervisees into pairs to complete *Motivating Operation Examples* (Appendix A). During this activity, they

will provide examples of motivating operations that affect their own personal behavior. When they complete this activity, have them return to the group and share their examples.

Define unconditioned and conditioned motivating operations. Introduce the three conditioned motivating operations: CMO-S, CMO-R, and CMO-T. Provide definitions and examples of each. Then divide you supervisees in pairs again to complete *Unconditioned and Conditioned Motivating Operation Examples* (Appendix B). Like the previous activity, they will provide examples of conditioned motivating operations that affect their own personal behavior. When they complete the activity, share responses with the group. This topic is one that often presents confusion among supervisees. Listen carefully to identify correct examples to praise and erroneous examples to correct.

Know Your Motivating Operations!

You will need to prepare this activity prior to your group supervision meeting by printing and cutting out the questions found in *Know Your Motivating Operations!* (Appendix C) and creating a board similar to the game show Jeopardy! Begin by dividing your supervisees into three teams. If you have only two or three supervisees in your group meeting, they can play as individual players. If you have more than three supervisees, they will need to divide into teams and rotate players each round. Read the directions found in Appendix C aloud to the players and begin the game.

How Can You Manipulate Motivating Operations Now?

During the last 20 minutes of your group supervision meeting, you will facilitate your supervisees beginning to plan how to use motivating operations to the benefit of their clients' progress toward goals. Begin with a group brainstorm. Ask your supervisees, "What considerations regarding motivating operations should be made prior to conducting a preference assessment?" Ask the same questions about functional analysis, skill acquisition programs, and challenging behavior reduction programs. Facilitate a lengthy discussion as the possibilities are truly endless.

Divide your supervisees into pairs or trios. For the next 10 minutes, ask them to discuss in their groups how motivating operations could be manipulated within their client's program. They should each identify two ways in which they may improve their client's progress using motivating operations. For the last 5 minutes, return to the group discussion and ask your supervisees to individually share their ideas.

Knowledge Check

1. What are the two motivating operations effects?
2. Define establishing operation and abolishing operation.
3. Define evocative effect and abative effect.
4. Provide an example of an establishing and an abolishing operation.
5. Describe the three conditioned motivating operations.

Homework

Inform your supervisees that prior to the next meeting they will create a 5-minute video that introduces motivating operations to individuals seeking graduate-level training in applied behavior analysis. Give them the freedom to create the video in any format they want. Some may opt to record a traditional lecture with PowerPoint slides, and others may wish to be far less traditional. Allow as much creativity with the format as they wish with the only guidelines of (a) it is in video format, (b) the audience is graduate-level trainees, and (c) they cover the topics of establishing operation, abolishing operation, evocative effect, and abative effect. They must send you the video at least 48 hours prior to your next meeting.

Second, inform your supervisees that they will be considering how motivating operations can be manipulated to increase a client's success on mastering the goals in their current program. Ask them to bring a list of client goals and the interventions used to help the client master those goals to the next meeting. Finally, instruct your supervisees to read McAdam et al. (2005) in preparation of replicating the procedures with their client.

Homework for Individual Supervision without a Client

1. Create a 5-minute training video to teach future trainees about motivating operations. The video should cover the following topics: (a) establishing operation, (b) abolishing operation, (c) evocative effect, and (d) abative effect.
2. For one client, prepare a list of goals and intervention procedures. This will be used to begin brainstorming how to systematically manipulate motivating operations to improve mastery of goals.
3. Read McAdam et al. (2005).
4. Retrieve a client's recent preference assessment results (i.e., administered within last three months), if available.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 1-hour meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Motivating Operations Training Video: Viewing and Feedback
15:00–30:00	Review Client Goals and Intervention Procedures
30:00–55:00	Plan Preference Assessment
55:00–60:00	Homework Review

Materials Needed

- Motivating operations training video (send to supervisor 48 hours prior to meeting)
- Computer or tablet for playing the motivating operations training video
- Clipboard/pen or laptop/tablet for taking feedback notes during the motivating operations training video viewing
- Appendix D: *Motivating Operations Training Bideo Feedback Form*, 1 copy
- Prior preference assessment results for target client.
- McAdam et al. (2005), access to electronic or printed copy for reference
- Appendix E: *Preference Assessment Planning Guide*; 1 copy
- Appendix F: *Paired Stimulus Procedural Fidelity Checklist Template*, preferably electronic copy to edit as needed
- Appendix G: *Paired Stimulus Data Sheet*, 1 copy to review
- Four stimuli to role play a paired stimulus preference assessment

Motivating Operations Training Video: Viewing and Feedback

Begin your meeting by viewing your supervisee's training video. As you observe, take notes regarding the accuracy of the information presented and how well your supervisee conveyed the topic to a new trainee. You may wish to use *Motivating Operations Training Video Feedback Form* (Appendix D) to assist you in delivering feedback. The purpose of this activity is to confirm your supervisee's accurate knowledge of motivating operations as well as to give them an opportunity to practice communicating about motivating operations. While the goal is not necessarily for them to improve skills in creating training videos, you can give them feedback regarding their method of instruction. For example, where they easy to understand? Were they engaging? Such skills can translate to improved collaboration with caregivers and colleagues. However, focus your feedback on the accuracy with which they describe the main concepts.

Review Client Goals and Intervention Procedures

We allocated 15 minutes for you and your supervisee to begin to brainstorm how they can manipulate motivating operations in a way to improve their client's goal mastery. Begin this activity by explaining to your supervisee that when planning interventions, the manipulation of motivating operations should be considered the same as a clinician considers how to manipulate discriminative stimuli, prompts, and consequences to improve the client's success. Give examples of how motivating operations may be manipulated. For example, withholding access to stimuli to serve as reinforcers for desired behavior prior to the session is an establishing operation that will increase the effectiveness of those stimuli as reinforcers. Additionally, a clinician may reduce the length of an aversive task, an abolishing operation that decreases the value of escape as a reinforcer and abates challenging behavior previously reinforced with escape (e.g., crying, elopement, aggression). Inform your supervisee that you would like for them to read each of the client's goals aloud and then briefly describe the intervention. After doing so, the two of you will collaboratively brainstorm how you may manipulate motivating operations to improve the client's mastery of this goal with this intervention procedure. Repeat these for as many goals as you can within the 15 minutes allotted.

Plan Preference Assessment

During the individual supervision meeting with a client, your supervisee will conduct at least 12 preference assessments in order to evaluate the effects of restricted and unrestricted access of stimuli on the results of the preference assessment similar to the evaluation conducted by McAdam et al. (2005). This includes four control assessments; four restricted access (deprivation) assessments, one for each stimulus; and four unrestricted access (habituation) assessments, one for each stimulus. The purpose of this activity is for your supervisees to gain a better understanding of how motivating operations can affect behavior.

Ask your supervisee to share the prior preference assessment results. Identify at least four preferred stimuli. If the available preference assessment results do not allow for identification of four preferred stimuli, ask your client to identify additional stimuli presumed to be preferred based upon interviews and/or anecdotal observations. Explain the assessment process, referring to McAdam et al. (2005) as needed. Use the *Preference Assessment Planning Guide* (Appendix E) to collaboratively plan the assessment process, scheduling when to administer each of the 12 assessments. Note that only one assessment can be conducted per day, so to plan with that in mind.

Review the *Paired Stimulus Procedural Fidelity Checklist* (Appendix F) with your supervisee. Edit the template to meet the needs of the client. After completing

the procedural fidelity checklist, review the *Paired Stimulus Data Sheet: Four Items* (Appendix G) to confirm that your supervisee knows how to use this data sheet.

After discussing the purpose of this assessment, finalizing the assessment procedures, and reviewing the data sheet, provide your supervisee the opportunity to role-play administering the control preference assessment at least once, but additional opportunities if needed. In the role play of the control preference assessment, rather than providing you, the confederate client, with 10 minutes of noncontingent access to all four stimuli, instruct your supervisee to provide 1 minute of noncontingent access just for the sake of efficiency. After completing the role play, provide performance feedback. We encourage you to provide feedback not only the manipulation of the motivating operations, but also on the accuracy with which the supervisee implemented all steps of the paired stimulus preference assessment.

Homework Review

End your meeting by confirming that your supervisee will conduct 12 preference assessments. Multiple assessments cannot be completed on the same day. You will observe at least four assessments, meaning you will schedule four separate observations. Be sure that you observe at least one of each (control, deprivation, and habituation).

It is not necessary to observe the 24-hour restricted access associated with the deprivation and habituation assessments. Instead, you will begin your observation 10 minutes prior to the assessment. During the control assessment, you will confirm that the supervisee provided noncontingent access to all four stimuli for 10 minutes. During the restricted access (deprivation) assessment, you will confirm that your supervisee provided noncontingent access to three of the four stimuli for 10 minutes. During the unrestricted access (habituation) assessment, you will confirm that your supervisee provided noncontingent access to only one of the four stimuli for 10 minutes. After the first 10-minute access observation, you will observe the administration of the preference assessment. In total, each observation should last about 15 minutes.

First, work with your supervisee to select four observation opportunities when they will be conducting the preference assessment. Next, remind them to send you a final electronic version of the procedural fidelity checklist and the data sheet that they will use with their client.

Homework for Individual Supervision with a Client

1. At least 48 hours prior to the meeting, send the paired stimulus procedural fidelity checklists (see Appendix F for a template).
2. If revisions were made, send revised data sheets to your supervisor.

Individual Supervision Meetings with a Client

Below is a plan for activities to incorporate into a 40-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda (to Be Repeated Four Times)

Time	Activity
0:00–15:00	Observe Preference Assessment Administration (repeat four times)
15:00–25:00	Performance Feedback (repeat four times)
25:00–40:00	Discuss Applied Value of Results (after final observation only)

Materials Needed

- Paired stimulus procedural fidelity checklist template, provided by supervisee 48 hours prior to meeting
- Paired stimulus data sheet, provided by supervisee 48 hours prior to meeting
- Clipboard
- Pen/Pencil

Observe Preference Assessment Administration

Your supervisee should have provided you with two items for the preference assessments: (a) three procedural fidelity checklists (control, deprivation, and habituation) and (b) a data sheet. Review these materials prior to your meeting. If you note changes that must be made, notify your supervisee in advance of your observation and request the changes prior to the first assessment observation. We did not allocate time for feedback to these documents as your supervisee should have conducted preference assessments in Chap. 8. Therefore, they have likely used similar procedural fidelity checklists and data sheets.

You will observe your supervisee conducting a preference assessment four times. These observations will take place across four different days. Each observation should be approximately 15 minutes in duration; therefore, four observations should total about one hour of supervision in which you observe your supervisee working directly with a client.

You will observe the 10 minutes prior to the assessment when access to stimuli has been programmed to manipulate motivating operations. After the 10 minute access period, you will observe the paired stimulus preference assessment. During the observation, measure procedural fidelity and collect data on client's selection. Be sure your supervisee notifies you of which assessment they will be conducted during each observation as well as to which stimulus (i) the client will have noncontingent access so you can provide accurate feedback on the correct procedural fidelity checklist.

Performance Feedback

Schedule 10 minutes after your observation to provide performance feedback. Do so when no clients are present. Begin by praising correct implementation and then correct observed errors. Provide an opportunity for your supervisee to ask questions and to role-play any steps in which they implemented with poor fidelity. End by asking your supervisee to calculate IOA between the data you both collected. When applicable, discuss discrepancies and measures that can be taken to reduce these in the future.

Discuss Applied Value of Results

After your supervisee completes all twelve assessments, instruct them to graph the results in a format similar to the graphs provided by McAdam et al. (2005). Schedule a meeting without the client present to review the results. Provide performance feedback on the graphs. Ask your supervisee to describe how the results of this assessment can be translated to practice with their client. You may expect your supervisee to report that they will vary the use of reinforcing stimuli to avoid creating an abolishing operation by lengthy access to a single stimulus. They may also suggest withholding access to a particular stimulus to create an establishing operation for that stimulus prior to particularly difficult or nonpreferred tasks so that a highly effective reinforcer is available for nonpreferred task completion.

Mastery Criteria

In order to progress from this lesson, your supervisee must (a) create an instructional video that contains accurate descriptions of an establishing operation, abolishing operation, evocative effect, and abolishing effect, (b) conduct a deprivation preference assessment condition with at least 80% fidelity, and (c) conduct a habituation preference assessment condition with at least 80% fidelity.

Future Growth

- ☐ Evaluate your supervisee's ability to manipulate motivating operations effectively during a skill acquisition program.
- ☐ Evaluate your supervisee's ability to manipulate motivating operations effectively during a behavior reduction program.

Appendix A: Motivating Operation Examples

Instructions: Describe an example of each of the following using your own personal behavior and related motivating operations. You may work in a pair to brainstorm, but each supervisee should complete their own examples.

Establishing Operations	
Reinforcer Establishing Effect	
Evocative Effect	
Abolishing Operations	
Reinforcer Abolishing Effect	
Abative Effect	

Appendix B: Unconditioned and Conditioned Motivating Operation Examples

Instructions: Describe an example of each of the following using your own personal behavior and related motivating operations. You may work in a pair to brainstorm, but each supervisee should complete their own examples.

Motivating Operation	Example
UMO	
CMO-S	
CMO-R	
CMO-T	

Appendix C: Know Your MOs!

Preparation Instructions: Print and cut out each square. Write the point value on the backside of the question and tape to the wall so that only the point value can be seen. Affix to the wall in a fashion similar to the Jeopardy! Board.

Game Instructions (please read aloud to your supervisees): The game host (i.e., your supervisor) will randomly determine which of the three players begins. If you are playing with teams, as opposed to individual players, rotate the player that will "represent" your team each round of the game. The selected player/team will select a category and point value. The supervisor will read the question aloud. The first person to raise their hand will be given the opportunity to answer the question. If they answer correctly, they earn the point value. If they answer incorrectly, the lose the point value. If they answer incorrectly, the other players/teams can choose to answer. If no player/team answers in 15 seconds, the question is passed. The team with the highest number of points at the end of the game wins!

These are category headers for your posting of questions:

Name That Effect
S^D or MO?
UMO & CMO

Category: Name That Effect

Point Value: 100 Adriana has been on a very restrictive diet for the past four weeks. She has not had a single piece of candy or baked good during this time. This period of time without sweets has increased the effectiveness of sweet treats as a reinforcer. What type of motivating operation effect is this?
Point Value: 200 Noor is a freshman in college. She selected a college that is in another time zone from her family and she is rarely able to catch them on the phone or Zoom thanks to the difference in time. Noor's mother's attention has now increased in effectiveness as a reinforcer due to this long period of separation. What type of motivating operation effect is this?
Point Value: 300 Sebastian came home with a terrible headache. He took some at 5:00 pm and laid in bed. By 6:00 the headache had mostly disappeared. Lying in bed has now decreased in effectiveness as a reinforcer. What type of motivating operation effect is this?
Point Value: 400 Roman is a 5-year-old boy who loves playing on his tablet. His dad only allows tablet play when they are on long car rides. It has been four months since Roman and his dad had a long car ride and Roman has not had access to his tablet since then. When Roman learns that he and his dad will be driving three hours to visit Roman's grandma this afternoon, Roman's requests for the tablet increase. What type of motivating operation effect is this?
Point Value: 500 Zara began dating a new guy about three weeks ago. She was very excited about him at first, but in the last week he has become clingy. He comes to her house unannounced, calls her multiple times a day while she is at work, and sends many texts checking on her in a day. Zara has decreased the number of times she calls or texts her boyfriend in the past week due to this clingy behavior. What type of motivating operation effect is this?

Category: S^D or MO

Point Value: 100 Santiago mowed the yard this morning and didn't realize that he was brushing up against poison ivy! By noon, Santiago's arms itching like crazy. Santiago runs to the bathroom where he stores the hydrocortisone cream to apply the cream. In this situation, is bathroom an S^D or MO?
Point Value: 200 Mateo had a bit too much to drink last night. He woke up with a terrible headache. He knows that his partner always has aspirin in her bag, so he walks into the living room where she is watching TV and asks for the aspirin. In this situation, is the headache an S^D or MO?
Point Value: 300 Mila is a 3-year-old girl with autism. Her favorite snack is applesauce pouches that her grandma keeps in the refrigerator. When Mila gets hungry, she walks to the refrigerator and begins banging on the door, a response that is frequently reinforced with access to an applesauce pouch. In this situation, is the refrigerator an S^D or MO?

Point Value: 400 Cecilia is a 14-year-old girl who frequently exhibits challenging behavior at school. Cecilia particularly struggles at math. When Cecilia sees her teacher, Mr. Evans beginning to pass out a stack of worksheets filled with algebra problems to complete independently, Cecilia begins to make inappropriate comments, behavior that typically results in her being sent to the principal's office. In this situation, is the math worksheet an S^D or MO?
Point Value: 500 Theo started a new job in which he feels completely in over his head. Last week his boss assigned him a report to submit on Friday. Theo was not sure how to complete the project, so he never submitted anything. On Tuesday Theo is sitting in his cubicle when he spots his boss walk into the office. Theo quickly notices that single-user restroom is open and he quickly darts to the restroom to avoid his boss. In this situation, is the boss' presence an S^D or MO?

Category: UMO and CMO

Point Value: 100 Santiago mowed the yard this morning and didn't realize that he was brushing up against poison ivy! By noon, Santiago's arms itching like crazy. Santiago runs to the bathroom where he stores the hydrocortisone cream to apply the cream. Is the itch a UMO, CMO-S, CMO-R, or CMO-T?
Point Value: 200 Cooper and his partner Jace just moved into a new, hip, loft-style apartment. The apartment is perfect except for one thing, the kitchen cabinets are very high and Cooper is short. Thankfully, Jace is tall and can reach the cabinets. On Tuesday, Cooper is hungry and wants to make dinner. He needs a mixing bowl from a high cabinet and calls Jace for help. In this situation, hunger evokes the behavior of calling Jace for assistance to access a mixing bowl. Is this a UMO, CMO-S, CMO-R, or CMO-T?
Point Value: 300 Cooper and his partner Jace just moved into a new, hip, loft-style apartment. The apartment is perfect except for one thing, the kitchen cabinets are very high and Cooper is short. Thankfully, Jace is tall and can reach the cabinets. On Tuesday, Cooper is hungry and wants to make dinner. Cooper's hunger evokes cooking behavior that has previously been reinforced by access to food. Is this a UMO, CMO-S, CMO-R, or CMO-T?
Point Value: 400 Ebony is an 8-year-old girl with Down syndrome. She significant delays in fine motor skills and finds handwriting aversive. In collaboration with an occupational therapist, Ebony's clinician has embedded handwriting activities into their daily routine. Specifically, Ebony's therapist, Brent, brings one handwriting practice page to each therapy session. It consists of the 26 letters of the alphabet in a bubble-style font so that Ebony can write the letters over and within the bubble letter. The sight of Brent taking this worksheet from his folder evokes elopement behavior. Is this a UMO, CMO-S, CMO-R, or CMO-T?
Point Value: 500 Katie has a routine of watching the Golden Girls in bed before she falls asleep. Almost every night she crawls into bed exhausted, turns on the Golden Girls, and is out before the 30 minute episode is complete. Last Saturday Katie did not have much to do, so at 6:00 she decided to sit down and watch Golden Girls. Although she was not sleepy when she sat down for her favorite show, within minutes she began yawning and yearning for her bed. Is this a UMO, CMO-S, CMO-R, or CMO-T?

Know Your MOs!
Answer Sheet
DO NOT DISTRIBUTE TO SUPERVISEES

Category: Name That Effect

Point Value: 100 Establishing operation (value altering)
Point Value: 200 Establishing operation (value altering)
Point Value: 300 Abolishing operation (value altering)
Point Value: 400 Evocative effect (behavior altering)
Point Value: 500 Abative effect (behavior altering)

Category: S^D or MO

Point Value: 100 S^D
Point Value: 200 MO
Point Value: 300 S^D
Point Value: 400 S^D
Point Value: 500 MO

Category: UMO and CMO

Point Value: 100 UMO
Point Value: 200 CMO-T
Point Value: 300 UMO
Point Value: 400 CMO-R
Point Value: 500 CMO-S

Appendix D: Motivating Operations Training Video Feedback Form

Supervisee: _____ Supervisor: _____

Feedback Topics	Circle One
Accurate definition of motivating operations?	Yes No
Notes:	
Accurate definition of establishing operation?	Yes No
Notes:	
Accurate definition of abolishing operation?	Yes No
Notes:	
Accurate definition of evocative effect?	Yes No
Notes:	
Accurate definition of abative effect?	Yes No
Notes:	
Designed for a graduate-level trainee audience?	Yes No
Notes:	
The video was easy to understand?	Yes No
Notes:	
The video format was engaging and would be appealing to the audience?	Yes No
Notes:	
Additional Feedback:	

Appendix E: Preference Assessment Planning Guide

Supervisee: _____ Supervisor: _____

Client: _____ Assessment Dates: _____

Order	Assessment	Assessment Date
1	Control: Noncontingent access to all stimuli 10 min prior to assessment	
2	Restricted Access (Deprivation) Stimulus A: • No access to Stimulus A for 24 hours. • Noncontingent access to Stimuli B, C, & D for 10 min prior to assessment	
3	Unrestricted Access (Habituation) Stimulus A: • No access to Stimulus B, C, & D for 24 hours. • Noncontingent access to Stimuli A for 10 min prior to assessment	
4	Control: Noncontingent access to all stimuli 10 min prior to assessment	
5	Restricted Access (Deprivation) Stimulus B: • No access to Stimulus B for 24 hours. • Noncontingent access to Stimuli A, C, & D for 10 min prior to assessment	
6	Unrestricted Access (Habituation) Stimulus B: • No access to Stimulus A, C, & D for 24 hours. • Noncontingent access to Stimuli B for 10 min prior to assessment	
7	Control: Noncontingent access to all stimuli 10 min prior to assessment	
8	Restricted Access (Deprivation) Stimulus C: • No access to Stimulus C for 24 hours. • Noncontingent access to Stimuli A, B, & D for 10 min prior to assessment	
9	Unrestricted Access (Habituation) Stimulus C: • No access to Stimulus A, B, & D for 24 hours. • Noncontingent access to Stimuli C for 10 min prior to assessment	
10	Control: Noncontingent access to all stimuli 10 min prior to assessment	
11	Restricted Access (Deprivation) Stimulus D: • No access to Stimulus D for 24 hours. • Noncontingent access to Stimuli A, B, & C for 10 min prior to assessment	
12	Unrestricted Access (Habituation) Stimulus D: • No access to Stimulus A, B & C for 24 hours. • Noncontingent access to Stimuli D for 10 min prior to assessment	

Appendix F: Paired Stimulus Procedural Fidelity Checklist Template Control Assessment

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

	Step	Implemented Correctly? + = Yes − = No
1	Prior to the paired stimulus preference assessment, the client had noncontingent access to all four stimuli for [*insert time; recommended 10 min, but may vary based on the client's need*].	
2	To begin each trial, the supervisee places the appropriate two stimuli equal distance from the client. See data sheet for stimuli pairing.	
3	After placing stimuli in front of client, the supervisee instructs the client to "choose one". *Note: may need to change instruction wording or modality.*	
4	When client selects a stimulus, the supervisee provides access to that stimulus for [insert time; recommended 30 s, but may vary based on client need].	
5	If the client approaches both stimuli, the supervisee blocks and re-directs the client to choose one.	
6	When client selects a stimulus, the supervisee removes the remaining stimulus so it is out of sight and reach.	
7	If the client fails to select either stimuli, the supervisee prompts the client to sample each stimulus for 5 s. *Note: may need to change to a supervisee model rather than prompted interaction.*	
8	If after prompted sampling the client does not select a stimulus within 5 s, the supervisee removes both items and begins the next trial.	
9	The supervisee continues until all stimulus pairs have been presented.	
10	The stimulus pairs included each stimulus paired with the other once and the order of pairs of stimuli are randomized. See data sheet to confirm.	
11	The supervisee accurately records selection using data collection sheet.	

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Paired Stimulus Procedural Fidelity Checklist Template Restricted Access (Deprivation) Assessment

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Step		Implemented Correctly? + = Yes - = No
1	Prior to the paired stimulus preference assessment, the client had noncontingent access to three stimuli for [*insert time; recommended 10 min, but may vary based on the client's need*].	
2	Prior to the paired stimulus preference assessment, the client had no access to the remaining stimulus for [*insert time; recommended 24 hours, but may vary based on the client's need*].	
3	To begin each trial, the supervisee places the appropriate two stimuli equal distance from the client. See data sheet for stimuli pairing.	
4	After placing stimuli in front of client, the supervisee instructs the client to "choose one". *Note: may need to change instruction wording or modality.*	
5	When client selects a stimulus, the supervisee provides access to that stimulus for [insert time; recommended 30 s, but may vary based on client need].	
6	If the client approaches both stimuli, the supervisee blocks and re-directs the client to choose one.	
7	When client selects a stimulus, the supervisee removes the remaining stimulus so it is out of sight and reach.	
8	If the client fails to select either stimuli, the supervisee prompts the client to sample each stimulus for 5 s. *Note: may need to change to a supervisee model rather than prompted interaction.*	
9	If after prompted sampling the client does not select a stimulus within 5 s, the supervisee removes both items and begins the next trial.	
10	The supervisee continues until all stimulus pairs have been presented.	
11	The stimulus pairs included each stimulus paired with the other once and the order of pairs of stimuli are randomized. See data sheet to confirm.	
12	The supervisee accurately records selection using data collection sheet.	

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Paired Stimulus Procedural Fidelity Checklist Template
Unrestricted Access (Habituation) Assessment

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Step		Implemented Correctly? + = Yes − = No
1	Prior to the paired stimulus preference assessment, the client had no access to three stimuli for [*insert time; recommended 24 hour, but may vary based on the client's need*].	
2	Prior to the paired stimulus preference assessment, the client had noncontingent access to the remaining stimulus for [*insert time; recommended 10 min, but may vary based on the client's need*].	
3	To begin each trial, the supervisee places the appropriate two stimuli equal distance from the client. See data sheet for stimuli pairing.	
4	After placing stimuli in front of client, the supervisee instructs the client to "choose one". *Note: may need to change instruction wording or modality.*	
5	When client selects a stimulus, the supervisee provides access to that stimulus for [insert time; recommended 30 s, but may vary based on client need].	
6	If the client approaches both stimuli, the supervisee blocks and re-directs the client to choose one.	
7	When client selects a stimulus, the supervisee removes the remaining stimulus so it is out of sight and reach.	
8	If the client fails to select either stimuli, the supervisee prompts the client to sample each stimulus for 5 s. *Note: may need to change to a supervisee model rather than prompted interaction.*	
9	If after prompted sampling the client does not select a stimulus within 5 s, the supervisee removes both items and begins the next trial.	
10	The supervisee continues until all stimulus pairs have been presented.	
11	The stimulus pairs included each stimulus paired with the other once and the order of pairs of stimuli are randomized. See data sheet to confirm.	
12	The supervisee accurately records selection using data collection sheet.	

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Appendix G: Paired Stimulus Preference Assessment Data Sheet: Four Items

Supervisee: _____ Supervisor: _____

Client: _____ Assessment Dates: _____

Stimulus A: _____ Selected _____ times = _____% of trials

Stimulus B: _____ Selected _____ times = _____% of trials

Stimulus C: _____ Selected _____ times = _____% of trials

Stimulus D: _____ Selected _____ times = _____% of trials

Trial Number	Circle Stimulus Selected
1	A B
2	C A
3	A D
4	B C
5	D B
6	C D

References

Davis, T. N., Fuentes, L., & Durand, S. (2014). Examination of systematic durations of presession reinforcer access on functional communication training. *Journal of Developmental and Physical Disabilities, 26*, 263–270.

Davis, T. N., O'Reilly, M. F., Kang, S., Rispoli, M., Lang, R., Machalicek, W., Chan, J. M., Lancioni, G., & Sigafoos, J. (2009). Impact of presession access to toys maintaining challenging behavior on functional communication training: A single case study. *Journal of Developmental and Physical Disabilities, 21*, 515–521.

Gottschalk, J. M., Libby, M. E., & Graff, R. B. (2000). The effects of establishing operations on preference assessment outcomes. *Journal of Applied Behavior Analysis, 33*(1), 85–88.

Keller, F. S., & Schoenfeld, W. N. (1950). Principles of psychology: A systematic text in the science of behavior. *Appleton-Century Crofts.*

Laraway, S., Snycerski, S., Michael, J., & Poling, A. (2003). Motivating operations and some terms to describe them: Some further refinements. *Journal of Applied Behavior Analysis, 36*(3), 407–414.

Langthorne, P., & McGill, P. (2009). A tutorial on the concept of the motivating operation and its importance to application. *Behavior Analysis in Practice, 2*(2), 22–31.

McAdam, D. B., Klatt, K. P., Koffarnus, M., Dicesare, A., Solberg, K., Welch, C., & Murphy, S. (2005). The effects of establishing operations on preferences for tangible items. *Journal of Applied Behavior Analysis, 38*(1), 107–110.

McGill, P. (1999). Establishing operations: Implications for the assessment, treatment, and prevention of problem behavior. *Journal of Applied Behavior Analysis, 32*(3), 393–418.

Michael, J. (1993). Establishing operations. *The Behavior Analyst, 16*(2), 191–206.

Michael, J. (2007). Motivating Operations. In J. O. Cooper, T. E. Heron & W. L. Heward (Eds.), Applied behavior analysis (2nd ed., pp. 374–391). NJ: Merrill Prentice Hall.

Michael, J., & Miguel, C. (2020). Motivating operations. In J. O. Cooper, T. E. Heron, & W. L. Heward (Eds.), *Applied behavior analysis* (3rd ed., pp. 372–394). Prentice Hall.

O'Reilly, M. F., Lang, R., Davis, T. N., Rispoli, M., Machalicek, W., Sigafoos, J., Lancioni, G., Shogren, K., & Didden, R. (2009). Temporal versus behavioral characteristics of pre-session exposure to reinforcers during functional analyses. *Journal of Applied Behavior Analysis, 42*, 773–783.

Rispoli, M., O'Reilly, M., Lang, R., Machalicek, W., Davis, T. N., Lancioni, G., & Sigafoos, J. (2011). Effects of motivating operations on problem and academic behavior in classrooms. *Journal of Applied Behavior Analysis, 44*, 649–663.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Appleton-Centry-Crofts.

Sundberg, M. L. (1993). The application of establishing operations. *The Behavior Analyst, 16*(2), 211–214.

Worsdell, A. S., Iwata, B. A., Conners, J., Kahng, S. W., & Thompson, R. H. (2000). Relative influences of establishing operations and reinforcement contingencies on self-injurious behavior during functional analyses. *Journal of Applied Behavior Analysis, 33*(4), 451–461.

Chapter 14
Discrete Trial Training

Topics Covered Within This Chapter

Topics
Introduction
ABC Paradigm
Advantages and Disadvantages

Discrete trial training (DTT), also referred to as *discrete trial teaching* and *discrete trial format*, is easily the most well-known teaching approach based upon the concepts and principles of applied behavior analysis. Developed in the 1970s, it grew in popularity due to its documented effectiveness (e.g., Lovaas, 1987). DTT is a relatively simple teaching procedure that involves clearly communicating the expected response, providing assistance in the form of prompts, immediately correcting errors, and reinforcing correct responses. As a result, many professionals such as new direct-service staff, teachers, and paraprofessionals can learn to implement DTT quickly and effectively (Catania et al., 2009; Higbee et al., 2016; Nosik et al., 2013; Vladescu et al., 2012).

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_14].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_14

ABC Paradigm

DTT consists of learning trials. Each DTT learning trial is aligned with the antecedent–behavior–consequence (ABC) model (see Fig. 14.1; Webber & Scheuermann, 2008). Within the antecedent phase at the start of a DTT trial, the clinician first secures client attention. When attention is secured, the clinician delivers the discriminative stimulus. Transitioning to the behavior phase of a trial, the client responds to the discriminative stimulus, which, in most cases, will require the assistance of a prompt. Ending with the consequence phase of the DTT trial, the clinician delivers the appropriate consequence, based on if the client responded correctly or made an error. Finally, a short intertrial interval provides time to record data, consume reinforcement, and engage in rapport-building activities, after which a new trial is presented.

DTT aligned with the ABC paradigm.

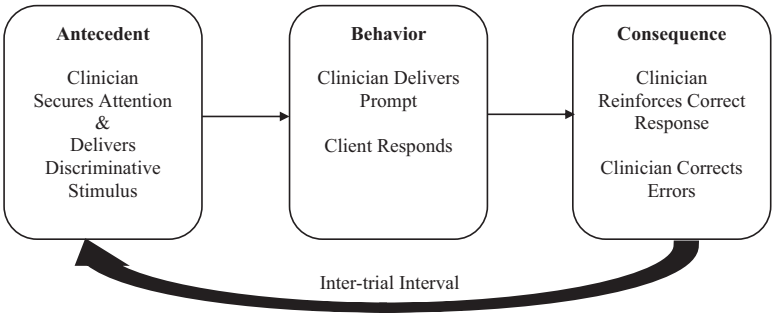


Fig. 14.1 DTT aligned with the ABC paradigm

Securing Attention

In order for a DTT trial to be successful, the client must be attending to the clinician. Securing attention may take many forms. For example, this may be done by saying the client's name or a variety of other vocalizations (e.g., "look at me") and gestures (e.g., pointing to the clinician's eyes). Your supervisees will be familiar with their clients, which will help identify the best methods for securing attention.

Discriminative Stimulus

DTT emphasizes the establishment of stimulus control. The purpose of DTT is to teach the client to engage in specific behaviors in response to specific stimuli (i.e., stimulus control). For example, DTT may be used teach sight words. The clinician wants the client's vocalization of the word "whole" to be under strong stimulus control; that is, the client should only vocalize the word "whole" when shown a flash card with the letters *w-h-o-l-e* and asked "what word?" but not when shown a flash card with the letters *w-a-s* or *w-h-e-r-e* or *w-h-y* and asked "what word?" Similarly, a client who has an imitation goal may be taught to imitate the clinician's behavior only after observing the discriminative stimulus of the clinician saying, "do this" followed by a motor movement. The clinician wants the client to imitate clapping when the clinician says "do this" and claps, but would not want the client to imitate all of the clinician's behaviors throughout a day. As a result, supervisees need to learn how to select appropriate discriminative stimuli. Discriminative stimuli may consist of a vocalization, gesture, physical environment arrangement, or some combination of these. A discriminative stimulus should follow the three C's: concise, comprehensible, consistent (across trials). Concise simply means that the discriminative stimuli should be as brief as possible to elicit the desired response. Comprehensible means that the discriminative stimulus should be one that is relevant and understandable in the natural environment. For example, if the goal was to teach the client to clean up their belongings, it would be best for the clinician to use a discriminative stimulus of "clean up" rather than a flicker of the overhead lights or four-verse clean-up song as the first is more comprehensible and relevant in a natural environment. Finally, the discriminative stimulus should be held consistent across trials, at least during initial instruction. In later trials, the discriminative stimulus may be altered to promote generalization.

Prompts

Prompts are additional assistance the clinician delivers to help the client respond to the discriminative stimulus correctly. If the discriminative stimulus already evoked the desired response, this goal would be considered mastered and would not be targeted with the use of DTT; therefore, your supervisees will need to be proficient at selecting and delivering prompts within a DTT framework.

It is our experience that supervisees often have a difficult time distinguishing between discriminative stimuli and prompts. If this is the case for some of your supervisees, we find the most useful tool for helping them discriminate between the two can be found in a well-written goal. A goal (also referred to as an *objective*, among other names), should include a description of the discriminative stimulus to which the client should respond; however, it would not include the prompts that

may be delivered to assist the client in responding to that discriminative stimulus. Consider this example:

> By May 31st, when shown an analogue clock and asked, "what time is it?," Jaylen will independently and correctly vocalize the time, within 3 minutes of the actual time, 90% of trials across three sessions.

The discriminative stimuli to which Jaylen should vocalize the time are (a) being shown an analogue clock and (b) being asked "what time is it?" Any additional assistance beyond those two stimuli would be considered prompts. Prompts may include (a) the clinician holding up two fingers to indicate it is two o'clock, (b) holding up a flash card with a digital clock display of the time presented on the analog clock (e.g., 2:00), (c) the addition of *15*, *30*, and *45* over the minute markers corresponding to those times, and (d) the clinician vocalizing, "say, 'it's 2:00'," or an endless number of possibilities that would help Jaylen successfully read the analog clock. It will be very important to help supervisees make the distinction between discriminative stimuli and prompts because this is a foundational skill that allows them to collect accurate data regarding the client's correct (i.e., independent) responses versus prompted responses.

Prompts come in two forms: response prompts and stimulus prompts. Response prompts are delivered within a few seconds after the discriminative stimulus. Stimulus prompts are built into the discriminative stimulus. There are countless types of prompts, each offering varying degrees of support based upon the desired response and the client's needs.

Response prompts While this is not meant to be an exhaustive list, most response prompts can be categorized as physical guidance, model prompts, gesture prompts, or verbal prompts.

- Physical guidance involves physically assisting the client to complete a task. For example, physically holding a client's hands to guide them through the steps of hand washing. Physical prompts can vary from providing partial guidance to complete hand-over-hand guidance.
- Model prompts involve the clinician modeling the desired response. These are typically divided into vocal models and physical models. For example, if the clinician is teaching Mario his address, they would deliver the discriminative stimulus, "What is your address?" followed by a vocal model prompt of "1234 Oak Street, Tacoma, Washington." If the clinician is teaching Mario to call his mother from a list of contacts on his cellular phone, they would deliver the discriminative stimulus, "call your mom" while presenting a phone followed by physically modeling how to dial the number of Mario's mom on the phone. Similar to physical prompts, models may be partial or full models of the desired response.
- Gesture prompts are a body movement that indicates the desired response without modeling the desired response. For example, if a clinician is teaching Teresa how to set the table for dinner, after delivering the discriminative stimulus, "set

the table," the clinician may point to the cupboard where the plates are stored to prompt Teresa to begin setting the table by retrieving the plates.
- Verbal prompts provide instructions or hints. These differ from vocalizations that model the desired response. For example, if a clinician is teaching Zara to write the letters of her name, after delivering the discriminative stimulus, "write the letter Z," the clinician may deliver the verbal prompt, "grasp your pencil closer to the bottom" or "remember, start with a line going across the top from left to right."

Stimulus prompts Stimulus prompt options are numerous as well. They are generally categorized as those that change the properties of the stimulus and those that change the position the stimulus.

- Changing properties of the stimulus may include changing the color, shape, size, or other dimensions. For example, if a clinician is working on the following goal, "When presented with drawing paper and a pencil and told to draw a square, Liam will independently and correctly draw a square 90% of trials across three sessions," they may use one of the following the stimulus prompts: (a) a square written in a dashed line that could be traced, (b) four dots on the paper to prompt the four corners of the square, or (c) a square written in highlighter that can be traced with a crayon.
- Changing the position of the stimulus involves moving a stimulus so that it is more prominent, typically closer to the client. For example, if a clinician is teaching Elijah to touch a photo of his mother in an array of three photos, the clinician may position the photo of the mom to be closer to Elijah than the photos of the other adults.

Prompts must eventually be faded so that the client learns to respond independently, only in response to the discriminative stimulus. Chapter 16 will provide your supervisees with in-depth review of prompt fading techniques.

Client Response

The client's response can be categorized according to two important questions: (a) when did the response occur (before or after the prompt) and (b) was the response correct? This leads to five potential options (Duker et al., 2004):

- Independent Correct: The client responded correctly and did so without a prompt.
- Prompted Correct: The client responded correctly, but with a prompt.
- Nonwait Error: The client responded incorrectly before a prompt was delivered.
- Incorrect Wait: The client responded incorrectly after a prompt was delivered.
- No Response: The client did not respond at all.

If the client responded correctly, the clinician will reinforce this response. In many cases, reinforcement will be differentiated based upon if the client's response

was independent correct or prompted correct. On the other hand, if the client emitted an error, the clinician will use an error correction procedure to correct the error and prompt a correct response.

Several procedural differences in error correction can be found across the literature and varying degrees of success across differing models suggest that some individualization is necessary in selecting the best error correction technique for each client (Carroll et al., 2015; Magee et al., 2006; McGhan & Lerman, 2013; Rapp et al., 2012; Rodgers & Iwata, 1991; Worsdell et al., 2005). At the very least, an error correction procedure should withhold reinforcement for errors and involve a subsequent trial for the opportunity to respond correctly, meaning a more immediate or more intrusive prompt would be delivered in conjunction with the subsequent opportunity to respond (Webber & Scheuermann, 2008). Some resources suggest that an error should be corrected immediately after the error by delivering an intrusive prompt for the correct response, which is then followed by a complete trial (e.g., Carroll et al., 2015). On the other hand, some resources suggest that the immediate prompt may inadvertently develop an undesirable response chain: discriminative stimulus➔incorrect response➔prompt➔correct response. As a result, they suggest that, in response to an error, the clinician should represent the complete trial by delivering the discriminative stimulus again, followed by an immediate prompt (e.g., Webber & Scheuermann, 2008).

There are a number of procedural variations to error correction. These also include the use of a short time out in which stimuli are removed and the clinician orients their body away from the client for a few seconds (e.g., Carrol et al., 2015). Another variation is the number of repetitions of the correct response necessary to begin the next trial (e.g., Carrol et al., 2015). While the procedural fidelity checklist included in this chapter includes an example in which an error is followed by a new trial, this is not to suggest we favor one approach over another. In fact, we encourage you to support your supervisees in making data-based individualizations to the DTT procedures as necessary.

Intertrial Interval

The final portion of DTT is the time between the discrete trials. As the name suggests, the trials are discrete, so the intertrial interval should be a smooth transition between trials. However, this short duration of time is ideal for recording data and allowing for reinforcer consumption or access, when appropriate. We also recommend clinicians use this time to continue rapport building with the client. For example, if the client earned 30 seconds access to a preferred toy for correct responding, rather than idly waiting for the 30 seconds to pass, the clinician could play with the client and their toy, assuming that doing so would only increase reinforcing value, rather than decrease it.

Advantages and Disadvantages

The main advantage of DTT is its effectiveness (Catania et al., 2009; Higbee et al., 2016; Nosik et al., 2013; Vladescu et al., 2012). Moreover, its precise and scripted nature is easy for other providers and caregivers to implement. The teaching approach fits nicely into the context of school and clinical settings. On the other hand, the consistency of the discriminative stimuli within the DTT framework often fails to promote generalization. In other words, the clinician must program for the stimuli in the natural environmental to control the target behavior, which often requires a transfer of stimulus control before terminating treatment. See Chap. 31 for a more thorough discussion of methods to promote generalization. Similarly, the dense schedule of reinforcement must be systematically thinned in order for the behavior to persist among reinforcement schedules found in the natural environment. Finally, DTT may not be the most effective instructional framework for all goals, so it is crucial that your supervisees develop expertise in other instructional approaches. Despite its remarkable efficacy, DTT is not the be-all and end-all of instructional approaches, and no educational program should be comprised solely of one instructional approach.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–10:00	Introduction to DTT
10:00–25:00	Writing Goals
25:00–40:00	Prompting
40:00–55:00	DTT Planning
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Sample Goals*, 1 copy per supervisee
- Each supervisee bring copy (paper or electronic) access to a client's goals
- Appendix B: *DTT Planning Guide* (Appendix B), 5 copies per supervisee

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Carrol et al. (2015)
- Dib & Sturmey (2007)
- Downs et al. (2008)
- Geiger et al. (2012)

Review Major Concepts

Begin your group supervision meeting by asking your supervisees if they have familiarity or experience with DTT. We imagine that most supervisees will have some experience implementing DTT, so give them a few minutes to share those experiences to begin the session. Ask those familiar with DTT to use one or two-word phrases to describe DTT. We expect supervisees to use words like *systematic*, *drills*, *trials*, *effective*, and *regimented*. As they share descriptions, expand on each. For example, if a supervisee describes DTT as *learning trials*, you could expand by saying, "yes, DTT is made up of learning trials that consist of six steps per trial." Of course, if you fail to understand how a description relates to DTT, ask the supervisee to elaborate and correct any misunderstandings.

Transition from the description of DTT to the six steps of DTT:

1. Secure Attention
2. Discriminative Stimulus
3. Prompt (if necessary)
4. Client Response
5. Reinforcer or Error Correction
6. Intertrial Interval

Lead into the framework by asking a supervisee to share what they know about the ABC paradigm (antecedent–behavior–consequence). On your slides for this meeting is Fig. 14.1 (see above). As you display this, explain how DTT is aligned with the ABC model. Slowly describe this figure as you explain how the six DTT steps align with the ABC framework.

Because we expect all of your supervisees will have some familiarity with DTT, lead a discussion of the advantages and disadvantages of DTT. Be sure that your supervisees identify a comprehensive list for both advantages and disadvantages.

Writing Goals

Inform your supervisees that the first step in planning to implement DTT is to specify what discriminative stimulus is expected to elicit what behavior. A well-written goal will detail both the discriminative stimulus and the client behavior; therefore, writing a clear goal is a foundational step in designing a DTT program, or any intervention program for that matter. Not only will a goal guide the DTT plan, but it will also provide clear communication about the client's therapeutic program to all stakeholders.

Explain that goals should consist of the following information: (a) the discriminative stimulus (b) the client, (c) the specific behavior, (d) the level of independence in which this behavior will be emitted, and (e) the criterion for mastery. *DTT Sample Goals* (Appendix A) contains several well-written goals. These are also presented in the PowerPoint slides available to you. Read the first goal aloud. Then, ask one supervisee to identify the discriminative stimulus, another to identify the client, another to identify the behavior, and so on. Repeat this process with the remaining goals.

For the second activity, your supervisees will identify the components of a goal using their client's actual goals. They should bring a list of goals to this meeting. You may wish for them to bring the goals for a single client or multiple clients, depending on how much practice you would like them to have. It is important that they have access to the written goal rather than a general description of the goal (e.g., "Liam is learning colors). Give your supervisees 5 to 7 minutes to review the goals. For each goal they should identify (a) the discriminative stimulus (b) the client, (c) the specific behavior, (d) the level of independence in which this behavior will be emitted, and (e) the criterion for mastery. After they work independently, have them pair with another supervisee and review each other's work for accuracy. Remind supervisees that they should maintain confidentiality when sharing their work; therefore, pseudonyms or initials should be used to protect the client's confidentiality.

Prompting

You will spend the next 15 minutes reviewing prompts. Begin this discussion by reminding your supervisees that if the client's correct behavior was reliably evoked by the discriminative stimuli described in the goal, then intervention would not be needed. In reality, prompts will be required, in addition to discriminative stimuli, to evoke the target behavior. In order to facilitate your supervisee's discrimination between the discriminative stimulus and a prompt, present each of the six goals in Appendix A again to the group. Ask a volunteer to identify the discriminative stimulus associated with the goal. Next, ask supervisees to describe prompts that may help evoke the target response. For example, with Goal One, supervisees should

identify that the discriminative stimulus for writing a letter of the alphabet is access to lined paper and a pencil and being asked to write the letter. Supervisees should identify additional prompts to support letter writing including: (a) a dot-to-dot of the letter to trace, (b) full physical guidance, (c) partial physical guidance, (d) the clinician modeling how to write the letter, (e) a written model of that letter, (f) instructions of how to move the pencil (e.g., "start at the bottom and draw a straight line up"), and many more possibilities. Repeat this process with all six goals.

Introduce the concept of response and stimulus prompts. Give examples of all the response prompts listed in the chapter or any additional that your supervisees may use. When giving examples, role-play the delivery of each prompt when possible. Next, provide examples of the stimulus prompts listed in the chapter. When possible, provide demonstrations as well. As you are introducing the concepts of prompts, remind your supervisees that Chap. 16 will provide in-depth guidance regarding the delivering and fading of prompts.

During the final 5 to 7 minutes of this activity, ask your supervisees to identify prompts that they could use for each of the client goals they brought to this meeting. Have them write down potential prompts. If there is enough time, share their prompts with a peer in order to give one another feedback.

DTT Treatment Plan

After spending sufficient time on the foundational concepts of discriminative stimuli and prompts, you will demonstrate for your supervisees how to plan for DTT. Begin by providing helpful reminders and guidance for each step. Include the following:

- Discriminative Stimulus: eliciting attention and the three C's of a good discriminative stimulus.
- Prompts: Deliver response prompts within a few seconds of the discriminative stimulus and stimulus prompts within the discriminative stimulus.
- Client Response: Review the five potential client responses and how the supervisee should respond to each.
- Reinforcer or Error Correction: When reviewing error correction, discuss the various approaches. Emphasize that at the very least, reinforcement should be withheld contingent upon an error and the client must have an additional opportunity to respond correctly. You may prefer to teach your supervisees a specific error correction procedure or you may wish to give them flexibility to develop the procedure based on the current literature; either is acceptable.
- Intertrial Interval: Your supervisee should collect data and allow sufficient time for reinforcer access.

After introducing the *DTT Planning Sheet* (Appendix B), model for your supervisees how to use this to plan DTT for Goal 1 from Appendix A (see second page of Appendix B as an example). Give your supervisees the remaining time in this meeting to complete the DTT Planning Guides, one for each of the remaining five goals in Appendix A. As they work, move about the room so that you can evaluate the progress of each supervisee throughout this independent activity. Verify that their DTT plan meets all of the aforementioned criteria and follows the planning sheet as you give one-on-one feedback.

Knowledge Check

The following questions can be administered in any method of your choice. These questions are designed to confirm your supervisee's understanding of the material associated with this chapter.

Knowledge Check

1. What are the three C's of a good discriminative stimulus for DTT?
2. Which of the following are included in a goal: (a) discriminative stimulus, (b) prompting, (c) client behavior, or (d) error correction procedure?
3. When should a response prompt be delivered? When should a stimulus prompt be delivered?
4. What are the two non-negotiable features of error correction?
5. What are two advantages and two disadvantages of DTT?

Homework for Individual Supervision without a Client

1. Select on goal from your client's therapeutic or educational program. Complete the *DTT Planning Guide* (Appendix B).

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 1-hour meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review DTT Planning Guide
10:00–20:00	Develop DTT Procedural Fidelity Checklist
20:00–50:00	Role-Play DTT and Measure Procedural Fidelity
50:00–60:00	Plan Baseline and Decision Decision-Making Guide

Materials Needed

- Appendix A: *DTT Planning Guide* completed, 2 copies
  - Instruct your supervisee to provide you with the completed guide at least 48 hours prior to your individual supervision meeting to give you time to review the results before the individual supervision meeting.
- Appendix C: *DTT Procedural Fidelity Checklist*, 1 copy
- Materials needed for DTT role play (e.g., discriminative stimuli, instructional materials, reinforcers)
- Appendix D: *DTT Data Sheet*, 2 copies
- Supervisee should bring a copy of, or be able to access graphed data, for the selected goal, if available

Review DTT Planning Guide

Your supervisee should send you the *DTT Planning Guide* for their client's goal at least 48 hours prior to your meeting. Review the guide and note any questions, praises, or corrections you have regarding the DTT plan. When you begin your meeting, spend the first 10 minutes discussing the items you previously noted. When you determine your supervisee's DTT plan is of sufficient quality to guide developing the DTT procedural fidelity checklist, move to the next activity in this meeting.

Develop DTT Procedural Fidelity Checklist

Using the approved content from the DTT planning guide, support your supervisee in writing a procedural fidelity checklist using *DTT Procedural Fidelity Checklist* (Appendix C) that is specific to this goal. The second page of Appendix C includes an example based on Goal 1 from Appendix A that you can use as an example. Allow your supervisee to take the lead in developing the document, while you provide consistent support as needed.

Role Play DTT and Measure Procedural Fidelity

We allotted 30 minutes for role play. During the role play, your supervisee will implement DTT with you playing the role of the client. Your supervisee will need to implement DTT exactly as prescribed in the procedural fidelity checklist you developed together. The role play should be as authentic as possible. This includes your supervisee collecting data (see Appendix D) and delivering reinforcers as they would during an authentic DTT session. We recommend dividing this role play time into 5-minute blocks. For 5 minutes, your supervisee implements DTT with you acting in the role of the client while you also evaluate their fidelity of implementation on the procedural fidelity checklist. After 5 minutes, pause to review their performance and deliver feedback. Repeat this 5-minute block pattern until your supervisee demonstrates the ability to implement DTT with fidelity (at least 90% of steps implemented correctly in one 5-minute role play). If this occurs in less than 30 minutes, use additional 5-minute blocks to continue to role play, but rather than evaluating your supervisee's fidelity of implementation, discretely collect data on your own performance (as a "client") for a 5-minute DTT session using the data sheet found in Appendix D. Use the 5-minute feedback block to calculate IOA of data collected on client behavior. In order to advance to implementing DTT with their client, your supervisee must demonstrate the ability to implement at least 90% of steps of DTT using their self-created procedural fidelity checklist in at least one role play session. If this fails to occur in the 30 minutes allotted for this activity, schedule an additional individual supervision meeting without a client to continue the role play until meeting this criterion.

Plan Baseline and Decision-Making Guide

Use the final 10 minutes of your meeting to confirm your supervisee's plan for conducting baseline sessions with the client. While it is likely that your supervisee or another implementer has been delivering instruction for the client's selected goal prior to your supervisee implementing DTT for this goal, it is important to collect baseline data so that the effectiveness of DTT can be evaluated. If baseline data had recently been collected on this client's goal, it may be in the best interest of the client to continue with instruction without returning to baseline. Therefore, you will spend your final 10 minutes to determine if baseline data should be gathered and if so, the procedures for doing so. Your supervisee will share the client's data in order for the two of you to determine (a) if baseline has been conducted and (b) if so, if it is appropriate to return to baseline or proceed with DTT intervention. Use this opportunity to revisit visual analysis skills introduced in Chap. 6.

If baseline had not been previously conducted or had been conducted a while ago, instruct your supervisee to conduct at least three baseline sessions. During baseline, your supervisee will deliver the discriminative stimulus, but will not

deliver prompts, praise, reinforcement, or error correction. The purpose of baseline is to determine the client's level of independence prior to intervention. After at least three baseline sessions have been conducted, your supervisee must graph these data and send to you for joint analysis. The purpose of conducting and analyzing baseline data is to determine if DTT intervention is warranted. Perhaps the client can perform this skill without assistance and a new goal should be targeted.

As you explain the purpose and plan for conducting baseline and evaluating the data collecting during these sessions, discuss anticipated data with your supervisee and how this would affect decision-making regarding the client's program. For example, discuss the possible responses to baseline data indicating (a) mastery of the skill, (b) near mastery of the skill, or (c) little to no ability to perform the behavior independently.

Homework

End the session by instructing your supervisee to conduct baseline sessions on the selected goal. Together, via informal communication such as email, determine if DTT for this goal is warranted. If DTT is warranted, proceed to the individual supervision meeting with a client in which you will observe your supervisee implementing the DTT program you created in this meeting. If not, you will need to work with your supervisee to select a different goal, collect baseline, and develop a DTT program prior to their individual supervision meeting with a client.

Homework for Individual Supervision without a Client

1. Conduct at least 3 baseline sessions with a client.
2. Graph data from baseline sessions.
3. Send graph to your supervisor. Via informal communication, determine if DTT is warranted.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–30:00	Observe DTT, Collect Data on Client Behavior, and Measure Procedural Fidelity
30:00–45:00	Performance Feedback

Materials Needed

- Supervisee-developed procedural fidelity checklist completed, 1 copy
- Appendix D: *DTT Data Sheet*, two copies
- Clipboard
- Pen/Pencil

Observe DTT

You will observe your supervisee implementing DTT for up to 30 minutes. It is quite likely that this 30 minutes will need to be divided into shorter observations, based on the needs of the client. In fact, it may be helpful to divide the observation to allow for two or three separate evaluations of procedural fidelity and performance feedback. During the observation, collect data using your supervisee's individualized procedural fidelity measure (Appendix A) and collect data on the client's behavior using the DTT data sheet (Appendix D). If it is difficult to measure both simultaneously, divide your observation period in half and collect client data during the first half and supervisee procedural fidelity data during the second half.

Performance Feedback

Schedule at least 15 minutes to deliver performance feedback when you will not disrupt ongoing client services. Begin by delivering performance feedback regarding the fidelity of implementation of DTT. Next, compare data collected on client behavior. Ask your supervisee to calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must implement DTT and (a) accurately collect data with at least 80% agreement and (b) conduct DTT with at least 80% fidelity. If either of these is not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement DTT with the same client, but a different goal.
- ☐ Evaluate your supervisee's ability to implement DTT with a different client.
- ☐ Evaluate your supervisee's ability to teach a caregiver or service provider how to implement DTT.

Appendix A: Sample Goals

Goal 1: When given lined paper and a pencil and asked to write a letter of the alphabet, Deven will independently and legibly write the capital letter 80% of trials, across five consecutive sessions. This objective will target all letters of the alphabet.

Goal 2: When presented with two flashcards, each with 3 to 5 letter words (e.g., cat, horse), a line drawing that represents one of those two words (e.g., a drawing of a cat), and told, "find the match," Jaxon will independently match the picture to the written word at least 90% of trials, across four consecutive sessions. This objective will target the following words: cat, dog, pig, horse, cow, fish, and snake.

Goal 3: After being told the temperature range for a day and asked, "do you need a coat in that weather?", Grayson will independently, accurately, and vocally respond "yes" or "no" 100% of trials across five consecutive sessions.

Goal 4: When presented with a flashcard of a line drawing of a shape and asked, "what shape?", Sydney will independently and vocally tact the shape at least 70% of trials, across three sessions. This objective will target the following shapes: pentagon, hexagon, octagon, and parallelogram.

Goal 5: When presented with a pile of up to 20 items within reach and instructed, "find three [insert color] items," Mila will independently select three items from the pile and move them to a distinctive place at least 70% of trials across three sessions. This objective will target the following colors: red, green, yellow, blue, and orange.

Goal 6: When shown two items and asked, "where is the [insert one item name]?", Hannah will independently describe the location in relation to the other item using a preposition in the following format (e.g., "the car is under the table") at least 60% of trials across two sessions. This objective will target the following prepositions: *on, under, next to,* and *behind*.

Appendix B: DTT Planning Guide

Goal: _____

_____

_____

S^D	Prompt	Response	Reinforcement for Correct Responses	Error Correction for Incorrect Responses
		• Correct: • Anticipated Incorrect Responses:		

Sample Document

Goal: *When given lined paper and a pencil and asked to write a letter of the alphabet, Deven will independently and legibly write the capital letter 80% of trials, across five consecutive sessions. This objective will target all letters of the alphabet.*

S^D	Prompt	Response	Reinforcement for Correct Responses	Error Correction for Incorrect Responses
Given lined paper and pencil and asked to write [letter of alphabet].	*Full physical model delivered within 2 sec of S^D.*	*Correct: Writes letter within lines of paper in a manner that is legible to most readers.* *Anticipated Incorrect Responses:* • *Writes another letter* • *Writes letter outside of lines on paper* • *Emits problem behavior in lieu of writing*	• *Specific praise (e.g., great job writing the J).* • *1 correct letter = token on token economy board.* • *10 tokens = 5 min with iPad.*	• *Withhold praise and token.* • *Immediately begin new trial with immediate full physical prompt.*

Appendix C: DTT Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Goal: _____

_____

Step	Implemented Correctly? + = Yes – = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

DTT Procedural Fidelity Measure
Example

Supervisee: *Joel* Supervisor: *Katie*

Client: *Deven* Date & Time: *Feb. 5th 2:00 – 2:30 pm*

Client Goal: When given lined paper and a pencil and asked to write a letter of the alphabet, Deven will independently and legibly write the capital letter 80% of trials, across five consecutive sessions. This objective will target all letters of the alphabet.

Step	Implemented Correctly? + = Yes - = No N/A = Not Applicable
Before session begins, implementer gathered appropriate materials, including paper, pencil, data collection sheet, writing utensil, token economy, and iPad.	
Implementer places paper and pencil in front of Deven and says, "Deven, look at me"	
When Deven establishes eye contact, implementer says, "write [letter]."	
Contingent upon an independent correct response, the implementer delivers specific praise (e.g., "great job writing [letter]") and places two tokens on Deven's token board.	
Within 4 seconds of instructing Deven to write the letter, the implementer places their hand on Deven's hand and guides his writing of the letter.	
Contingent upon a prompted correct response, the implementer delivers specific praise (e.g., "great job writing [letter]") and places one token on Deven's token board.	
Contingent upon an error (non-wait or incorrect wait), the implementer places their hand over Deven's hands, terminating writing, and immediately begins a new trial.	
No praise or tokens are delivered contingent upon the error.	
During the subsequent trial, a full physical prompt is delivered immediately after the discriminative stimulus.	
After each trial, the implementer records accurate data.	
After Deven earns 10 tokens, the implementer pauses instruction and provides 5 min of access to the iPad.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix D: DTT Data Sheet

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Goal: _____

Instructions: For each trial, circle if the client performed the behavior correctly or not. Use the final column for additional anecdotal notes, as needed. Calculate percent correct on bottom row.

Trial	Performed Correctly?	Notes
1	Yes No	
2	Yes No	
3	Yes No	
4	Yes No	
5	Yes No	
6	Yes No	
7	Yes No	
8	Yes No	
9	Yes No	
10	Yes No	
11	Yes No	
12	Yes No	
13	Yes No	
14	Yes No	
15	Yes No	
16	Yes No	
17	Yes No	
18	Yes No	
19	Yes No	
20	Yes No	
Percent Correct:		

References

Catania, C. N., Almeida, D., Liu-Constant, B., & Reed, F. D. D. (2009). Video modeling to train staff to implement discrete-trial instruction. *Journal of Applied Behavior Analysis, 42*(2), 387–392.

Carroll, R. A., Joachim, B. T., St. Peter, C. C., & Robinson, N. (2015). A comparison of error-correction procedures on skill acquisition during discrete-trial instruction. *Journal of Applied Behavior Analysis, 48*(2), 257–273.

Dib, N., & Sturmey, P. (2007). Reducing student stereotypy by improving teachers' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40*(2), 339–343.

Downs, A., Downs, R. C., Fossum, M., & Rau, K. (2008). Effectiveness of discrete trial teaching with preschool students with developmental disabilities. *Education and Training in Developmental Disabilities, 43*, 443–453.

Duker, P. C., Didden, R., & Sigafoos, J. (2004). *One-to-one training: Instructional procedures for learners with developmental disabilities*. Pro-Ed.

Geiger, K. B., Carr, J. E., LeBlanc, L. A., Hanney, N. M., Polick, A. S., & Heinicke, M. R. (2012). Teaching receptive discriminations to children with autism: A comparison of traditional and embedded discrete trial teaching. *Behavior Analysis in Practice, 5*(2), 49–59.

Higbee, T. S., Aporta, A. P., Resende, A., Nogueira, M., Goyos, C., & Pollard, J. S. (2016). Interactive computer training to teach discrete-trial instruction to undergraduates and special educators in Brazil: A replication and extension. *Journal of Applied Behavior Analysis, 49*(4), 780–793.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*(1), 3–9.

Magee, S. K., & Ellis, J. (2006). The role of error-correction procedures in the reinforcement of errors. *Behavioral Interventions, 21*, 205–226. https://doi.org/10.1002/bin.217

McGhan, A. C., & Lerman, D. C. (2013). An assessment of error-correction procedures for learners with autism. *Journal of Applied Behavior Analysis, 46*, 626–639. https://doi.org/10.1002/jaba.65

Nosik, M. R., Williams, W. L., Garrido, N., & Lee, S. (2013). Comparison of computer based instruction to behavior skills training for teaching staff implementation of discrete-trial instruction with an adult with autism. *Research in Developmental Disabilities, 34*(1), 461–468.

Rapp, J. T., Marvin, K. L., Nystedt, A., Swanson, G. J., Paananen, L., & Tabatt, J. (2012). Response repetition as an error-correction procedure for acquisition of math facts and math computation. *Behavioral Interventions, 27*, 16–32. https://doi.org/10.1002/bin.342

Rodgers, T. A., & Iwata, B. A. (1991). An analysis of error correction procedures during discrimination training. *Journal of Applied Behavior Analysis, 24*, 775–781. https://doi.org/10.1901/jaba.1991.24-775

Vladescu, J. C., Carroll, R., Paden, A., & Kodak, T. M. (2012). The effects of video modeling with voiceover instruction on accurate implementation of discrete-trial instruction. *Journal of Applied Behavior Analysis, 45*(2), 419–423.

Webber, J., & Scheuermann, B. (2008). *Educating students with autism: A quick start manual*. Pro-Ed.

Worsdell, A. S., Iwata, B. A., Dozier, C. L., Johnson, A. D., Neidert, P. L., & Thomason, J. L. (2005). Analysis of response repetition as an error-correction strategy during sight-word reading. *Journal of Applied Behavior Analysis, 38*, 511–527. https://doi.org/10.1901/jaba.2005.115-04

Chapter 15
Naturalistic Instruction

Topics Covered Within This Chapter

Topics
Context
Motivation
Consequence

Naturalistic instruction is a procedure that capitalizes on the learner's motivation when teaching new skills. Therefore, a firm understanding of motivating operations will enhance a practitioner's ability to effectively implement naturalistic instruction (see Chap. 13 for an overview of motivating operations). Naturalistic instruction is often contrasted with discrete trial training (see Chap. 14) as they are both strategies used with children. Naturalistic instruction is less structured than discrete trial training, and for naturalistic instruction, the reinforcer is directly related to the behavior rather than arbitrary reinforcers (e.g., tokens, edible items) that are provided during discrete trial training. In addition, there are fewer teaching trials when using naturalistic instruction, and the trials are led by the client, based on their interest, rather than directed by the clinician. Although there are several specific naturalistic instruction strategies, we describe common components more generally to increase the extent to which this chapter is applicable to the population with whom your supervisees work. We provide a breakdown of the components of naturalistic strategies according to the (a) context, (b) motivation, and (c) consequence.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_15].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_15

Context

The context of naturalistic instruction is important because as the name implies the instruction is implemented in the environment in which the behavior should *naturally* occur. Context includes the setting, the implementer, and the ongoing activity. For example, for the setting, instruction might occur in the playroom at the learner's home rather than at the table at a clinic. For implementer, instruction might include caregivers, peers, and classroom teachers rather than a clinician. For ongoing activity, instruction might occur during free time rather than during one-on-one instruction. Naturalistic instruction does not require all of these to be met; however, the closer the instructional context is to the context in which the behavior should occur, the more likely it is that the learner will effectively use the behavior in that context.

Researchers have suggested that one way in which an intervention can be implemented in contextually appropriate activities is to capitalize on established routines to target goals. For example, if your supervisee has developed a fine motor goal for their client, this goal could be targeted during mealtime which is a routine. Inserting teaching opportunities into routines is ideal because the routines are repetitive and familiar for the client and may be more convenient for caregivers to implement. In fact, based on their findings, Roberts and Kaiser (2011) encourage clinician to train caregivers to implement communication teaching trials during everyday routines. Much of the literature on the use of routine-based instruction is specific to young children (e.g., Hwang et al., 2013; McWilliam, 2016); however, routines are a part of life for individuals of all ages, suggesting this strategy could easily translate to older individuals.

Motivation

Naturalistic instruction is distinct from other instruction procedures because teaching trials are only conducted when an establishing operation is in place. That is, the learner must show some indication of motivation before a teaching trial is presented. Preferred items can be identified by conducting a preference assessment or less formally presenting the learner with choices between options (see Chap. 8 for an overview of preference assessments). Motivation can be captured by blocking access to preferred items, keeping them out of reach (e.g., up on a shelf), or only providing a small portion of the item (e.g., one piece of the puzzle). For example, Gillett and LeBlanc (2007) taught caregivers to present three items to their child and ask the child to select one. The caregiver then blocked access to the selected item and provided access contingent on the child emitting a vocalization.

Another method for capturing motivation is to interrupt a behavioral chain. This strategy requires that the individual can independently complete a chained task (see Chap. 19 for an overview of behavior chains) and that the terminal reinforcer of the

behavior chain is sufficiently motivating for the learner. That is, if the behavior chain is making a sandwich, the learner must be motivated to obtain the sandwich if a request for the missing knife to complete the chain of responses is to occur. Interrupting a behavior chain is an effective method for contriving motivation because completion of the chain results in a terminal reinforcer which the learner is motivated to access. For example, researchers inserted requesting opportunities into established leisure behavior chains including using a device to listen to music and preparing a flavored drink for two adults with intellectual disability (Rosales & Rehfeldt, 2007). Specifically, the researchers presented most of the required items for completing the behavior chain while withholding certain needed items (i.e., headphones, cup, spoon). When the participant initiated the step that required one of the missing items, this was an opportunity for them to request the missing item. Other examples of interrupting behavior chains might include instructing children to go play outside and *forgetting* to unlock the door which would be an opportunity for the children to say "open," or asking an individual to do laundry and *accidentally* providing an empty bottle of laundry soap which would be an opportunity for the individual to ask where the new bottle is, or bringing bagels to class for college students and *forgetting* to put the knives out which is an opportunity for the students to ask for knives (one of the authors used this as a teaching example in class and it was very effective). We include the word accidentally and forgetting in italics because it is important to present these interruptions as silly mistakes rather than ill-willed sabotage. That is, from the learner's perspective, the opportunity should appear to be a natural occurrence.

In the event that motivation is lost, the trial will end, and the clinician will attempt to recapture motivation to present another trial. Stress to your supervisee the importance of following with the learner's motivation. Continuing to prompt a request when the learner no longer is interested in the item is inappropriate and does not align with naturalistic instruction.

Consequence

The consequence within naturalistic instruction is always directly related to the target behavior. Using an example from above, when the children ask the teacher to "open" the locked classroom door, the teacher opens the door. In structured teaching approaches such as DTT, edible items, unrelated tangible items, and tokens are often presented contingent upon the target responses. In contrast, the consequence of naturalistic instruction will be defined specifically based on the selection of the target behavior. In addition to providing a natural consequence, it is common to have less stringent response requirements when implementing naturalistic interventions. Many responses targeted during naturalistic instruction are being shaped and thus approximations of responses are often reinforced.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Routines Embedded Goals Activity
30:00–40:00	Contriving Motivation
40:00–55:00	Goals for Naturalistic Instruction
55:00–60:00	Knowledge Check

Materials Needed

- None

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Dunst et al. (2012)
- D'Agostino et al. (2020)
- Roberts & Kaiser (2011)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with naturalistic instruction including context, motivation, and consequences. A brief summary of each is provided below, and PowerPoint slides are available to share with your group.

Review the importance of implementing instruction in the context in which the behavior should naturally occur. Provide examples of goals that can be targeted in naturalistic settings, by natural change agents and during ongoing activities. Ask your supervisees to come up with additional examples. Highlight the impact of introducing teaching trials during established routines. Provide examples of goals

that could be targeted during routines that would be applicable for the population with whom your supervisees work.

Next, transition to the discussion to the importance of motivation. Remind your supervisees of the definition of an establishing operation.

1. Establishing operation: a motivating operation that increases the effectiveness of a consequence to function as a reinforcer (Cooper et al., 2020).

Naturalistic instruction can only occur when the learner is motivated to respond; thus, capturing and contriving motivation is essential. Review the different ways in which motivation can be captured and contrived. Provide examples of each that are relevant to the population with whom your supervisees work. Ask your supervisees to provide additional examples.

1. Block access to preferred items or activities
2. Place preferred items or activities out of reach
3. Provide limited amounts of items or activities
4. Interrupting behavior chains
   (a) Behavior chain must be in the individual's repertoire.
   (b) Individual must be motivated to access the terminal reinforcer.

Stress to your supervisees that once motivation is lost the teaching trial should end. If the client is no longer interested in the item or activity shift teaching to follow the client's motivation (i.e., identify new sources of motivation and incorporate them into teaching trials).

Finally, transition the discussion to the use of natural consequences. Remind your supervisees that correct responding during naturalistic instruction should always result in the consequence that corresponds to the response. Provide several examples and compare with consequences which are typically employed during discrete trial training. End the discussion by highlighting that there is some leniency with the response requirement when implementing naturalistic instruction. Often shaping procedures are being used, thus approximations are welcomed. Ask your supervisees to identify potential approximations that they may accept from their clients during naturalistic instruction.

Routines-Embedded Goals Activity

For this activity, ask your supervisees to identify a potential goal that could be addressed during the listed routines. (If these routines are not applicable for the clients with whom your supervisees work, edit as necessary). First, have your supervisees discuss in small groups and then, ask each small group to share their goals.

Example: Getting dressed—color identification: Ask client to select from two shirt options, after they point to one, ask them to say the color before giving them the shirt.

Routines

1. Riding to and from school/work
2. Eating a meal
3. Grooming (e.g., combing hair, brushing teeth, washing face)
4. Making lunch
5. Watching television

Contriving Motivation Activity

For this activity, use the provided vignettes or create your own. Present the vignette to your supervisees and ask them to identify a strategy for contriving motivation.

Example: teaching client to ask "where"—contriving motivation: First, hide the client's favorite toy without their knowledge. Then, tell the client they can play with their favorite toy and to go get it. When the client cannot find the toy, they should ask you "where." Then you provide the location of the toy so the client can find the toy and play with it.

1. Jasmine is teaching her client to say "ball."
2. Esme is teaching her client to sign *cookie*.
3. Jonathon is teaching his client to ask for "help."
4. Stephen is teaching his client to exhale with pursed lips.
5. Mina is teaching her client to point.
6. Ryuu is teaching his client to ask for the kitchen utensil that is appropriate for the task (e.g., knife to spread, spoon to stir).
7. Max is teaching his client to exchange a picture for the word *go*.
8. Ella is teaching her client to pour liquid into a cup.

Goals for Naturalistic Instruction

For this activity, ask your supervisees to identify five or more potential goals that would be applicable to their client and could be targeted during naturalistic instruction. Your supervisees can work independently or in small groups. Provide guidance and feedback as necessary. Each supervisee will need to develop five formal written goals before individual supervision without a client.

Example: Tyler will correctly identify the color of the presented toy on four out of five trials. When Tyler is interacting with a blue truck, the implementer will block access to the truck until Tyler says, "blue."

Knowledge Check

1. What are the three components of naturalistic teaching?
2. What is one way to contrive motivation?
3. Give an example of interrupting a behavior chain.
4. What is the consequence for naturalistic instruction?

Homework for Individual Supervision without a Client

1. Prepare 5 potential goals for client that could be targeted using naturalistic instruction.

Individual Supervision Meeting without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Goal and Procedure Selection
15:00–30:00	Client-Directed Activities

Materials Needed

- Five potential goals
- Appendix A: *Goal Component Checklist*
- Appendix B: *Naturalistic Instruction Procedural Fidelity Checklist*

Goal and Procedure Selection

Prior to this meeting, your supervisee should have developed at least five potential goals for their client that could be targeted using naturalistic instruction. During this meeting, review and evaluate each of the goals using the *Goal Component Checklist* (Appendix A). Provide specific feedback to your supervisee on how they can improve their goals in the future. You and your supervisee should select one or two of the goals to target first. Several factors should be considered when selecting goals to target including the level of difficulty, access to necessary materials and personnel, and client preference. Next, discuss potential naturalistic teaching procedures that will best fit the selected goal(s). For the procedures, your supervisee should identify the context, motivation, and consequence. Ask your supervisee to provide a clear rationale for the selection of procedures. Provide guidance and feedback as needed.

Client-Directed Activities

Once you and your supervisee have determined the goal(s) and naturalistic teaching procedures, you and your supervisee should develop a procedural fidelity checklist (using Appendix B) that you can use to evaluate your supervisee's performance when addressing the goal(s). Following the meeting, your supervisee should finalize the *Naturalistic Instruction Procedural Fidelity Checklist* (Appendix B) and develop a data sheet for collecting data on the client's responding during naturalistic instruction. They should have the fidelity checklist and client data sheet prepared for you to collect data to evaluate their fidelity of implementation and IOA for data collection.

Homework for Individual Supervision with a Client

1. Finalize *Naturalistic Instruction Procedural Fidelity Checklist* (Appendix B).
2. Finalize client data sheet.
3. Collect at least 3 baseline sessions and receive supervisor approval to move to intervention.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Naturalistic Instruction Administration
30:00–60:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix B: *Naturalistic Instruction Procedural Fidelity Checklist*
- *Supervision Observation Form*

Naturalistic Instruction Administration

Prior to your meeting with your supervisee, they should have finalized the data sheet for the client behavior and fidelity checklist and provided you a copy of each. They also should have collected baseline data and received your approval to introduce naturalistic instruction. Join your supervisee's session with a client to observe them use naturalistic instruction to target the client's goal(s). During the observation, you will collect data on fidelity of implementation and the client's engagement in the target response.

Session Procedures

After your supervisee has conducted a sufficient number of naturalistic instruction trials, continue to observe your supervisee target other goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee, ask your supervisee to calculate IOA for the client's behavior data sheet. Discuss and resolve any discrepancies. Then, provide feedback to your supervisee according to the *Naturalistic Instruction Procedural Fidelity Checklist*. Provide specific praise for steps completed correctly and corrective feedback for steps completed incorrectly. Ask your supervisee if they would like to role-play intervention steps that were implemented incorrectly. End this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement naturalistic instruction with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback.

Future Growth

- ☐ Observe your supervisee use Naturalistic Instruction to target a different goal with a different client.
- ☐ Observe your supervisee provide feedback to another trainee on their administration of naturalistic instruction.

Appendix A: Goal Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct			Notes
The target stimuli are identified	Y	N	N/A	
The instruction is specified	Y	N	N/A	
The materials are identified	Y	N	N/A	
The setting is specified	Y	N	N/A	
The operational definition is provided	Y	N	N/A	
The level of independence is specified	Y	N	N/A	
The mastery criteria are specified	Y	N	N/A	

Appendix B: Naturalistic Instruction Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis*. Pearson.

D'Agostino, S., Douglas, S. N., & Horton, E. (2020). Inclusive preschool practitioners' implementation of naturalistic developmental behavioral intervention using telehealth training. *Journal of Autism and Developmental Disorders, 50*(3), 864–880. https://doi.org/10.1007/s10803-019-04319-z

Dunst, C. J., Raab, M., & Trivette, C. M. (2012). Characteristics of naturalistic language intervention strategies. *Journal of Speech-Language Pathology & Applied Behavior Analysis, 5*.

Gillett, J. N., & LeBlanc, L. A. (2007). Parent-implemented natural language paradigm to increase language and play in children with autism. *Research in Autism Spectrum Disorders, 1*(3), 247–255. https://doi.org/10.1016/j.rasd.2006.09.003

Hwang, A. W., Chao, M. Y., & Liu, S. W. (2013). A randomized controlled trial of routines-based early intervention for children with or at risk for developmental delay. *Research in Developmental Disabilities, 34*(10), 3112–3123. https://doi.org/10.1016/j.ridd.2013.06.037

Rosales, R., & Rehfeldt, R. A. (2007). Contriving transitive conditioned establishing operations to establish derived manding skills in adults with severe developmental disabilities. *Journal of Applied Behavior Analysis, 40*(1), 105–121. https://doi.org/10.1901/jaba.2007.117-05

Roberts, M. Y., & Kaiser, A. P. (2011). The effectiveness of parent-implemented language interventions: A meta-analysis. https://doi.org/10.1044/1058-0360(2011/10-0055)

McWilliam, R. A. (2016). The routines-based model for supporting speech and language. *Revista de logopedia, foniatría y audiología, 36*(4), 178–184. https://doi.org/10.1016/j.rlfa.2016.07.005

Chapter 16
Stimulus and Response Prompts

Topics Covered Within This Chapter

Topics
Introduction
Stimulus Prompt fading
Response Prompt fading

The goal of any skill acquisition program is that the desired response is evoked by a specific discriminative stimulus. Needless to say, if the specific stimulus does not reliably evoke the desired response, it is not yet a discriminative stimulus. In such cases, this stimulus is referred to as a *criterion stimulus*. Moreover, additional stimuli are needed to evoke the desired response. A prompt is a supplemental stimulus that is paired with the criterion stimulus and increases the likelihood of the desired response (Noell et al., 2011). The prompt is not a critical component of the three-term contingency (Dietz & Malone, 1985; Cengher et al., 2018); rather, the idea is that the pairing of the prompt with the criterion stimulus, and subsequent fading of the prompt, will result in a transfer of stimulus control from the prompt to the criterion stimulus so that the criterion stimulus becomes a discriminative stimulus (Demchak, 1990; Noell et al., 2011). Transfer of stimulus control is considered complete when the desired stimulus, now a discriminative stimulus, evokes the desired response without the support of a prompt (Dietz & Malone, 1985).

Terrace (1963) successfully transferred stimulus control of pigeon key pecking using fading of stimuli. This process was coined *errorless learning* because the

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_16].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_16

systematic transfer of stimulus control resulted in very few pigeon errors. The prompt fading techniques described in this chapter are also systematically designed to minimize errors.

Prompts are classified as stimulus or response prompts. Stimulus prompts are those in which the stimulus itself is manipulated in some way (Cegher et al., 2018; Etzel & LeBlanc, 1979). A stimulus prompt, by nature, is presented simultaneously with the criterion stimulus. This may involve changing the properties of the stimulus or adding to the stimulus. For example, a clinician teaching a client to discriminate between two numerals simultaneously presented could make the correct stimulus (e.g., numeral 1) larger and the incorrect stimulus (e.g., numeral 2) smaller. Another example is a positional prompt in which the clinician instructs the client to "touch the number one" while the card with the numeral one is positioned close to the client and the other card, the card with the numeral two, is positioned further from the client.

A response prompt is an additional stimulus (i.e., the clinician's behavior) that is added to evoke the desired response (Cegher et al., 2018; Noell et al., 2011). As a result, the criterion stimulus and the response prompt are not presented simultaneously, rather the response prompt is presented after the criterion stimulus.

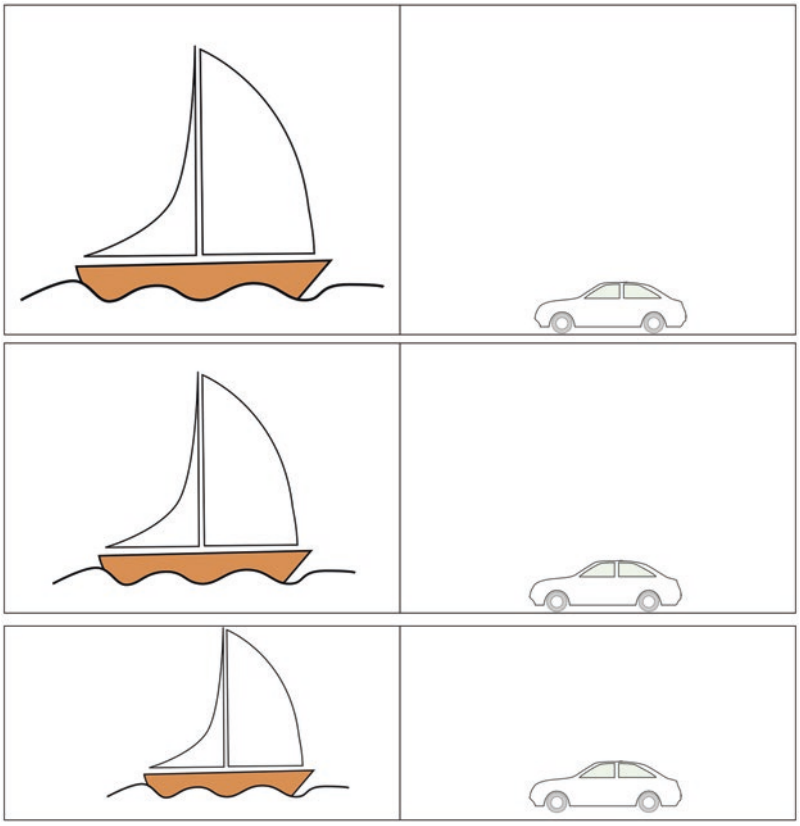
There are four forms of response prompts: verbal, gesture, model, and physical guidance. Verbal prompts frequently consist of vocal verbal instructions. For example, if the clinician is teaching a client to clean up, they may say "clean up" (criterion stimulus) followed by "pick up the block and put it in the box" (verbal prompt). Gesture prompts frequently consist of pointing or head nods. If the aforementioned clinician were to use a gesture prompt, after instructing, "clean up" (criterion stimulus), they may point to the blocks on the floor or nod to the box to which the blocks should be placed (response prompts). Model prompts include both vocal and physical models of the desired response. In this example, a model prompt would involve the clinician demonstrating how to pick up a block and put it in the box. Finally, physical guidance involves the clinician physically guiding the clinician to complete a task. For example, after instructing, "clean up," the clinician would physically take the client's hand, place it on the block, and guide the client to place the block in the box. Response prompts are often conceptualized along a continuum from least intrusive, verbal prompts, to most intrusive, physical guidance (Noell et al., 2011). The continuum of least to most intrusive prompts is individualized across individuals. For example, it is incorrect to assume that a physical guide should always be considered the most helpful prompt because some individuals find physical guidance aversive and would engage in escape or avoidant behaviors if prompted with physical guidance, rendering this prompt not helpful in any way. Similarly, many people erroneously assume verbal prompts are the least intrusive, but these are often difficult to fade. If this is the case with a client, they may not be considered appropriate for the continuum. This continuum occurs within each prompt category as well. For example, a vocal model can range from modeling an initial sound of a word to a complete sentence or more. On the far end of the continuum is the controlling prompt. A controlling prompt is one that consistently results in the client emitting the desired response (Wolery et al., 1992).

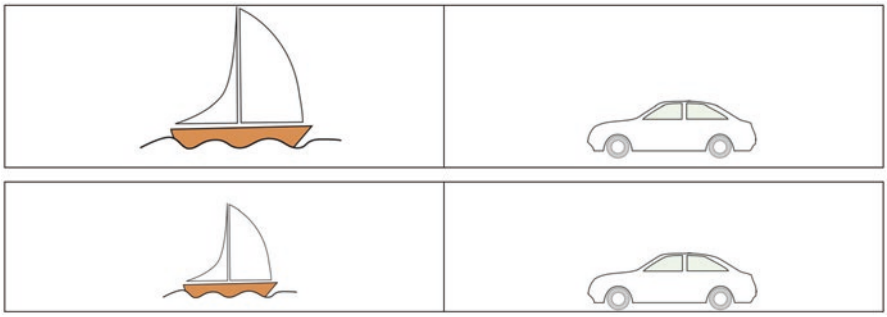
Stimulus Prompt Fading

Stimulus prompts are faded using two techniques: *stimulus fading* or *stimulus shaping*. Both stimulus fading and stimulus shaping begin with a manipulation of the criterion stimulus, but the type of manipulation determines the type of prompt fading technique.

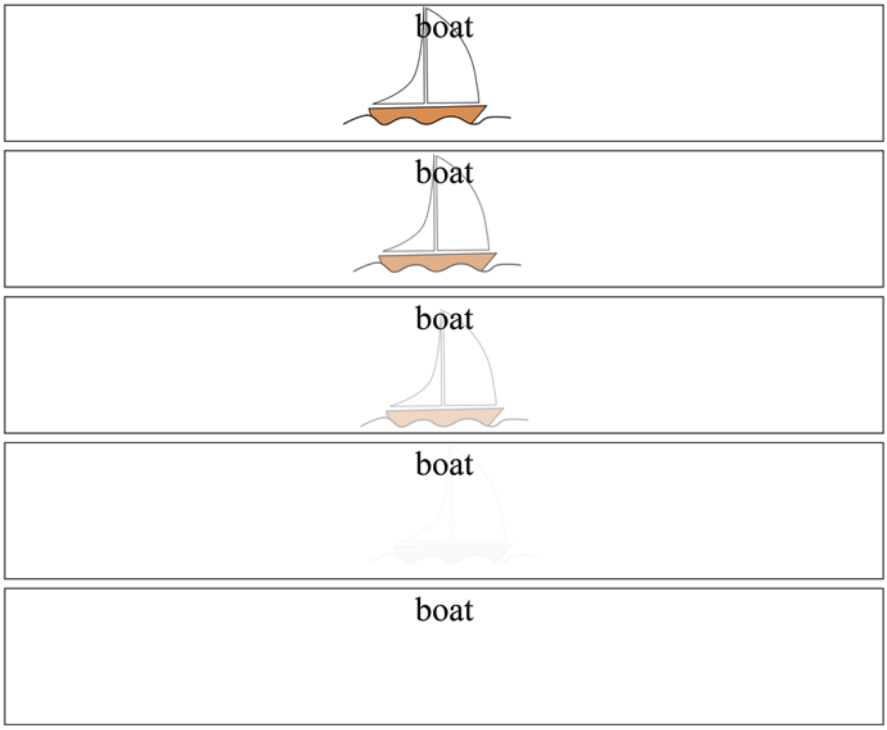
Stimulus Fading

Stimulus fading begins with a stimulus in which the manipulation does not involve the shape or configuration of the stimulus (Etzel & LeBlanc, 1979). Rather, with stimulus fading, a noncritical dimension of the stimulus is altered such as size, intensity, color, or position. To transfer stimulus control from the altered stimulus to the criterion stimulus, thus making the criterion stimulus a discriminative stimulus, this altered dimension is systemically faded. Below is an example of stimulus fading in which the clinician is teaching a client to point to a boat from an array of two vehicles when instructed, "touch boat." A noncritical dimension of the stimulus, the size of the boat, is originally altered, but eventually faded across trials in this fashion:



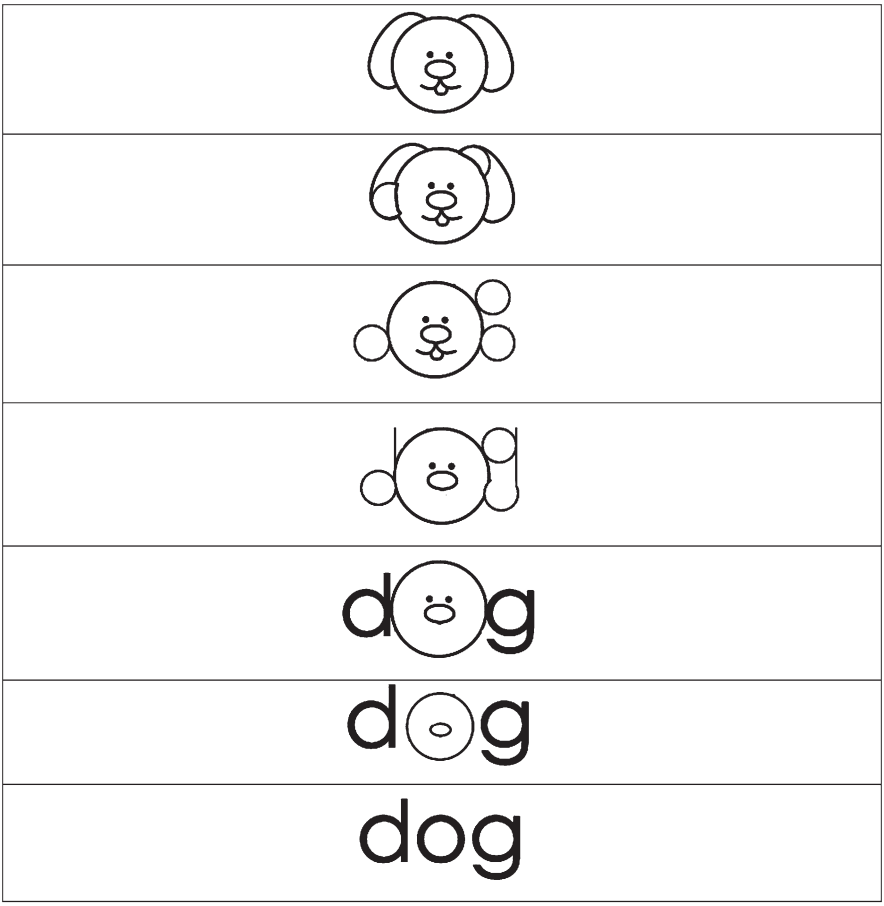


Stimulus fading may also begin with the superimposition of a stimulus that is then faded (Cooper et al., 2020; Terrace, 1963). An example of fading a superimposition is below in which the stimulus evoking the vocal response "boat" transfers from the picture of the boat to the text *b-o-a-t*.



Stimulus Shaping

Stimulus shaping, on the other hand, begins with a stimulus in which the overall configuration of the discriminative stimulus is altered (Dietz & Malone, 1985). Stimulus shaping involves systematically changing the configuration in which stimulus control will be transferred. See the example below.



Response Prompt Fading

Response prompts are faded using four techniques: least-to-most-prompting, most-to-least prompting, graduated guidance, and time delay (Cooper et al., 2020).

Most-to-Least Prompting

In order to implement most-to-least prompting, a clinician must determine a hierarchy of prompts, from least to most intrusive. During initial teaching trials, the clinician delivers the most intrusive prompt. After meeting a predetermined criterion, the clinician transitions from the most intrusive prompt to the second most intrusive prompt. Again, after meeting a specific criterion, the clinician transitions to a less intrusive prompt. This continues until all prompts are faded and the behavior is evoked by the discriminative stimulus. While the goal is to move from most, to least intrusive prompts, the clinician may also move up prompt hierarchy across trials in response to the client's behavior. For example, if the clinician selected a hierarchy of prompts consisting of physical guidance, gesture, and verbal prompts and the client had mastered the criterion associated with physical guidance, the clinician would now be delivering trials with a gesture prompt. If during those trials, the client made a significant number of errors after the prompt, the clinician would most likely return to using physical guidance for many more trials to prevent errors.

Least-to-Most Prompting

Least-to-most prompting, also referred to as *a system of least prompts*, also involves a prompt hierarchy. Within each teaching trial, the clinician first waits for the client to respond independently. If no response is emitted, the clinician provides the least intrusive prompt in the hierarchy. This pattern of wait time followed by the next prompt in the hierarchy continues until the client correctly responds. Unlike most-to-least prompting in which only one prompt is delivered per trial, the clinician continues to deliver prompts that are increasingly more helpful until the client emits the correct response. The opportunity for the client to respond independently and the prescriptive nature of least-to-most prompting are two noted advantages (Billingsley & Romer, 1983; Noell et al., 2011).

Graduated Guidance

Graduated guidance is similar to most-to-least prompting in that it begins with the most intrusive prompt; that is, the controlling prompt. However, unlike most-to-least prompting in which the prompting level decreases across trials, the prompting intrusiveness, or helpfulness, changes moment-to-moment. For example, if teaching a client to draw a triangle, the clinician may provide full physical guidance when starting the triangle, but withdraw their hand momentarily as the client draws a straight edge of the triangle, only to return when the client's pencil techniques the top of triangle and must change direction. While graduated guidance allows the client to demonstrate the skill with maximum possible impendence, the unsystematic fading approach is often viewed unfavorably by clinicians (Wolery & Gast, 1984).

Time Delay

Time delay also begins with selecting a controlling prompt. Unlike the aforementioned prompt fading techniques, only one prompt is implemented across all prompt fading trials. Initial trials begin with the controlling prompt being delivered simultaneously with the criterion stimulus (i.e., 0-second prompt delay). Rather than systematically changing prompts, the delay between the criterion stimulus and the prompt is systematically increased (Touchette, 1971). There are two forms of time delay: progressive time delay and constant time delay (Snell & Gast, 1981). With progressive time delay, the delay between the criterion stimulus and prompt is systematically increased across trials, typically in increments of 1 to 2 seconds. Constant time delay also begins with simultaneous presentation of the criterion stimulus and the prompt; however, after several presentations of a 0-second delay, the delay is increased to a fixed time across all other trials. The duration of the constant delay is determined by the response; in other words, it is selected based upon what is an acceptable delay between the discriminative stimulus and the behavior in the natural environment.

Comparison

All stimulus and response prompt fading procedures have been demonstrated to be successful across the literature. Stimulus prompting has been found to be more effective and efficient compared to response prompting (Cengher et al., 2018). However, the comparisons of response prompting techniques suggest that individual variables impact the most effective and efficient response prompting techniques (Cengher et al., 2018).

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–5:00	Introduction
5:00–20:00	Stimulus Prompt Fading
20:00–35:00	Response Prompt Fading
35:00–55:00	Role Play: Response Prompt Fading
55:00–60:00	Knowledge Check

Materials Needed

- Computers for supervisees to create stimulus prompt and prompt fading materials
- Block (e.g., building block, LEGO), and small box or container (for modeling)
- Appendix A: *Response Prompt Fading Model Guidance*, 1 copy for supervisor
- Appendix B: *Response Prompt Fading Procedural Fidelity Checklist Examples*, 1 copy per supervisee

Reading Assignments

At least one week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Graff & Green (2004)
- Libby et al. (2008)
- Gil et al. (2019)

Introduction

Begin your supervision meeting by asking your supervisees to summarize the goal of skill acquisition in one sentence. We expect you may get a variety of answers. Explain that the goal of any skill acquisition program is that a specific behavior is evoked by a specific discriminative stimulus. Then introduce the following terminology. For the most part, these should be familiar terms, so you may wish to call on a supervisee to define each one:

1. Discriminative stimulus
2. Criterion stimulus
3. Prompt
4. Prompt fading
5. Transfer of stimulus control

Introduce the classification of prompts as stimulus prompts or response prompts, defining each term. Provide several examples of stimulus prompts in which the stimulus was changed or something was added to the stimulus. Invite your supervisees to share examples of stimulus prompts that they have incorporated into skill acquisition programs.

Response prompts were introduced in Chap. 14; therefore, the review of response prompts should be rather quick. Introduce the four prompts: verbal, gesture, model, and physical guidance by defining and giving at least one example of each. Invite

your supervisees to share examples of response prompts that they have incorporated into skill acquisition programs.

Stimulus Prompt Fading

Define the two stimulus prompt fading techniques: stimulus fading and stimulus shaping. Share examples of each that are provided in the PowerPoint. Assign your supervisees to work in pairs. Within the pair, they must identify a client goal that could be taught using stimulus prompting and subsequent stimulus prompt fading with stimulus fading or stimulus shaping. It is likely that they will need to develop materials to demonstrate their stimulus prompt fading example. Therefore, allot about 10 minutes to this activity. After each of the pairs has developed at least one stimulus prompt fading procedure for a client goal, have them share their work.

Response Prompt Fading

Introduce each of the four response prompt techniques: least-to-most-prompting, most-to-least prompting, graduated guidance, and time delay. To do so, first define and describe the procedure and then model the procedure. To model, ask a supervisee to role-play as a client. Instruct your supervisee that in order to focus on the critical feature of each prompting technique, your supervisee should do the following:

- Respond correctly before a prompt no more than 25% of trials.
- Make an error (before or after a prompt) no more than 25% of trials.
- For most trials, wait for a prompt and then respond appropriately to that prompt. For least-to-most prompting, do not always respond correctly after the first prompt, but wait for additional prompts in the hierarchy across some trials.
- Do not engage in disruptive or challenging behavior.

We find that that it is easier to observe the critical features of each prompt fading technique when they are demonstrated to teach the same behavior. Therefore, each model will be used to teach the confederate client (i.e., your role-playing supervisee) to respond to the instruction, “clean up” by putting a single block in a box. Demonstrate each prompt and prompt fading technique within a DTT frame work. See the *Response Prompt Fading Modeling Guidance* (Appendix A) to prepare to model all four techniques. Allot about 3 minutes to modeling each response prompt fading technique.

Role Play: Response Prompt Fading

Now that all four response prompt fading approaches have been discussed and demonstrated, the next 20 minutes will be dedicated to role play. Divide your supervisees into pairs. Distribute *Response Prompt Fading Procedural Fidelity Checklist Examples* (Appendix B). For the first 5 minutes, instruct your supervisees to role-play the first prompt fading technique: most-to-least prompting. One supervisee should role-play for 2 minutes, while the other measures procedural fidelity. After 2 minutes, they should discuss the fidelity of implementation and then switch roles. Continue these 5-minute role-play activities until they have completed all four response prompt fading techniques. As they role-play, move about the room to deliver performance feedback.

Knowledge Check

1. What is a stimulus prompt? What is a response prompt?
2. What are the two approaches to stimulus prompt fading?
3. Describe most-to-least prompting.
4. What is another term for least-to-most prompting?
5. What is the distinction between graduated guidance and most-to-least prompting?

Homework for Individual Supervision without a Client

1. Choose one client and one goal for which to implement DTT with a prompt fading technique.
2. Collect baseline data on the goal behavior across at least three sessions.
3. Graph the baseline data.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 1-hour meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Homework Review
10:00–25:00	Complete DTT and Prompt Fading Planning Guide
25:00–35:00	Develop DTT and Prompt Fading Procedural Fidelity Checklist
35:00–60:00	Role-Play DTT and Prompt Fading

Materials Needed

- Appendix C: *DTT and Prompt Fading Guide*, 1 copy
- Appendix D: *DTT and Prompt Fading Procedural Fidelity Checklist Template*, 1 copy
- Data sheet for measuring client behavior, at least 5 copies
- Pen/pencil and clipboard
- Materials needed to role play DTT with prompt fading

Homework Review

Your supervisee should have selected a single goal among a client's program for which they will implement DTT with prompt fading. They should have taken baseline data for at least three sessions and graphed those data. To begin your individual supervision meeting without a client, ask your supervisee to read the goal, identify the discriminative stimulus, the target behavior, and a list of prompts that may evoke the target response. Next, ask your supervisee to share the graphed baseline data and summarize the data by describing level, trend and variability. Ask your supervisee to justify if intervention is warranted, based on these data.

Complete DTT and Prompt Fading Planning Guide

We recommend your supervisee implement a prompt fading technique within the framework of DTT. Prompt fading is not limited to use within DTT, but the two fit well together and the structure of DTT will be helpful for your supervisee's initial experiences with prompt fading. Provide your supervisee with a copy of the *DTT and Prompt Fading Guide* (Appendix C). We recommend having two copies so you can each follow along. Have your supervisee complete this as independently as possible, but provide support as needed.

Develop DTT and Prompt Fading Procedural Fidelity Checklist

Using information gathered from responding to the guide in the previous activity, support your supervisee in writing a procedural fidelity checklist using *DTT and Prompt Fading Procedural Fidelity Checklist Template* (Appendix D) for this client's goal. Allow your supervisee to take the lead in this process, providing support only as needed.

Role-Play DTT and Prompt Fading

We allotted 25 minutes for a role play in which you play the role of the client while your supervisee practices implementing DTT with prompt fading. In your role, be sure to demonstrate a variety of responses your supervisee may encounter. In other words, in some trials respond independently, in others respond only after a prompt, and in other trials make an error. During the role play, your supervisee should collect data on your behavior using the same data sheet used for baseline data collection. Moreover, as you role play as the client, discretely record data on your supervisee's fidelity of implementation using the procedural fidelity checklist you just created. Role play for 5 minutes, then pause to provide performance feedback. Continue in this pattern of role play and feedback until your supervisee is able to implement the procedure in a role-play scenario with at least 90% of steps correct.

Homework for Individual Supervision with a Client

1. Finalize procedural fidelity checklist. At least 48 hours prior to the next meeting, send the procedural fidelity checklist to the supervisor.
2. At least 48 hours prior to the next meeting, send the data sheet used to measure client behavior to the supervisor.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 50-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–10:00	Homework Feedback
10:00–40:00	Observe DTT and Prompt Fading
40:00–50:00	Performance Feedback

 **Materials Needed** 

- Supervisee-developed procedural fidelity checklist (sent 48 hours prior to meeting)
- Supervisee-developed client behavior data sheet (sent 48 hours prior to meeting)
- Clipboard
- Pen/Pencil

Homework Feedback

We allotted 10 minutes to discuss feedback on your supervisee's homework: to finalize the procedural fidelity checklist. You may or may not have feedback to share, likely depending on how much revision was needed to the procedural fidelity checklist after the last meeting. If you do not have feedback, feel free to omit this activity. If you do, be sure to highlight the strengths of the procedural fidelity checklist and justify why changes needed to be made.

Observe DTT and Prompt Fading

You will observe your supervisee implement DTT with the selected prompt fading technique for up to 30 minutes. You may wish to divide this 30-minute observation into several shorter observations. Similarly, you are welcome to extend the total duration of observation. During the observation, measure procedural fidelity using the procedural fidelity checklist your supervisee provided. Additionally, collect data on the client behavior using the data sheet your supervisee developed and provided.

Performance Feedback

During your final 10 minutes, you will provide performance feedback to your supervisee. Deliver feedback when you will not disrupt ongoing client services. If you divide your observation into several shorter observations, we recommend you provide feedback after each observation rather than only after the last observation. This will allow your supervisee to correct errors as quickly as possible. End your performance feedback session by providing your supervisee with your data sheet(s) so they can calculate IOA on data regarding client behavior. Discuss discrepancies and how to improve data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must implement DTT with a prompt fading technique while they also (a) accurately collect data with at least 80% agreement and (b) conduct DTT with a prompt fading technique with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement the same prompt fading technique with the same client, but to target a different goal.
- ☐ Evaluate your supervisee's ability to implement a different prompt fading technique with same client.
- ☐ Evaluate your supervisee's ability to implement a prompt fading technique with a different client.

Appendix A: Response Prompt Fading Modeling Guidance

Most-to-Least Prompting

S^D: "Clean up."
Prompt Hierarchy: Verbal→Gesture→Physical Guidance
Delay Between S^D and Prompt: 3 seconds
Error Correction: Correct with physical guidance. Begin a new trial. Increase the prompt intrusiveness on the subsequent trial. Decrease to less intrusive prompts as you see fit.
Reinforcement: Praise (higher quality for independent response)

Step	
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). Place block and box on table.
2	Call the client's name. When their eye gaze shifts to you say, "clean up".
3	Wait 3 seconds.
4	Deliver prompt. *Note: First 5 trials prompt with physical guidance. Next 5 trials prompt with gesture prompt. Last 5 trials prompt with verbal prompt.*
5	If the client puts the block in the box, praise. End the trial.
6	If the client makes an error (would only occur in trials with verbal or gesture prompt), provide physical guidance to put the block in the box and end the trial. Increase the prompt level on the subsequent trial and fade to less intrusive prompts across trials as you feel appropriate.

Least-to-Most Prompting

S^D: "Clean up." Repeat S^D ("clean up") prior to each increasing prompt in the hierarchy.
Prompt Hierarchy: Verbal→Gesture→Physical Guidance
Delay Between Prompts: 3 seconds
Error Correction: Correct with physical guidance. Begin a new trial.
Reinforcement: Praise (higher quality for independent response)

Step	
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). Place block and box on table.
2	Call the client's name. When their eye gaze shifts to you say, "clean up".
3	Wait 3 seconds.
4	If the client puts the block in the box, praise. End the trial.
5	If the client makes an error, provide physical guidance to put the block in the box and end the trial.
6	If the client does not respond, say, "Clean up. Pick up the block and put it in the box."
7	If you deliver the verbal prompt, wait 3 seconds.
8	If the client puts the block in the box, praise. End the trial.
9	If the client makes an error, provide physical guidance to put the block in the box and end the trial.
10	If the client does not respond, say, "Clean up" and point to the block and then the box.
11	If you deliver the gesture prompt, wait 3 seconds.
12	If the client puts the block in the box, praise. End the trial.
14	If the client makes an error, provide physical guidance to put the block in the box and end the trial.
15	If the client does not respond, say, "Clean up" and physically guide the client to put the block in the box. Praise the completed response.

Graduated Guidance

S^D: "Clean up."
Prompt: Physical guidance that changes moment to moment.
Delay Between S^D and Prompt: None
Error Correction: Correct with maximum physical guidance.
Reinforcement: Praise (higher quality for independent response)

Step	
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). Place block and box on table.
2	Call the client's name. When their eye gaze shifts to you say, "clean up".
3	Physically guide the client to pick up the block and place in the box. Change your support from moment to moment, providing as little assistance as necessary for the client to complete the skill. *Note: For demonstration purposes, on each trial range from no assistance to full physical guidance. For example, provide maximum physical guidance to pick up the block, but them remove all guidance when the client drops it in the box.*
5	If the client puts the block in the box, praise. End the trial.

Time Delay

S^D: "Clean up."
Controlling Prompt: Physical guidance
Delay Between S^D and Prompt: Begin with 0-second delay, increase by 2 seconds every three trials.
Error Correction: Correct with immediate physical guidance. Begin a new trial. Decrease the prompt delay by at least 2 seconds or back to a 0-second delay and begin the prompt fading, by increasing the prompt delay, across trials as described above.

Step	
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). Place block and box on table.
2	Call the client's name. When their eye gaze shifts to you say, "clean up".
3	Initial Trials: Immediately physically guide the client to pick up the block and place it in the box. *Note: First 3 trials immediately prompt with physical guidance. Next 3 trials delay physical guidance for 2 seconds after the S^D. Continue to delay by 2 seconds every three prompts.*
4	If the client puts the block in the box, praise. End the trial.
5	If the client makes an error (would only occur in trials with a delayed prompt), immediately provide physical guidance to put the block in the box and end the trial. Decrease the delay between the S^D and the prompt by at least 2 seconds or return to the 0-second delay. Begin prompt fading by increasing the prompt delay as described in step 3.

Appendix B: Response Prompt Fading: Procedural Fidelity Checklist Examples

Most-to-Least Prompting

Summary:
S^D: "Tap the table twice."
Prompt Hierarchy: Verbal→Model→Physical Guidance
Delay Between S^D and Prompt: 2 seconds
Error Correction: Correct with physical guidance. Begin a new trial. Increase the prompt intrusiveness on the subsequent trial. Decrease to less intrusive prompts as you see fit.
Reinforcement: Praise for prompted response. Praise and high five for independent response.

Step		Implemented Correctly? + = Yes - = No
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*).	
2	Call the client's name. When their eye gaze shifts to you say, "tap the table twice".	
3	Wait 2 seconds.	
4	Deliver prompt. *Note: First 5 trials prompt with physical guidance. Next 5 trials prompt with model prompt. Last 5 trials prompt with verbal prompt.*	
5	If the client independently taps the table twice, praise and give high five. End the trial.	
	If the client taps the table twice after a prompt, praise. End the trial.	
6	If the client makes an error (would only occur in trials with verbal or model prompt), provide physical guidance to put the block in the box and end the trial. Increase the prompt level on the subsequent trial and fade to less intrusive prompts across trials as you feel appropriate.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Least-to-Most Prompting

Summary:
S^D: "Tap the table twice." "Repeat S^D prior to each increasing prompt in the hierarchy.
Prompt Hierarchy: Verbal→Model→Physical Guidance
Delay Between Prompts: 2 seconds
Error Correction: Correct with physical guidance. Begin a new trial.
Reinforcement: Praise for prompted response. Praise and high five for independent response.

	Step	Implemented Correctly? + = Yes - = No
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). .	
2	Call the client's name. When their eye gaze shifts to you say, "tap the table twice".	
3	Wait 2 seconds.	
4	If the client taps the table twice, praise and give a high five. End the trial.	
5	If the client makes an error, provide physical guidance to tap the table twice and end the trial.	
6	If the client does not respond, say, "Tap the table twice. Lift you hand and tap two times."	
7	If you deliver the verbal prompt, wait 2 seconds. ↓	
8	If the client taps the table twice, praise. End the trial.	
9	If the client makes an error, provide physical guidance to tap the table twice and end the trial.	
10	If the client does not respond, say, "Tap the table twice" and model tapping the table twice.	
11	If you deliver the model prompt, wait 2 seconds. ↓	
12	If the client taps the table twice, praise. End the trial.	
14	If the client makes an error, provide physical guidance to tap the table twice and end the trial.	
15	If the client does not respond, say, "Tap the table twice" and physically guide the client to do so. Praise the completed response.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Graduated Guidance

Summary:
S^D: "Tap the table twice."
Prompt: Physical guidance that changes moment to moment.
Delay Between Prompts: None
Error Correction: Correct with maximum physical guidance.
Reinforcement: Praise for prompted response. Praise and high five for independent response.

Step		Implemented Correctly? + = Yes - = No
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*).	
2	Call the client's name. When their eye gaze shifts to you say, "tap the table twice".	
3	Physically guide the client to tap the table twice. Change your support from moment to moment, providing as little assistance as necessary for the client to complete the skill.	
4	If the client independently taps the table twice, praise and give high five. End the trial.	
5	If the client taps the table twice after a prompt, praise. End the trial.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Time Delay

Summary:
S^D: "Tap the table twice."
Controlling Prompt: Physical guidance
Delay Between S^D and Prompt: Begin with 0-second delay, increase by 2 seconds every three trials.
Error Correction: Correct with immediate physical guidance. Begin a new trial. Decrease the prompt delay by at least 2 seconds or back to a 0-second delay and begin the prompt fading, by increasing the prompt delay, across trials as described above.

Step		Implemented Correctly? + = Yes - = No
1	Sit across table for the supervisee role playing as the client (hereafter referred to as *client*). .	
2	Call the client's name. When their eye gaze shifts to you say, "tap the table twice".	
3	Initial 3 Trials: Immediately physically guide the client to tap the table twice.	
4	After 3 trials with successful 0-second delay, provide physical guidance 2 seconds after the S^D.	
5	After 3 trials with successful 2-second delay, provide physical guidance 4 seconds after the S^D.	
6	After 3 trials with successful 4-second delay, provide physical guidance 6 seconds after the S^D. *Note: we do not recommend extending beyond a 6-second delay because a client responding with this long of a delay would not be socially valid.*	
7	If the client makes an error (would only occur in trials with a delayed prompt), immediately provide physical guidance tap the table twice and end the trial. Decrease the delay between the S^D and the prompt by at least 2 seconds or return to the 0-second delay. Begin prompt fading by increasing the prompt delay as described in steps 3-6.	
8	If the client independently taps the table twice, praise and give high five. End the trial.	
9	If the client taps the table twice after a prompt, praise. End the trial.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix C: DTT Planning Guide

Client Goal: _____

_____

_____

From the Goal:

S^D: _____

Behavior: _____

Potential Prompts:

Stimulus Prompts: _____

_____

Response Prompts: _____

_____

Select a Prompt Fading Technique (circle one):

Stimulus Fading	Stimulus Shaping	Most-to-Least Prompting
Least-to-Most Prompting	Graduated Guidance	Time Delay (progressive or constant)

Complete the Planning Guide for the Selected Prompt Fading Criteria:

Stimulus Fading:

Describe initial stimulus: _____

_____

Number of fading steps: _____

Prepare stimuli

Stimulus Shaping:

Describe initial stimulus: _____

_____

Number of fading steps: _____

Prepare stimuli

Most-to-least Prompting:

Prompt Hierarchy: _____

_____

Delay Between S^D and Prompt: _____

Error Correction Procedure: _____

_____

Reinforcement Procedure: _____

_____

Least-to-Most Prompting:

Prompt Hierarchy: _____

_____

Delay Between Prompts: _____

Error Correction Procedure: _____

_____

Reinforcement Procedure: _____

_____

Graduated Guidance:

Describe Prompt: _____

_____

Error Correction Procedure: _____

_____

Reinforcement Procedure: _____

_____

Constant Time Delay:

Controlling Prompt: _____

Constant Delay Between S^D and Prompt: _____

Number of Trials with Initial 0-second Delay: _____

Error Correction Procedure: _____

_____

Reinforcement Procedure: _____

_____

Progressive Time Delay:

Controlling Prompt: _____

Incremental Increase in Prompt Delay: _____

Criteria for Increasing Prompt Delay: _____

Error Correction Procedure: _____

_____

Reinforcement Procedure: _____

_____

Appendix D: DTT and Prompt Fading Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Goal: _____

_____

Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Billingsley, F. F., & Romer, L. T. (1983). Response prompting and the transfer of stimulus control: Methods, research, and a conceptual framework. *Journal of the Association for the Severely Handicapped, 8*(2), 3–12.

Cengher, M., Budd, A., Farrell, N., & Fienup, D. M. (2018). A review of prompt-fading procedures: Implications for effective and efficient skill acquisition. *Journal of Developmental and Physical Disabilities, 30*(2), 155–173.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). Applied Behavior Analysis, EBook. Pearson UK.

Deitz, S. M., & Malone, L. W. (1985). On terms: Stimulus control terminology. *The Behavior Analyst, 8*, 259–264.

Demchak, M. (1990). Response prompting and fading methods: A review. *American Journal on Mental Retardation, 94*(6), 603–615.

Gil, V., Bennett, K. D., & Barbetta, P. M. (2019). Teaching young adults with intellectual disability grocery shopping skills in a community setting using least-to-most prompting. *Behavior Analysis in Practice, 12*(3), 649–653.

Graff, R. B., & Green, G. (2004). Two methods for teaching simple visual discriminations to learners with severe disabilities. *Research in Developmental Disabilities, 25*(3), 295–307.

Etzel, B. C., & LeBlanc, J. M. (1979). The simplest treatment alternative: The law of parsimony applied to choosing appropriate instructional control and errorless-learning procedures for the difficult-to-teach child. *Journal of Autism and Developmental Disorders, 9*(4), 361–382.

Libby, M. E., Weiss, J. S., Bancroft, S., & Ahearn, W. H. (2008). A comparison of most-to-least and least-to-most prompting on the acquisition of solitary play skills. *Behavior analysis in practice, 1*(1), 37–43.

Noell, G. H., Call, N. A., & Ardoin, S. P. (2011). Building complex repertoires from discrete behaviors by establishing stimulus control, behavioral chains, and strategic behavior. In *Handbook of applied behavior analysis* (pp. 250–269).

Snell, M. E., & Gast, D. L. (1981). Applying time delay procedure to the instruction of the severely handicapped. *Journal of the Association for the Severely Handicapped, 6*(3), 3–14.

Terrace, H. S. (1963). Discrimination learning with and without "errors" 1. *Journal of the Experimental Analysis of Behavior, 6*(1), 1–27.

Touchette, P. E. (1971). Transfer of stimulus control: Measuring the moment of transfer 1. *Journal of the Experimental Analysis of Behavior, 15*(3), 347–354.

Wolery, M., Holcombe, A., Cybriwsky, C., Doyle, P. M., Schuster, J. W., Ault, M. J., & Gast, D. L. (1992). Constant time delay with discrete responses: A review of effectiveness and demographic, procedural, and methodological parameters. *Research in Developmental Disabilities, 13*(3), 239–266.

Wolery, M., & Gast, D. L. (1984). Effective and efficient procedures for the transfer of stimulus control. *Topics in Early Childhood Special Education, 4*(3), 52–77.

Chapter 17
Modeling and Imitation

Topics Covered Within This Chapter

Topics
Generalized Imitation
Considerations for Teaching Imitation
Video Modeling
Behavioral Skills Training

Imitation is an important skill for children to develop because it allows them to learn from observing others rather than being direct taught every skill. That is, a child can observe another child climb up the stairs and go down the slide and after observing this behavior they can engage in the same response without being taught to do so. Imitation is important for adults as well. For example, upon entering a cafeteria style eatery one might watch the other patrons to follow their lead regarding gathering a tray, where the line starts, and how to order food. Overall, imitation skills allow the individual to more effectively navigate their environment.

Generalized Imitation

Imitation has received attention in the behavior analytic literature since the 1960s. Researchers sought to understand the parameters under which generalized imitation would develop. Generalized imitation is defined as when an individual imitates a variety of behaviors that were *not directly taught* and have *not contacted reinforcement*. Imitation represents a special form of behavior because it is defined not by topography but rather by the correspondence between the modeled action and the behavior (Baer et al., 1967).

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_17].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_17

There are multiple types of imitation which are often defined as object imitation, motor imitation, and vocal imitation. Object imitation entails imitative behavior that includes the manipulation of an object as part of the response. For example, stacking one block on top of the other, rolling a car, and picking up a doll. Motor imitation includes both gross motor imitation and fine motor imitation. Gross motor movements typically require larger muscles (e.g., jumping), whereas fine motor movements are typically hand and finger movements (e.g., thumbs up; Gonzalez et al., 2019). Vocal imitation is also referred to as echoic behavior within the verbal behavior paradigm. The length of the imitated response is not important, rather the important feature is the extent to which the response has point-to-point correspondence with the vocal utterance. Vocal imitation is important for developing vocal speech; however, unlike the other types of imitation, vocal imitation cannot be physically guided. Therefore, establishing vocal imitation may be more difficult than the other types of imitation.

Considerations for Teaching Imitation

There are several resources that outline procedures for teaching imitation, and Chap. 14 in this text provides an overview of discrete trial training which can be used to teach imitation. Therefore, in this chapter, we will confine the conversation to special considerations that apply to imitation training specifically. First, an empirically validated instructional sequence for imitation training currently does not exist. Until an order of teaching is developed, Ledford and Wolery (2011) suggest first teaching object imitation then motor imitation and then vocal imitation. Teaching and probing for the different types of imitation responses are important as researchers have demonstrated that generalized imitation may not emerge across types of imitation (e.g., object) without some direct instruction (Garcia et al., 1971; Young et al., 1994). That is, researchers showed that establishing vocal imitation did not generalize to object imitation or motor imitation. Responses for each type had to be trained and reinforced before untrained imitative responses were observed.

A second consideration is the importance of establishing appropriate stimulus control over imitative behavior. That is, the modeled behavior should occasion the response rather than the presence of a specific object or a specific instruction. This is particularly important when teaching object imitation. If every time the child is presented with a car, she rolls the car regardless of what the model is doing with a car, this is not imitation. Although we would certainly be excited that the child could play with a car functionally, the goal of imitation would not be achieved. Therefore, it is important to present multiple objects from which the child must select to match the provided model and to model multiple actions with each object (see Fig. 17.1 for an example). This will help ensure the model alone is controlling behavior.

Relatedly, many individuals with developmental disabilities are taught to imitate behavior following the instruction “do this.” This instruction serves as part of the discriminative stimulus to occasion the target response. Although there are

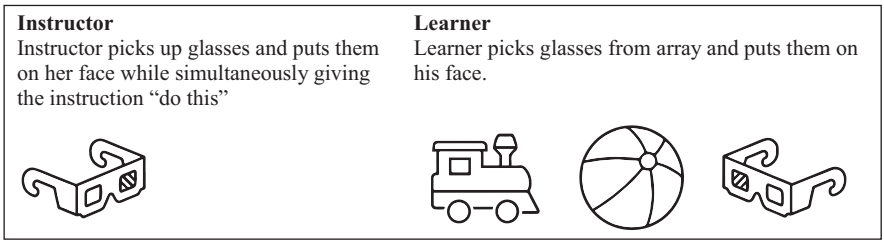


Fig. 17.1 Instructional arrangement to promote the establishments of appropriate stimulus control

examples of similar instructions occasioning imitation (e.g., "Simon says touch your head," "Everyone look at Cynda cleaning up, do what she is doing"), there are many instances in which a clear instruction is not provided to signal that imitation should occur. Therefore, researchers encourage clinicians to ensure stimulus control transfers from the instruction to the stimuli which should occasion the response in the natural environment (Brown et al., 2008). Using the example provided by Brown and colleagues, if an imitative repertoire has been established, the individual attending a formal dinner party should accurately identify which fork is used for each course because they will follow the model of the individual sitting next to them.

Video Modeling

Next, we will provide an overview of modeling. Modeling is a form of prompt in which the antecedent stimulus is the modeled response. This is different than teaching imitation because in this situation the model would only temporarily be included as part of the antecedent. The model would be faded once the stimulus that should occasion the behavior does so. A model prompt will only effectively occasion a response if the individual has a generalized imitation repertoire and readily attends to models. Modeling can be provided in vivo or via recorded video. For additional information about in vivo modeling, refer to Chap. 14 on discrete trial teaching and to Chap. 16 on prompting. We will spend the remainder of this chapter focused on video modeling.

Video modeling entails presenting the model via recorded video, asking the learner to watch the video, and then providing the opportunity for the learner to imitate the modeled behavior. Video models have been used to teach a number of skills to individuals with developmental disabilities including academic skills, vocational skills, social skills, and daily living skills (Park et al., 2019). For example, researchers used video modeling to increase appropriate play statements and play activities between dyads with ASD (Ezzeddine et al., 2020). In the model, two known adults engaged in appropriate play with common games such as Candyland™ and emitted 10 conversational exchanges. Following the intervention, researchers observed an increase in the number of statements made by the dyads during play.

Video modeling has also been used to teach adults to implement discrete trial training (e.g., Catania et al., 2009), to conduct preference assessments (e.g., Deliperi et al., 2015), and to implement Behavioral Skills Training (BST; e.g., Erath et al., 2021). Researchers often incorporate other components as part of a video modeling intervention package. These can include error correction, contingent reinforcement, systematic prompting, and voice over narration (see Park et al., 2019 for a review).

When discussing video modeling with your supervisees, present the following steps (a) select a behavior, (b) identify the model, (c) determine the perspective of the video (whole body or specific part), (d) create a script (actions and dialog) for the video, (e) record the video, (f) specify where and how often the video will be viewed by the learner, and (g) determine what will happen if the behavior does not occur or the learner makes an error.

Selecting a behavior includes operationally defining the behavior and determining how data will be collected. Encourage your supervisees to consult the literature to determine whether video modeling will be most appropriate for the target behavior. When identifying the model, your supervisees must determine whether the learner can serve as the model or whether it should be someone else. If they determine it should be someone else, they must specify whether the person will be known or unknown to the learner and if it will be a peer or an adult. When determining the perspective of the video, your supervisee must consider what the learner should focus on. For example, if your supervisee plans to use a video to teach their client to wash their hands, your supervisee may determine that having the video focus on the hands would be the best option. When creating the script, have your supervisee develop a storyboard that clearly outlines the actions and dialog for the model(s) in the video. When recording the video, your supervisee should use technology that will produce a high enough quality video to serve as an effective model. That is, the video must be clear enough that the learner can observe the actions and imitate them. Your supervisee must also determine where the video will be recorded and the required materials for recording the video. Then, your supervisee must select a location for the video to be viewed by the learner and the frequency in which it should be viewed. For example, if your supervisee is teaching handwashing, the learner will likely view the video by the bathroom sink after using the restroom. When determining what will happen if the behavior does not occur or an error occurs, your supervisee should consider if and when prompts will be provided, if the learner will rewatch the video, and how to proceed if errors persist.

Behavioral Skills Training

BST is included in this chapter because modeling is one of the components of BST. Overall, BST is comprised of four components including (a) instructions, (b) modeling, (c) role play, and (d) performance feedback. BST has been used to teach a variety of skills including abduction prevention (Johnson et al., 2005), interview

skills (Stocco et al., 2017), and safe tackling skills (Tai & Miltenberger, 2017). You, as the supervisor, have modeled the use of BST to your supervisees during every lesson provided in this text. It is important for your supervisees to recognize the components and effectively use BST in their own practice. Before using BST, your supervisee must have a fidelity checklist which will be used to evaluate the target skill throughout. Provide your supervisees with guidelines for each component.

Instructions

Related to instructions, your supervisees must determine whether they will provide written instructions, oral instructions, or both. They must decide whether the instructions will be provided in a group format or one on one.

Modeling

For modeling, your supervisees should determine whether they will model the target skill (e.g., FCT) with another adult or with the client. There are benefits for both options. If the target skill is modeled with an adult, your supervisee can ensure all potential responses and outcomes are modeled. If a skill is modeled with the client, it will be more similar to the situations in which the target skill will be implemented. In addition, for caregivers, it may be ideal to model the target skill with their child to demonstrate the effectiveness of the intervention and thus increase buy in from the caregiver.

Role Play

For role play, your supervisees will need to determine whether a script with predetermined errors or instances of challenging behavior will be created to ensure the learner (i.e., individual being trained using BST) has enough opportunities to practice the target skill and problem solve when they are unsure of how to proceed. Role play can be uncomfortable for many adults (e.g., caregivers, new clinicians); thus, your supervisees will need to be transparent about the training process and encourage the learner to react to the situation as realistically as possible. Your supervisees will need to determine a mastery criterion (e.g., 90% accuracy for three consecutive 5-minute sessions) for the learner to reach before transitioning to sessions with the target individual. The mastery criterion should be sufficiently stringent because the learner is engaging in the target skill under ideal circumstances.

Performance Feedback

For performance feedback, your supervisees will determine whether feedback will be provided immediately (during the session) or delayed (following the session). Some research suggests immediate feedback may be more effective (Sleiman et al., 2020); however, this may not be possible in every situation. Also, some learners (e.g., caregivers) may become overwhelmed if they are interrupted multiple times during the session. Therefore, the decision about when to provide feedback should not be taken lightly. Verbal feedback should include praise for correctly implemented components and corrective feedback for incorrectly implemented components. Corrective feedback should include (a) a description of the error, (b) a justification as to why the error should be addressed, (c) modeling of the correct response, and (d) an opportunity for the clinician to role-play the correct response with your supervisee. Your supervisees will need to determine a mastery criterion for using the target skill with the client. Your supervisees will need to continue to provide feedback on an as needed basis.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Imitation Stimulus Control
30:00–55:00	Video Model Development
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *BST Fidelity Checklist*, 1 copy for each supervisee
- Appendix B: *Video Model Development,* 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Baer et al. (1967)
- Brown et al. (2008)
- Park et al. (2019)
- Tai and Miltenberger (2017)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with imitation, video modeling, and BST. A brief summary of each is provided below, and PowerPoint slides are available to share with your group.

Imitation

Review the importance of imitation with your supervisees. Provide examples of imitation in everyday life and ask your supervisees to come up with additional examples. Highlight the importance of establishing generalized imitation and remind them of the definition.

1. Generalized imitation: a term used when an individual imitates numerous untrained, unprompted, nonreinforced modeled behaviors in a variety of settings (Cooper et al., 2020).

Review the different types of imitation. Provide examples of each and ask your supervisees to provide additional examples.

1. Object imitation
2. Motor imitation
3. Vocal imitation

Explain to your supervisees that although there is not an empirically validated sequence for teaching imitation, some researchers suggest starting with object imitation, then introducing motor imitation and finally moving to vocal imitation. Remind your supervisees that this progression may not be necessary for all clients; however, probing for imitation across each type is imperative as researchers have shown that imitation may not immediately transfer across types (Garcia et al., 1971; Young et al., 1994).

Transition to the discussion of establishing appropriate stimulus control for imitation. First, your supervisees need to be confident that the modeled response is controlling the client response and not the object itself. This can be accomplished by modeling multiple actions with each object and by presenting multiple objects from which the client must select to imitate the correct action. Second, they need to ensure that imitation behavior comes under the control of the relevant environmental stimuli. Potential ways to accomplish this include fading the instruction "do this" and probing for imitation in the natural environment (Brown et al., 2008).

Video Modeling

Next, transition the discussion to video modeling. First, remind your supervisees that imitation and attending to models (e.g., videos) are prerequisites for using video modeling as an intervention. Second, review the steps for developing a video model. Provide examples throughout and encourage your supervisees to ask questions as they arise.

1. Select a behavior
   (a) Operational definition
   (b) Measurement
2. Identify a model
   (a) Self or other
   (b) Known or unknown
   (c) Peer or adult
3. Determine the perspective of the video
   (a) Most important features
4. Create a script for the video
   (a) Develop a storyboard with actions and dialog (if applicable)
5. Record the video
   (a) Video quality is clear enough for easy viewing and imitation
6. Specify where and how often the video will be viewed
7. Determine what will happen if the behavior does not occur or an error is made

BST

Finally, transition to the discussion of BST. Remind your supervisees of the four components of BST: (a) instructions, (b) modeling, (c) role play, and (d) performance feedback. Review *BST Fidelity Checklist* (Appendix A) to discuss how you will assess their accurate use of BST.

1. Instructions
   (a) Oral or written
   (b) Group format or one on one

2. Modeling
   (a) With adult or client
3. Role play
   (a) Create script with errors
   (b) Develop mastery criterion
4. Performance Feedback
   (a) Immediate or delayed
   (b) Develop mastery criterion

Imitation Stimulus Control Activity

For this activity, have your supervisees identify three target imitative behaviors for the clients with whom they work. They must identify the natural stimulus/context which should occasion the response and potential strategies for probing/teaching the imitative response. Your supervisees can work independently or in small groups. Provide guidance and feedback as necessary. Have each supervisee or group present at least one of the examples and discuss any difficulties they encountered when considering the example.

Video Model Development

For this activity use the *Video Model Development* sheet (Appendix B) or create your own document. Ask your supervisees to identify a skill they would like to target using video modeling for a client. If video modeling is inappropriate for the clients with whom your supervisees work (e.g., clients do not attend to models), ask your supervisees to develop a video model to teach a skill to someone other than their client (e.g., past client, another clinician, caregiver). Your supervisees should each have their video model skill approved by you before completing the activity. Your supervisees may not finish the activity during this meeting; however, they should try to complete as much as possible as they will need to create their video before individual supervision without a client. Provide guidance and feedback throughout the completion of this activity.

Knowledge Check

1. How is it determined that an individual has a generalized imitation repertoire?
2. What is one way to promote the establishment of appropriate stimulus control when teaching imitation?
3. What are the two prerequisites for using modeling with a client?
4. What is an example of skill that can be targeted using video modeling?
5. What are the four components of BST?

Homework for Individual Supervision without a Client

1. Prepare a video model according to form created in group supervision.
2. Prepare a fidelity checklist for a new goal for client (Appendix C).
3. Graph the collected data (three to five baseline sessions) to display the current level of the behavior of interest before the introduction of the intervention.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Video Modeling Development
15:00–30:00	Client-Directed Activities

Materials Needed

- Video Model
- Appendix A: *BST Fidelity Checklist*
- Appendix B: *Video Model Development*
- New client goal
- Appendix C: *New Goal Procedural Fidelity Checklist*

Prior to this meeting, your supervisee should have recorded the video model that they will use with their client or other identified individual. In addition, your supervisee should have received your approval for a new client goal, collected adequate baseline data, and received your approval for the intervention procedures to be implemented following this meeting.

Video Modeling Development

During this meeting, review your supervisee's *Video Model Development* sheet (Appendix B) they completed during group supervision. Then review the video model they have recorded. Evaluate the video based on correspondence to the *Video Model Development* sheet, quality of the recording, and the extent to which the video provides an appropriate model to occasion the target behavior. If the recording does not pass your evaluation, provide specific instructions for your supervisee to follow as they rerecord the video.

Client-Directed Activities

During this meeting, you and your supervisee should review the *New Goal Procedural Fidelity Checklist* (Appendix C) that they created for a new client goal. Evaluate the fidelity checklist to ensure it provides accurate and comprehensive information. Once you have approved the checklist, your supervisee should practice using BST to train someone else to implement the procedures for the goal. During this activity, you will serve as the trainee. Your supervisee should first provide you with instructions and access to the fidelity checklist, if appropriate. Then they should model the implementation of the goal. This can be done with an imaginary client, the actual client if they are easily accessible, or another clinician (not the clinician who will receive the training later). After modeling the procedures, your supervisee should ask you to implement the procedures with them serving the role as the client. As the implementer, ensure your fidelity is low such that your supervisee will need to provide feedback (i.e., do not implement the procedures with 100% accuracy). Role play should continue until you meet the predetermined mastery criterion. For the feedback portion of BST, rather than having you implement the procedures, have your supervisee practice providing feedback for different fidelity errors. For example, you could ask your supervisee to provide feedback for an error related to delivery of the reinforcer. Then your supervisee would practice providing corrective feedback for this error and providing a rationale for why consistent delivery of reinforcement is important. Use the *BST Fidelity Checklist* (Appendix A) to evaluate your supervisee's fidelity of BST implementation.

Homework for Individual Supervision with a Client

1. Prepare data sheets and bring to the session. Data sheets should include (a) recording of the client's behavior (three copies), (b) recording of the clinician's behavior (procedural fidelity; two copies) and recording on your supervisee's behavior (one copy).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–45:00	BST Administration
45:00–60:00	Performance Feedback

Materials Needed

- Appendix A: *BST Fidelity Checklist*, 1 copy
- Appendix C: *New Goal Procedural Fidelity Checklist*, 2 copies
- Data sheets for client responding, 3 copies

BST Administration

Prior to your meeting with your supervisee, they should have finalized the data sheet for the client behavior and fidelity checklist. During this meeting, the following individuals will be present: you, your supervisee, a clinician who will implement procedures with the client, and the client (when appropriate). You, your supervisee, and the clinician should all collect data on the client's engagement in the target behavior. Following the session, your supervisee should calculate IOA between their data sheet and your data sheet AND their data sheet and the clinician's data sheet. Your supervisee should collect data using the procedural fidelity checklist approved during the supervision without a client meeting. You will collect data using this form as well. Your supervisee will calculate IOA on the clinician's procedural fidelity using their data sheet and yours. You will also record fidelity data on your supervisee's implementation of BST (Appendix A).

Once data sheets have been distributed, your will observe your supervisee use BST to train the clinician to implement the procedures for the new client goal. First,

your supervisee will provide directions for implementing procedures for the target goal and access to the fidelity checklist to review the procedures with the clinician step-by-step. Then, you will observe your supervisee as they model implementation of the procedures. This modeling can occur with the client, if possible, or with another adult (potentially yourself if needed). Following the modeling of the procedures, your supervisee should engage in role play with the clinician. Your supervisee should play the role of the client and make errors (according to a predetermined script if possible). They should provide feedback as necessary to the clinician, and the role play should continue until the clinician meets the mastery criterion. At this time, the clinician should implement the protocol with the client. Your supervisee should provide feedback to address errors (either in the moment or after implementation is complete). Following the implementation, your supervisee should use the fidelity checklist to provide positive feedback for steps implemented correctly and corrective feedback for steps implemented incorrectly. Corrective feedback should include a rationale for why the behavior should change. Your supervisee should calculate IOA for the client's behavior using their data sheet and the clinician's data sheet and address any discrepancies.

Performance Feedback

After you observe your supervisee implement BST, ask your supervisee to calculate IOA between your data recording and their data recording for the client's behavior and the clinician's behavior (i.e., fidelity checklist). Discuss and resolve any discrepancies. Then, provide feedback to your supervisee according to the *BST Fidelity Checklist*. End this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement BST with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback.

Future Growth

- ☐ Observe your supervisee use BST to train a caregiver.
- ☐ Observe your supervisee use video modeling to target a different skill with another client

Appendix A: Behavioral Skills Training Fidelity Checklist

BST Step	Step Implemented Correctly √ = Yes X = No
Instructions	
The supervisee shares the procedural fidelity checklist for the new client goal with the clinician. The supervisee reviews each step of the checklist and answers any questions posed by the clinician.	
Modeling	
The supervisee accurately models implementation of the procedures.	
Role -Play	
The supervisee role-plays the procedures with the clinician.	
The supervisee engages in incorrect responding/challenging behavior to ensure the clinician responds correctly to a variety of situations.	
The supervisee provides feedback regarding the clinician's implementation during the role play.	
Role play continues until the clinician meets mastery criterion.	
Feedback	
The supervisee observes the clinician implement the procedures with the client.	
The supervisee corrects any errors the clinician commits during the session.	
The supervisee provides a rationale for changing ineffective performance for each of the steps that the clinician performed incorrectly.	
The supervisee provides instructions for how to improve each of the steps that the clinician performed incorrectly.	
The supervisee models the correct implementation of each of the steps that the clinician performed incorrectly.	
The supervisee provides an opportunity for the clinician to practice each of the steps that the clinician performed incorrectly	
The supervisee solicits questions from the clinician after providing feedback on correct or incorrect performance.	
The supervisee collects data on correct implementation by the clinician, which aligns with your data with interobserver agreement of at least 80%.	
The supervisee collects client data, which aligns with your data with interobserver agreement of at least 80%.	
Number of Steps Completed Correctly:	
Percent of Steps Implemented Correctly:	

Appendix B: Video Modeling Development

1 Select Behavior *(Operational definition & measurement)*

2 Identify the Model *(Self or other; known or unknown; adult or peer)*

3 Determine the Perspective *(Whole body or specific body part)*

4 Create the Script

Use the table below

5 Record the Video *(technology to use; quality of technology; materials needed; location of recording)*

6 Location and Frequency of Video Viewing

7 Prompting and Error Correction

If no response, then…
If incorrect response, then…
Prompt Hierarchy *(If applicable)*
Time delay *(If applicable)*

Draw or describe every action that model(s) & write out the dialog the model(s) will engage in during the recording

Appendix C: New Goal Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Baer, D. M., Peterson, R. F., & Sherman, J. A. (1967). The development of imitation by reinforcing behavioral similarity to a model 1. *Journal of the Experimental Analysis of Behavior, 10*(5), 405–416. https://doi.org/10.1901/jeab.1967.10-405

Brown, A. K., Brown, J. L., & Poulson, C. L. (2008). Discriminating which fork to use: Teaching selective imitation to people with autism. *Research in Autism Spectrum Disorders, 2*(2), 199–208. https://doi.org/10.1016/j.rasd.2007.06.001

Catania, C. N., Almeida, D., Liu-Constant, B., & Reed, F. D. D. (2009). Video modeling to train staff to implement discrete-trial instruction. *Journal of Applied Behavior Analysis, 42*(2), 387–392. https://doi.org/10.1901/jaba.2009.42-387

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied Behavior Analysis*, eBook. Pearson.

Deliperi, P., Vladescu, J. C., Reeve, K. F., Reeve, S. A., & DeBar, R. M. (2015). Training staff to implement a paired-stimulus preference assessment using video modeling with voiceover instruction. *Behavioral Interventions, 30*(4), 314–332. https://doi.org/10.1002/bin.1421

Erath, T. G., DiGennaro Reed, F. D., & Blackman, A. L. (2021). Training human service staff to implement behavioral skills training using a video-based intervention. *Journal of Applied Behavior Analysis, 54*(3), 1251–1264. https://doi.org/10.1002/jaba.827

Ezzeddine, E. W., DeBar, R. M., Reeve, S. A., & Townsend, D. B. (2020). Using video modeling to teach play comments to dyads with ASD. *Journal of Applied Behavior Analysis, 53*(2), 767–781. https://doi.org/10.1002/jaba.621

Garcia, E., Baer, D. M., & Firestone, I. (1971). The development of generalized imitation within topographically determined boundaries 1. *Journal of Applied Behavior Analysis, 4*(2), 101–112. https://doi.org/10.1901/jaba.1971.4-101

Gonzalez, S. L., Alvarez, V., & Nelson, E. L. (2019). Do gross and fine motor skills differentially contribute to language outcomes? A systematic review. *Frontiers in Psychology, 2670*. https://doi.org/10.3389/fpsyg.2019.02670

Johnson, B. M., Miltenberger, R. G., Egemo-Helm, K., Jostad, C. M., Flessner, C., & Gatheridge, B. (2005). Evaluation of behavioral skills training for teaching abduction-prevention skills to young children. *Journal of Applied Behavior Analysis, 38*(1), 67–78. https://doi.org/10.1901/jaba.2005.26-04

Ledford, J. R., & Wolery, M. (2011). Teaching imitation to young children with disabilities: A review of the literature. *Topics in Early Childhood Special Education, 30*(4), 245–255. https://doi.org/10.1177/0271121410363831

Park, J., Bouck, E., & Duenas, A. (2019). The effect of video modeling and video prompting interventions on individuals with intellectual disability: A systematic literature review. *Journal of Special Education Technology, 34*(1), 3–16. https://doi.org/10.1177/0162643418780464

Sleiman, A. A., Sigurjonsdottir, S., Elnes, A., Gage, N. A., & Gravina, N. E. (2020). A quantitative review of performance feedback in organizational settings (1998–2018). *Journal of Organizational Behavior Management, 40*(3–4), 303–332. https://doi.org/10.1080/01608061.2020.1823300

Stocco, C. S., Thompson, R. H., Hart, J. M., & Soriano, H. L. (2017). Improving the interview skills of college students using behavioral skills training. *Journal of Applied Behavior Analysis, 50*(3), 495–510. https://doi.org/10.1002/jaba.385

Tai, S. S., & Miltenberger, R. G. (2017). Evaluating behavioral skills training to teach safe tackling skills to youth football players. *Journal of Applied Behavior Analysis, 50*(4), 849–855. https://doi.org/10.1002/jaba.412

Young, J. M., Krantz, P. J., McClannahan, L. E., & Poulson, C. L. (1994). Generalized imitation and response-class formation in children with autism. *Journal of Applied Behavior Analysis, 27*(4), 685–697. https://doi.org/10.1901/jaba.1994.27-685

Chapter 18
Shaping

Topics Covered Within This Chapter

Topics
Defining Features of Shaping
Steps for Shaping
Conditioned Reinforcement with Shaping

One of the most powerful tools that we have in our arsenal as behavior analysts is differential reinforcement. Behavior analysts consistently influence the behavior of our clients by providing reinforcement for one response and not another or differentiating between two responses by manipulating a dimension of reinforcement (e.g., quality). In this excerpt from an article entitled *Reinforcement Today,* Skinner highlights the importance and power of implementing shaping to establish new behavior.

> One day we decided to teach a pigeon to bowl. The pigeon was to send a wooden ball down a miniature alley toward a set of toy pins by swiping the ball with a sharp sideward movement of the beak. To condition the response, we put the ball on the floor of an experimental box and prepared to operate the food-magazine as soon as the first swipe occurred. But nothing happened. Though we had all the time in the world, we grew tired of waiting. We decided to reinforce any response which had the slightest resemblance to a swipe—perhaps, at first, merely looking at the ball—and then to select responses which more closely approximated the final form. The result amazed us. In a few minutes, the ball was caroming off the walls of the box as if the pigeon has been a champion squash player. (Skinner, 1958, pg. 94)

This excitement voiced by Skinner should be shared by all behavior analysts because we can positively influence the behavior of ourselves and others. Within this chapter we will cover the defining features of shaping, the steps required for implementing shaping, and using conditioned reinforcement with shaping.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_18].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_18

Defining Features of Shaping

Ensure your supervisees fully understand the definition of shaping, which is differential reinforcement of successive approximations of a target behavior. That is, gradually reinforcing responses that more closely match the target terminal response. Differential reinforcement in the context of shaping requires reinforcement for closer approximations to the terminal behavior as well as extinction for earlier approximations that have been mastered. As an important side note, differential reinforcement does not always include extinction, as it may be the case that the target approximation is followed by a higher quality or higher magnitude reinforcer compared to the earlier approximations (see Chap. 12 for a more in-depth discussion about differential reinforcement). We highlight the use of extinction within shaping because the variability in responding induced by extinction often facilitates the client's engagement in responding that aligns with successive approximations (Neuringer et al., 2001). If earlier approximations continue to contact reinforcement, the learner is less likely to progress to the terminal behavior.

It is also important for supervisees to recognize that shaping can be used to modify multiple dimensions of behavior (Cooper et al., 2020). That is, shaping is not only used to change the topography of the behavior. Rather it can also be used to alter the duration, rate, and other measurable dimensions of behavior. For example, if your supervisee is working with a client learning to request one-syllable items, shaping might be used to change the topography of the response from "bbb" to "ball"; if, however, your supervisee is working on increasing how long the client will sit at the dinner table, shaping would be used to change the duration of the behavior, and the response would maintain the same topography throughout the shaping process.

Steps for Shaping

You will want to ensure that your supervisees can effectively implement shaping using the following steps (see Cooper et al., 2020 for an in-depth discussion of steps). First, your supervisee will need to select a terminal behavior. This includes identifying the specific response in which the client must engage, isolating the dimension which is being altered, and specifying the point at which the behavior will be considered mastered. Your supervisees will need to develop an operational definition of the terminal behavior to ensure all clinicians on the intervention team are reinforcing the same behavior. Next, your supervisee will need to assess the client's current performance with the response. This step must be completed before moving to the next step which is determining the different approximations that will be reinforced. Stress to your supervisees the importance of developing reasonable approximations while also understanding that these may change once shaping is initiated. Returning to the example of sitting at the dinner table, before initiating the

shaping procedure your supervisee might specify that target approximations will be 15 seconds, 30 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, and finally 10 minutes. However, if after transitioning from 15 seconds to 30 seconds challenging behavior is observed, your supervisee should be flexible and consider altering the approximation to a shorter time increase. Following the development of target approximations, your supervisee must develop criteria for progressing from one approximation to the next. The criteria must be stringent enough to ensure the client is successful without inadvertently over strengthening the response. Your supervisee must also identify a potent reinforcer which will be provided contingent upon correct responding. Once the shaping procedure is introduced, your supervisees must ensure all individuals working with the client are on the same page regarding the differential reinforcement procedures. That is, there should be consistency with the reinforcement of a specific approximation and extinction for mastered approximations. The supervisee will use the data to make decisions regarding progressing from one approximation to the next and any modifications to approximations that must be introduced.

Conditioned Reinforcement with Shaping

As stated within the steps for implementing shaping, identification of a potent reinforcer is necessary before shaping can begin. There are instances in which the contingent application of reinforcement can be disruptive during the shaping process. For example, if your supervisee is shaping up the behavior of independently walking down a hallway, presentation of a tablet after every two steps would impede further engagement in the behavior of walking. In these instances, providing a less disruptive conditioned reinforcer may be ideal. In order to achieve this scenario, the supervisee would repeatedly pair a neutral stimulus such as a click with a potent reinforcer. Eventually, the brief click will function as a conditioned reinforcer and will maintain responding without continuous presentation of a more disruptive reinforcer. This procedure is typically referred to as clicker training; however, when implemented with humans, referring to the procedure as Teaching with Acoustical Guidance or TAG teach may be preferable (Quinn et al., 2015). Returning the example of shaping the behavior of walking down the hallway: (a) the supervisee would first sufficiently pair the click with a reinforcer, (b) then after the client takes two steps the supervisee would click, (c) after another steps the supervisee would click again, (d) and every so often the click will be paired with the back-up reinforcer. It is imperative to pair the stimuli every now and then to maintain the effectiveness of the click as a conditioned reinforcer. The same steps of shaping apply here as the only difference is the contingent reinforcer.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–40:00	Shaping Peer's Behavior
40:00–55:00	Develop Shaping Plan
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Shaping Planning Guide*, 1 copy per supervisee
- Appendix B: *Shaping Planning Guide Example*, 1 copy per supervisee
- Appendix C: *Shaping a Peer's Behavior*, print copy and cut out cards
- Appendix D: *Designing a Shaping Protocol*, 1 copy per supervisee
- Appendix E: *Shaping Procedural Fidelity Checklist*, distributed electronically to be used for homework
- Appendix F: *Shaping Data Sheet Template*, distributed electronically to be used for homework
- Means to Record Role Play (e.g., tablet, smartphone)

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Athens et al. (2007)
- Fonger and Malott (2019)
- Hodges et al. (2017)

Review Major Concepts

Begin your group supervision by reviewing the major concepts associated with shaping. Because some of the concepts, such as differential reinforcement, have been previously covered, this review can be fairly quick to allow for more time for activities. Begin the discussion by asking supervisees to define the term differential reinforcement. Be sure that your supervisee's definition is not limited to *reinforcing*

one response, but not another response. While this is in fact an example of differential reinforcement, differential reinforcement can take on other forms. A more comprehensive definition of this term encompasses the fact that differential reinforcement can be applied to a single response, differentiating reinforcement based on a dimension of the behavior. For example, differentiation reinforcement based on the duration or rate of the response. Moreover, the definition should also encompass the fact that differential reinforcement is not limited to one response contacting reinforcement and the other contacting extinction. In fact, differential reinforcement may also involve reinforcing both behaviors, but providing a higher quality or magnitude of reinforcer for one response relative to the other. It is important to point out to your supervisees that within the context of shaping, there may be a benefit of implementing extinction within a differential reinforcement procedure. Extinction-induced variability may actually result in the client displaying coincidentally emitting a response that is a closer approximation of the terminal behavior. Next ask supervisees to describe examples of their use of differential reinforcement with a client. Ensure their descriptions match the concept of differential reinforcement and correct any misconceptions about differential reinforcement that may become apparent as they describe their use of it.

Shaping Definition

After reviewing differential reinforcement, define the term *shaping* for your supervisees: differential reinforcement of successive approximations of a target behavior. Ask them to break down the definition by calling on someone to define the terms *successive approximations* and *target behavior*, in the context of this definition. To ensure that supervisees have a good grasp of the concept of shaping, ask them to break into groups of two to three supervisees. Instruct them to pretend that a caregiver asked them to explain shaping and they have to provide a simple, lay explanation that they can share to this caregiver in 1 minute or less. They should only need a few minutes to perfect their response the hypothetical caregiver question. When they have done so, ask each group take a turn sharing their response. As they describe shaping to the hypothetical caregiver, listen for any evidence of understanding or misunderstanding of the concept of shaping. Specifically praise definitions that (a) accurately encompass the concept of shaping and (b) are in lay terms that a caregiver could easily understand. Follow-up with questions or correction if their definition suggests they may not fully grasp the concept of shaping. Close the discussion of the concept of shaping by identifying the various dimensions by which a behavior could be shaped: topography, rate, duration, latency, interresponse time (IRT), and magnitude. Provide an example of each. Here are some examples, but feel free to create your own that best fit the clientele and settings in which your supervisees practice.

- Topography: A child who cannot yet draw shapes such as a circle may first be reinforced for gripping a crayon, then making any mark on the page, then making a line at least 1 inch long, then drawing an arc, and finally drawing a circle.
- Rate: A young adult who is completing vocational training at a restaurant may be reinforced for rolling silverware at a rate of one set of silverware rolled every 2 minutes, but then one set per 1 minute, and then two sets per minute, and finally three sets per minute.
- Duration: An adolescent who is learning to work on homework for extended periods of time may first be reinforced for sitting at his desk and actively engaged in homework for 3 minutes, then 6 minutes, then 9 minutes, then 12 minutes, and finally for 15 minutes.
- Latency: A young adult applying for new jobs may first be reinforced for answering job interview questions in a role-play scenario with a 5-minute delay between question and answer, then decrease to a 3-minute delay, then a 1-minute delay, and finally a 30-second delay.
- IRT: An elementary student who is capable of completing his homework assignment, but finds the assignment to be aversive may first be reinforced for completing a 10-problem mat worksheet with a 2-minute IRT between problems, then decreased to a 1-minute IRT, then a 30-second IRT, and finally a 15-second IRT.
- Magnitude: A young child who talks at a volume much higher than his peers may first be reinforced for keeping his voice below 75 dB, then 70 dB, and finally 65 dB.

Involve your supervisees in identifying examples of behaviors to be shaped on topography, rate, duration, latency, IRT, and magnitude. Break them into the same small groups of two to three supervisees. Ask them to identify one to two client behaviors per dimension (topography, rate, duration, latency, IRT, and magnitude) for which they may use shaping. Give supervisees about 4 minutes to discuss examples in their small group, then return to the full group format. Ask groups to volunteer examples.

Steps to Shaping

Transition your conversation from types of shaping, to the process of shaping. Review the following steps to shaping with your supervisees:

1. Select and operationally define the terminal behavior.
2. Assess the client's response repertoire.
3. Select the initial behavior to reinforce
4. Project potential successive approximations that may be emitted and reinforced.
5. Select a reinforcer.
6. Reward successive approximations
   (a) Proceed gradually.
   (b) Limit number of reinforced approximations
7. Continue reinforcing the target behavior. Plan to thin the schedule of reinforcement.

As you review these steps, highlight the following recommendations for each step. The first step is to not only select the terminal behavior, but also operationally define it. The operational definition not only allows your supervisees to know it when they see it, but also helps them think through the various dimensions of the response that may need to be shaped to reach the terminal behavior. For example, if the operational definition includes a description of the duration, this will indicate to the supervisee that duration may need to be shaped. When summarizing step two, point out that the assessment informs the next two steps. That is, an assessment allows the clinician to observe the behaviors in the client's current repertoire in order to identify the initial response to reinforce (Step 3). The assessment also provides the clinician with information about the gap between the current repertoire and the terminal behavior, which can guide the clinicians in projecting the successive approximations that may occur throughout the shaping process. It is important to point out here that it is simply impossible to predict with accuracy the exact approximations needed to reach the terminal goal. In fact, the projected approximations will be a fluid list, changing throughout the shaping process as the clinician observes the behavior transforming. For Step 5, remind supervisees of effective methods for selecting potential reinforcers and evaluating reinforcer efficacy (see Chaps. 8 and 12 for more information). Finally, shaping begins with Step 6. Remind supervisees that shaping can be a slow process because it is dictated by the learners' behavior. Gradual shaping ensures that each successive approximation is observed and reinforced. On the other hand, it is important to note that the gradual process should not be interpreted as direction to remain at a specific approximation for too many trials. In fact, continuing to reinforce too many occurrences of an approximation may hinder the client's progress in emitting the next successive approximation. Finally, Step 7 refers to the final step in shaping in which the clinician continues to reinforce the terminal behavior once it is achieves; however, it is likely that the schedule of reinforcement will eventually be thinned to one that can be maintained in the client's typical environments.

Planning for Shaping

Share with your supervisees the *Shaping Planning Guide* found in Appendix A either by distributing hard copies or presenting via PowerPoint or a similar-style presentation. Carefully describe each component of the planning guide and how to use this guide in practice. Next share the *Shaping Planning Guide—Example* (Appendix B) so they can see the document in action. Explain that they will use a similar guide in planning shaping in upcoming supervision activities and encourage them to ask questions about the document at this time.

Additional Shaping Components

In practice, your supervisees will likely combine shaping with additional behavior analytic techniques. It is important to note here that it is critical that your supervisees can distinguish between the individual treatment components combined for a single intervention. Specifically, they should be able to isolate the components that represent the concept of shaping and those that do not. That being said, it is worthwhile to briefly discuss additional components that are frequently combined with shaping to enhance the success they have in implementing shaping in practice.

The most common technique combined with shaping is prompts and prompt fading. Share the following examples of shaping with your supervisees and ask them to identify two to three prompts that may facilitate the client in demonstrating some of the projected successive approximations to the terminal behavior.

- Example One: Evelyn is learning to brush her teeth independently. The initial assessment indicates that she can physically maneuver the brush around her mouth to effectively brush her teeth, it also indicated that she brushes her teeth for only 20 seconds. The terminal behavior goal is to brush her teeth for 120 seconds. The projected approximations are to increase teeth brushing by increments of 10 seconds.
- Example Two: Porter is learning to answer the phone using the restaurant's official scripted response, "Hello, Dottie's Diner. This is Porter. How may I help you? Currently, Porter answers the phone by saying "Hello" at a barely audible volume. The projected approximations include increasing the volume to about 65 dB by 5 dB increments and increasing the script one word at a time.
- Example Three: Greyson is learning to complete tasks independently in the classroom. When Greyson's teacher, Ms. Delaney, tells the students to get their lunchboxes and line up for lunch, Greyson takes about 3 minutes to do so. The terminal goal is for Greyson to get his lunchbox and line up within 45 seconds to do so. The projected approximations are to decrease the latency in increments of 15 seconds.

Shaping a Peer's Behavior

During the next 20 minutes of group supervision, lead your supervisees in an activity that will not only will bolster their understanding and correct application of shaping, but will surely lead to a few laughs. Before beginning this activity, you will need to cut out the terminal behavior card options found in *Shaping a Peer's Behavior* (Appendix C). You may also provide another means for presenting those terminal behavior options so that supervisees can randomly select one (e.g., an online wheel of choices or lottery system). Do not show supervisees the terminal behavior options until instructed to so; see below.

Divide your supervisees into groups of two to four supervises. Assign one supervisee in each group to role-play as the client and the remaining one to three supervisees to be members of the *shaping team*. Explain to the supervisees that each team will be responsible for shaping their client's behavior. The client will be unaware of the terminal behavior. During this role play, the learner will be reinforced by exactly three quick claps (i.e., conditioned reinforcer). Explain that when delivering the reinforcer, the magnitude and rate of the claps should be held constant as changes in those dimensions will not affect the efficacy of the claps as a reinforcer. Explain that the purpose of this activity is to improve their ability to shape a behavior; therefore, no prompts will be allowed. This includes verbal instruction and modeling of desired responses. Allow your supervisees to ask questions and then instruct those supervisees role playing as the client to leave the room, ensuring that they are far enough removed from the shaping team so that they cannot overhear their planning conversation.

Distribute a blank, hard copy of the *Shaping Planning Guide* (Appendix A). Provide the shaping team with about 5 minutes to plan how they will shape the behavior. Remind supervisees that successive approximations are only project and that they may need more or less approximations than the form provides. When they have established a plan, randomly call the first supervisee role playing as the client to come back to the room.

When the supervisee role playing as the client returns, remind all supervisees that there will be no instructions or prompting during the activity. Also, remind them that only three quick claps serve as reinforcement and all other responses should be placed on extinction (i.e., not contact the reinforcement of three quick claps). Further, inform your supervisees that this is not a game of Hot and Cold. Claps should not increase in magnitude, rate or frequency as the client's behavior gets "warmer" nor should claps decrease in magnitude, rate or frequency as the client's behavior gets "colder." Rather, three quick claps should be delivered contingent upon any response that is should contact reinforcement according to the plan. Now, let the fun begin!

It is important to note here that you will likely need to monitor their performance to ensure they are following your instructions because, in our experience, supervisees get so invested in this game that their excited leads them to forget the purpose of the activity is to practice shaping in isolation. Of course, this is never malintent, simply getting carried away. But if the activity is to have value, they will need to be reminded and redirected to only use shaping throughout the activity. That being said, we have also experienced supervisees getting stuck in a rut mid-shaping. If given unlimited time, the shaping process would eventually result in the terminal behavior, you may need to occasionally deliver a prompt to the supervisee role playing as the client to keep the activity within a reasonable time frame. After the first client emits the terminal response, praise supervisees for accurate implementation of shaping and correct any errors observed. Next, allow other groups to have their turn.

Developing a Shaping Plan

During the next 15 minutes of group supervision, lead your supervisees in a shaping plan for a client with which they are currently working. Distribute the *Designing Shaping Protocol* (Appendix D), either a hard copy or electronic copy for use to develop this plan. In the case that your supervisee is not working with a client who does not have a current goal well matched to shaping, you can pair that supervisee with a client who does have a current goal well suited to be addressed with shaping. However, there are many drawbacks of completing this activity for another supervisee's client, so reserve this option only for when necessary. During the 15-minute activity, approach each supervisee to offer assistance, answer questions, and correct any errors you observe. End this activity by distributing *Shaping Procedural Fidelity Checklist Template* (Appendix E), which will be needed for the homework assignment.

Knowledge Check

1. True or False: Differential reinforcement means that one response is reinforced while the other is placed on extinction.
2. Name the six dimensions of behavior that can be shaped.
3. What is at least one intervention commonly combined with shaping?
4. What is the purpose of assessing your client's behavior prior to planning and implementing shaping?
5. Explain why you should limit the number of response approximations that are reinforced for each successive approximation?

Homework for Individual Supervision without a Client

1. Review and practice the shaping protocol they developed at the end of the group supervision meeting.
2. Develop a procedural fidelity checklist that corresponds to the shaping protocol they developed at the end of the group supervision meeting. See Appendix E.
3. Develop a data sheet (see Appendix F for a template) that corresponds to the shaping protocol they completed at the end of the group supervision meeting.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–8:00	Review Homework
8:00–30:00	Role-Play Shaping with Feedback

Materials Needed

- Supervisee-developed shaping protocol
- Supervisee-developed shaping procedural fidelity checklist
- Supervisee- developed Shaping Data Sheet, two copies
- Technology to record role play (e.g., tablet, smartphone)

Homework Review

Begin your session by reviewing your supervisee's homework. Ask to see their shaping protocol developed in the group supervisions as well as their procedural fidelity checklist and shaping data sheet they developed as homework. Review these documents paying special attention to the following:

- Consistency between the protocol and procedural fidelity checklist.
- Thorough and clear operational definition of the terminal behavior.
- Thorough and clear operational definition of the initial behavior.
- Successive approximations represent changes in the appropriate dimensions that must be shaped between the terminal and initial behaviors.
- A sufficient number of successive approximations are represented so that shaping is neither too gradual nor too speedy that client success may be hindered.
- Reinforcement for target approximations is sufficient for strengthen the response.
- If the supervisee selected to differentially reinforce previously mastered approximations, rather than implement extinction, ask for a justification and confirm this procedural modification is recommended.
- The number of trials of each approximation to be reinforced is so high that it may impede moving from one approximation to the next.

Role-Play Shaping with Feedback

During this role play, you will play the role of their client and your supervisee will use their protocol to shape the target behavior. Record a video of a 5- to 6-minute role play. Begin your role play by demonstrating the initial response, but it is not necessary that your role play involves your reaching the terminal behavior because doing so would present an unlikely scenario rather than a real-life experience. During the role play, be sure to do the following so that your supervisee gets a well-rounded experience that represents the many behaviors that clients may emit during shaping.

- Advance through at least three successive approximations, according to the trials per approximation to be reinforced. This is to evaluate if your supervisee detects and reinforces all successive approximations.
- Emit a logical successive approximation that is not projected or anticipated according to the protocol. This is to evaluate if your supervisee detects and reinforces all successive approximations and maintains a fluid approach to projecting approximations.
- Emit a prior approximation that should contact extinction. This is to evaluate if your supervisee is implementing the reinforcement contingency according to plan.
- Repeatedly fail to advance to a projected approximation. This is to determine if your supervisee will use the protocol in a flexible manner, specifically if they will resume reinforcement of a previously-demonstrated when progress is stagnant.

After the 5- to 6-minute role play, you can your supervisee will observe the video together twice. During the first observation, collect data on the client's behavior. Do so as independently as possible, despite likely being in close proximity while observing from the same screen. At the end of the video, calculate IOA (see Chap. 5). In order to further support your supervisee's data analysis skills, have your supervisee calculate IOA independently. Discuss any disagreements in your data collection. If necessary, review the video to reach a consensus on any disagreements.

After you arrive upon a consensus regarding data measuring the dependent video, watch the video again. During the second observation, ask your supervisee to collect data on their own fidelity of implementation using the procedural fidelity checklist. As you observe this process, continue to praise accurate implementation and correct observed errors. If your supervisee does not recognize an error, identify this immediately. You may need to watch portions of the video again in efforts to ensure your supervisee can accurately identify implementation errors. Upon observing an error, pause the video and discuss what your supervisee should have done differently in that moment. Offer your supervisee the opportunity to role-play just that segment again so they can experience success with this particular step in shaping. Overall, this should be a positive experience for your supervisee, so be sure to sufficiently praise correct implementation, attempting to deliver more specific praise than error correction statements.

Homework for Individual Supervision with a Client

1. If needed, revise the shaping protocol, data sheet, and procedural fidelity checklist.
2. Provide the supervisor with an up-to-date shaping protocol, data sheet, and procedural fidelity checklist to be used at the next meeting. Be sure to specify to your supervisee if you prefer a hard copy or electronic copy.
3. Develop a template to graph the results of shaping session. Be sure to approve the graphing software to be used (e.g., Microsoft Excel).
4. Observe a BCBA implementing shaping (optional).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Review Homework
5:00–25:00	Conduct Shaping with a Client
25:00–45:00	Performance Feedback

Materials Needed

- Shaping Protocol
- Shaping Procedural Fidelity Checklist
- Shaping Data Sheet
- Supervision Observation Form

Homework Review

Begin your session by having your supervisee review each of the documents: (a) shaping protocol, (b) shaping procedural fidelity checklist, and (c) shaping data sheet. Ask your supervisee to direct your attention to any changes that were made to the document since your last meeting. You may need to conduct this document review prior to the client's arrival for the session so that you can dedicate your attention to this task.

Conduct Shaping with a Client

Observe your supervisee implementing shaping with a client. During this observation, collect data on the data sheet they provide, and complete the procedural fidelity checklist they provided. It is likely that during your observation your supervisee will spend time addressing other targets and goals, rather than devoting the full 20 minutes to a shaping goal. This is perfectly acceptable. You may use the Supervision Observation Form to provide general feedback that is pertinent to both the portion of the observation in which your supervisee is delivering shaping as well as to the portion of the observation in which your supervisee is addressing other targets and goals. Before ending your observation, ask your supervisee to provide you with access to a copy of their data sheet so that you can quickly calculate IOA.

Performance Feedback

Deliver feedback on (a) IOA, (b) fidelity of shaping implementation, and (c) general observations captured on the Session Observation Form. When delivering feedback, attempt to deliver at least twice as many specific praise statements as corrections. However, be direct about errors committed and provide suggestions for correcting those errors in future implementation. End your feedback session with the opportunity for your supervisee to role-play or ask questions if desired. This session feedback may need to take place after the client is no longer present in order for you and your supervisee to dedicate the attention needed to this feedback session. This is perfectly acceptable, but we encourage you to schedule the feedback session as soon as possible after the observation.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following when implementing shaping: (a) accurately collect data with at least 80% agreement and (b) implement shaping with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Observe your supervisee implement shaping with another client.
- ☐ Observe your supervisee implement shaping for a different terminal behavior with the same client.
- ☐ Have your supervisee identify one journal articles in which shaping was implemented. Ask them to summarize the results of that study in a 5-minute presentation in an upcoming group supervision meeting.

Appendix A: Shaping Planning Guide

Client: _____ Reinforcer(s): _____

Terminal Response Goal (operational definition): _____

_____

Initial Response to Reinforce (operational definition): _____

_____

Trails per Response Approximation: _____

Planning Instructions: Within each column, list response approximation to reinforce in top, yellow-highlighted cell. List the response approximations on extinction (or receiving lower quality reinforcement) below in gray boxes.

Shaping Instructions: Begin in the far left column (Step One). Reinforce the response in the top, yellow-highlighted cell on an FR1 schedule of reinforcement. See the *Trials Per Response Approximation* to determine the number of response occurrences to reinforce. When that reinforcement contingency has been met, move to the next column. Continue reinforcing the response in the top, yellow-highlighted cell on an FR1 using the *Trials Per Response Approximation* guidance. Place all prior approximations listed in the bottom, gray cells on extinction, unless a plan to deliver lower quality reinforcement has been established. Continue until you reach the final column (Step Seven). Note that successive approximations are projected and may need to be changed as the client's behavior changes. Similarly, columns may need to be added or removed to meet the client's needs. Moreover, while the goal is to move from left to right across the columns, at times it may be necessary to decrease expectations by moving from right to left.

Step One	Step Two	Step Three	Step Four	Step Five	Step Five	Step Six	Step Seven
							[terminal goal]
						[approximation 6]	[approximation 6]
					[approximation 5]	[approximation 5]	[approximation 5]
				[approximation 4]	[approximation 4]	[approximation 4]	[approximation 4]
			[approximation 3]	[approximation 3]	[approximation 3]	[approximation 3]	[approximation 3]
		[approximation 2]	[approximation 2]	[approximation 2]	[approximation 2]	[approximation 2]	[approximation 2]
	[approximation 1]	[approximation 1]	[approximation 1]	[approximation 1]	[approximation 1]	[approximation 1]	[approximation 1]
[initial response]	[initial response]	[initial response]	[initial response]	[initial response]	[initial response]	[initial response]	[initial response]

Appendix B: Shaping Planning Guide Example

Client: Dylan Reinforcer(s): Token to be used in token economy

Terminal Response Goal (operational definition): Wash hands: After applying soap to hands, rub hands together, so that soap visibly covers both palm, back of hand, and fingers. Continue rubbing hands for 60 seconds, then rinse hands by placing hands under running water until soap is no longer visible on hands.

Initial Response to Reinforce (operational definition): Dylan can apply soap to hands and can rub hands together, but only rubs hands for about 10 seconds and only covers palms with soap. He will rinse hands thoroughly, but too early in the process (i.e., after only rubbing palms together for about 10 seconds.

Trails per Response Approximation: 3

Planning Instructions: Within each column, list response approximation to reinforce in top, yellow-highlighted cell. List the response approximations on extinction (or receiving lower quality reinforcement) below in gray boxes.

Shaping Instructions: Begin in the far left column (Step One). Reinforce the response in the top, yellow-highlighted cell on an FR1 schedule of reinforcement. See the *Trials Per Response Approximation* to determine the number of response occurrences to reinforce. When that reinforcement contingency has been met, move to the next column. Continue reinforcing the response in the top, yellow-highlighted cell on an FR1 using the *Trials Per Response Approximation* guidance. Place all prior approximations listed in the bottom, gray cells on extinction, unless a plan to deliver lower quality reinforcement has been established. Continue until you reach the final column (Step Seven). Note that successive approximations are projected and may need to be changed as the client's behavior changes. Similarly, columns may need to be added or removed to meet the client's needs. Moreover, while the goal is to move from left to right across the columns, at times it may be necessary to decrease expectations by moving from right to left.

Step One	Step Two	Step Three	Step Four	Step Five	Step Five	Step Six	Step Seven
							Rub soap for 60 s, covering palms, back of hands, and fingers.
						Rub soap for 60 s, covering palms and fingers.	Rub soap for 60 s, covering palms and fingers.
					Rub soap for50 s, covering palms and fingers.	Rub soap for 50 s, covering palms and fingers.	Rub soap for 50 s, covering palms and fingers.
				Rub soap for 40 s, covering palms and fingers.	Rub soap for 40 s, covering palms and fingers.	Rub soap for 40 s, coveringpalms and fingers.	Rub soap for 40 s, covering palms and fingers.
			Rub soap for 40 s, covering only palms.	Rub soap for 40 s, covering only palms.	Rub soap for 40 s, covering only palms.	Rub soap for 40 s, covering only palms.	Rub soap for 40 s,covering only palms.
		Rub soap for 30 s, covering only palms.	Rub soap for 30 s, covering only palms.	Rub soap for 30 s, covering only palms.	Rub soap for 30 s, covering only palms.	Rub soap for 30 s, covering only palms.	Rub soap for 30 s, covering only palms.
	Rub soap for 20 s, covering only palms.	Rub soap for 20 s, covering only palms.	Rub soap for 20 s, covering only palms.	Rub soap for 20 s, covering only palms.	Rub soap for 20 s, covering only palms.	Rub soap for 20 s, covering only palms.	Rubsoap for 20 s, covering only palms.
Rub soap for 10 s, covering only palms.	Rub soap for 10 s, covering only palms.	Rub soap for 10 s, covering only palms.	Rub soap for 10 s, covering only palms.	Rub soap for 10 s, covering only palms.	Rub soap for 10 s,covering only palms.	Rub soap for 10 s, covering only palms.	Rub soap for 10 s, covering only palms.

Appendix C: Shaping a Peer's Behavior

Terminal Behavior Option Cards

Shaping a Peer's Behavior
Terminal Behavior Option One:

The client will remove his/her/their shoe from his/her/their foot and place it on his/her/their head, leaving the shoe on the head for at 5 seconds.

Shaping a Peer's Behavior
Terminal Behavior Option Two:

The client will lay on his/her/their back, lifting the right arm and left leg straight up into the air, oriented to the ceiling and outstretching the left arm and right leg onto the ground.

Shaping a Peers Behavior
Terminal Behavior Option Three:

The client will touch one wall with a hand, run to the wall on the opposite side of the room, then touch that wall with a hand.

Shaping a Peers Behavior
Terminal Behavior Option Four:

The client will take 10 steps backwards, then spin his/her/their body in a complete circle once.

Shaping a Peers Behavior
Terminal Behavior Option Five:

The client will perform a selected dance move for 10 seconds. Your team can select the dance move and operational definition. Suggested dance move: The Twist, Moonwalk, The Robot, The Carlton, The Floss.

Appendix D: Designing Shaping Protocol

Client: _____

Terminal Response Goal (operational definition): _____

_____

Initial Response to Reinforce (operational definition): _____

_____

Anticipated Successive Approximations:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Reinforcement for Targeted Approximations: _____

Contingency in Place for Previously Mastered Approximations (circle one):

Extinction

Lower Quality Reinforcer (please specify): _____

Trails per Approximation to be Reinforced: _____

Appendix E: Shaping Procedural Fidelity Checklist

	Step	Implemented Correctly? + = Yes – = No
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix F: Shaping Data Sheet Template

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Goal: _____

Instructions: For each trial, describe the level of approximation and circle if the client performed the behavior correctly and independently or not. Use the final column for additional anecdotal notes, as needed. Calculate percent correct on bottom row.

Trial	Approximation	Performed Correctly?	Notes
1	[insert approximation]	Yes No	
2	[insert approximation]	Yes No	
3	[insert approximation]	Yes No	
4	[insert approximation]	Yes No	
5	[insert approximation]	Yes No	
6	[insert approximation]	Yes No	
7	[insert approximation]	Yes No	
8	[insert approximation]	Yes No	
9	[insert approximation]	Yes No	
10	[insert approximation]	Yes No	
11	[insert approximation]	Yes No	
12	[insert approximation]	Yes No	
13	[insert approximation]	Yes No	
14	[insert approximation]	Yes No	
15	[insert approximation]	Yes No	
16	[insert approximation]	Yes No	
17	[insert approximation]	Yes No	
18	[insert approximation]	Yes No	
19	[insert approximation]	Yes No	
20	[insert approximation]	Yes No	
	Percent Correct:		

References

Athens, E. S., Vollmer, T. R., & Pipkin, C. C. S. P. (2007). Shaping academic task engagement with percentile schedules. *Journal of Applied Behavior Analysis, 40*(3), 475–488.

Fonger, A. M., & Malott, R. W. (2019). Using shaping to teach eye contact to children with autism spectrum disorder. *Behavior Analysis in Practice, 12*(1), 216–221.

Hodges, A., Davis, T., Crandall, M., Phipps, L., & Weston, R. (2017). Using shaping to increase foods consumed by children with autism. *Journal of Autism and Developmental Disorders, 47*(8), 2471–2479.

Neuringer, A., Kornell, N., & Olufs, M. (2001). Stability and variability in extinction. *Journal of Experimental Psychology: Animal Behavior Processes, 27*(1), 79–94. https://doi.org/10.1037/0097-7403.27.1.79

Skinner, B. F. (1958). Reinforcement today. *American Psychologist, 13*, 94–99.

Quinn, M. J., Miltenberger, R. G., & Fogel, V. A. (2015). Using TAGteach to improve the proficiency of dance movements. *Journal of Applied Behavior Analysis, 48*(1), 11–24. https://doi.org/10.1002/jaba.191

Chapter 19
Chaining

Topics Covered Within This Chapter

Topics
Behavior Chains
Task Analysis
Chaining Procedures

Behavior Chains

A behavior chain is a set of responses that are linked together such that the completion of all the responses results in the terminal reinforcer. Chain schedules include (a) two or more schedules of reinforcement, (b) that are signaled by discriminative stimuli, and (c) presented successively (i.e., one at a time) in a specific order. The important feature of a behavior chain is the way in which the stimulus change functions as both a conditioned reinforcer for the previous response and a discriminative stimulus for the next response. For example, a pigeon in an operant chamber pecks a key that is illuminated red five times (FR 5) and the key changes from red to blue. The change in key color to blue serves as a conditioned reinforcer for completing the FR 5 schedule *and* as a discriminative stimulus for the impending FR 2 schedule. The pigeon pecks the key two times and the key changes from blue to green. The change in key color serves as a conditioned reinforcer for completing the FR 2 schedule *and* as a discriminative stimulus for the impending FR 3 schedule. The pigeon pecks the key three times and food is delivered. All links in the chain must be completed prior to the delivery of the terminal reinforcer. In this example, the

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_19].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_19

response (i.e., key peck) remains consistent across the chain schedule. This is referred to as a homogeneous chain (Pierce & Cheney, 2017). In contrast, most applied examples of behavior chains include different responses, which is referred to as a heterogeneous chain. An example of a behavior chain appropriate for an applied setting could be making a sandwich. The terminal reinforcer of consuming the sandwich is not available until the end of the chain. The first step might be to pull out two pieces of bread. The bread on the plate serves as a conditioned reinforcer for pulling out the bread *and* as a discriminative stimulus to open the peanut butter jar. After opening the jar, the opened jar would serve as a conditioned reinforcer for opening the jar *and* as a discriminative stimulus to pick up the knife. After picking up the knife, the knife in hand would serve as a conditioned reinforcer for picking up the knife *and* as a discriminative stimulus to spread peanut butter on the bread. After spreading the peanut butter, the peanut butter on the bread would serve as a conditioned reinforcer for spreading the peanut butter *and* as a discriminative stimulus to put the other slice of bread on top of the piece with peanut butter. Placing the second piece of bread on top of the piece with peanut butter results in access to the terminal reinforcer of consuming the sandwich. In this example, the schedule of reinforcement for each link in the chain was an FR 1.

Task Analysis

A task analysis specifies each response in a behavior chain. Stress to your supervisees the importance of creating a task analysis with adequate precision to ensure that their client will successfully master the chain of responses. That is, for some clients, breaking responses into more steps may be necessary, whereas other clients may respond correctly when fewer steps are taught. For example, the step described above as pulling out two pieces of bread could be further specified to be multiple steps of (a) untwisting the tie, (b) reaching into the bag, (c) pulling out two pieces of bread, (d) twisting the bread bag, and (e) returning the twist tie onto the bag. The level of specificity should be directly tailored to the client's skill level. According to Cooper et al. (2020), there are four methods that can be employed to create a task analysis. These include (a) observing someone else complete the chain of responses, (b) completing the chain of responses yourself, (c) recruiting input from an expert, and (d) trial and error. Recommend that your supervisees employ trial and error in conjunction with one of the other strategies rather than as an isolated strategy.

Chaining Procedures

Once the task analysis has been developed, the steps for effectively implementing a chaining procedure include selecting an assessment strategy, selecting a method of chaining, and identifying teaching procedures.

Assessment

The two assessment probe procedures used to collect data on responding during a behavior chain include the single-opportunity method and the multiple-opportunity method (Alexander et al., 2015). These probes can be conducted before intervention to serve as a baseline measure, but also during intervention as a measure of progress. If these probes are used during intervention, this will result in two types of sessions being conducted during the intervention phase. Specifically, treatment sessions will include teaching procedures (e.g., prompting), but will not be included in the primary graph used for decision-making, whereas probe sessions will not include teaching procedures, but the data collected during these sessions will be included in the primary graph.

When using the single-opportunity method, the clinician would provide the learner with the opportunity (e.g., wait 3 seconds) to complete the first step in the chain. If the learner completed the step, the clinician would record this as correct and provide the learner with opportunity to complete the next step. If at any point during the assessment the learner responds incorrectly or does not respond at all, the clinician will record the step as incorrect and terminate the assessment. When using the multiple-opportunity method, the clinician would provide the learner with the opportunity to complete the first step in the chain. If the learner completed the step, the clinician would record this as correct and provide the learner with the opportunity to complete the next step. If the learner responds incorrectly or does not respond at all, the clinician will complete the step and provide the learner with the opportunity to complete the next step. This would continue until the entire chain is complete.

When selecting an assessment procedure, your supervisee should evaluate the pros and cons of both assessments to determine which would be more appropriate for the given situation. The single-opportunity method is time-efficient and limits the extent to which the learner's behavior is impacted by the assessment, but less information is gathered during the assessment. The multiple-opportunity method requires more time to conduct but provides more information and data for the clinician to use when making decisions.

Methods of Chaining

There are three primary procedures used for increasing engagement in behavior chains including forward chaining, backward chaining, and total task presentation (Cooper et al., 2020).

For forward chaining, the learner is first taught to engage in the first step of the chain while the clinician completes the rest of the steps in the chain. Once the learner meets mastery for the first step, they are taught to complete the second step while the clinician completes the rest of the steps in the chain. This continues until the learner can engage in the entire chain independently.

For backward chaining, the clinician completes all the steps in the chain until the last step, which the learner is taught to complete. Once the learner meets mastery for the last step, the clinician completes all the steps in the chain until the last two steps, which the learner must complete. This continues until the learner can engage in the entire chain independently.

For total task presentation, the learner is taught to engage in all steps of the chain. This procedure typically includes a time-delay prompt which allows the learner the opportunity to complete each step independently.

Using the example of bed making with a 3-second time-delay to physical guidance, we will describe the progression of teaching for each of the procedures. For forward chaining, the clinician would wait 3 seconds for the learner to pull up the sheets. If the learner pulled up the sheets, the clinician would pull up the blanket and place the pillows on the bed. If the learner did not pull up the sheets, the clinician would physically guide them to do so and then immediately pull up the blanket and place the pillows on the bed. Once the learner mastered pulling up the sheets, the clinician would wait for 3 seconds before physically guiding for both pulling up the sheets and pulling up the blanket. After the learner pulled up the blanket (independently or after being physically guided to do so), the clinician would place the pillows on the bed. Once the learner mastered pulling up the blanket, the clinician would wait for 3 seconds before physically guiding all three of the steps.

For backward chaining, the clinician would pull up the sheets and the blanket and then wait 3 seconds for the learner to place the pillows on the bed. If the learner did not place the pillows on the bed, the clinician would physically guide them to do so. Once the learner mastered placing the pillows on the bed, the clinician would pull up the sheets and wait 3 seconds for the learner to pull up the blanket and place the pillows on the bed. Once the learner mastered pulling up the blanket, the clinician would wait for 3 seconds before physically guiding all three of the steps.

For total task presentation, the clinician would wait 3 seconds before physically guiding the learner to complete each step. The clinician would not complete any of the steps for the learner.

Teaching Procedures

Your supervisees will need to specify teaching procedures including selecting a prompt hierarchy and determining an appropriate mastery criterion. The prompt hierarchy should specify the time-delay before prompts are provided (e.g., 3 seconds) and the types of prompts which will be provided. One important consideration is whether vocal prompts will be used. If the goal is for the learner to complete the entire chain in the absence of vocal instructions, it may be ideal to avoid vocal prompts as they can be difficult to fade. In addition, there may be situations in which visual prompts (e.g., pictures, written instructions) can be included within the chaining procedure. Visual prompts are ideal for behavior chains because they allow clients to successfully complete task analysis steps without adult prompting (e.g.,

vocal, physical). For example, if your supervisee is teaching their client to engage in the behavior chain of dressing, introducing a sequence of pictures may allow for the client to correctly engage in each dressing step without your supervisee prompting each response. Eventually the pictures can be faded to further promote independence. Other considerations related to prompts include the client's imitative repertoire before introducing model prompts and the client's sensitivity to physical touch before introducing physical guidance.

Prior to introducing chaining procedures, your supervisees should determine the mastery criterion for the entire chain of responses. For example, the client will complete 90% of the steps independently across three consecutive days. In addition to the overall mastery criterion, your supervisee should determine the mastery criterion for each step in the task analysis when using forward and backward chaining. An example of this mastery criterion could be that the client independently completes the step for three consecutive opportunities. For example, after three sessions in which the client pulled up the blankets without physical guidance, the clinician would initiate teaching placing the pillows on the bed. Discuss the importance of selecting an appropriate mastery criterion to ensure the client is successful moving through each of the chaining steps.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Develop a Task Analysis
30:00–40:00	Name that That Chaining Procedure
40:00–55:00	Collecting and Graphing Chaining Data
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Chaining Data Collection Practice*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Alexander et al. (2015)
- Slocum & Tiger (2011)
- Spooner & Spooner (1984)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with behavior chaining including the purpose and basic procedures. Discuss each of the following topics (a) behavior chains, (b) task analyses, (c) assessment methods, (d) chaining methods, and (e) teaching procedures. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

Behavior Chains

Review the definition of a behavior chain with your supervisees and provide several examples. Ask your supervisees to contribute additional examples and you can provide feedback as necessary.

1. Behavior chain: A sequence of responses that link together and result in a terminal reinforcer. Each response in the sequence produces a stimulus change that functions as a conditioned reinforcer for that response and a discriminative stimulus for the subsequent response (Cooper et al., 2020).

Highlight the two functions stimulus changes serve within a behavior chain (i.e., conditioned reinforcer and discriminative stimulus). Walk through one of the examples you provided specifically noting (a) the stimulus change, (b) the response it serves as a conditioned reinforcer for, and (c) the response for which it serves as a discriminative stimulus.

Task Analyses

Review the definition of a task analysis and the ways in which they can be developed.

1. Task analysis: the result of breaking a complex skill or series of behaviors into smaller, teachable steps (Cooper et al., 2020).

Ask your supervisees to provide examples (similar to the sandwich example above) of task analyses and provide feedback as needed. Then, transition to the discussion of the methods for developing a task analysis. Next, review the four methods used to develop a task analysis inlcuding (a) observing someone else complete the chain of responses, (b) completing the chain of responses yourself, (c) recruiting input from an expert, and (d) trial and error. Provide examples of the methods that you have used and ask your supervisees to provide additional examples.

In addition to creating the task analysis, review the data sheets provided in the PowerPoint. Add other examples of data sheets that may be more appropriate to the population with whom your supervisees work.

Assessment Methods

Next, introduce the two assessment procedures to your supervisees and discuss the strengths and weaknesses of each.

1. Single-opportunity method: learner is given the opportunity to respond to each step until they either make an error or fail to respond at which point the session is terminated
   (a) Strengths: time efficient, limits effects of testing
   (b) Weaknesses: may underestimate the learner's baseline level of responding
2. Multiple opportunity probe: learner is given the opportunity to respond to each step, if they make an error or fail to respond the clinician will complete the step and allow the learner to respond to the next step
   (a) Strengths: provides a more accurate depiction of responding
   (b) Weaknesses: more time consuming

Using the task analysis examples discussed earlier, have your supervisees describe how the two assessments would be implemented. Remind your supervisees that these assessments can be used for both baseline and intervention. If your supervisees plan to use these assessment procedures during intervention, they will need to conduct probe sessions and treatment sessions. Probe sessions will be graphed and will not include any teaching procedures (e.g., prompting). The treatment sessions will include teaching procedures, but the data will not be included in the primary graph.

Chaining Methods

Then, present the three chaining methods to your supervisees. Provide examples of behavior chains and describe how they would be established using the different teaching methods (similar to the bed making example provided above).

1. Forward: The learner is taught to engage in the first step in the chain, while the clinician completes the remaining steps. Once the first step is mastered, the learner is taught to engage in the second step and the clinician completes the remaining steps. This continues until all steps are mastered.
2. Backward: The learner is taught to complete the last step in the chain, while the clinician completes the other steps. Once the learner masters the last step, the

learner is taught to complete the last two steps, while the clinician completes the other steps. This continues until all steps are mastered.
3. Total task presentation: The learner is taught to engage in all steps at once.

Teaching Procedures

Finish this review by discussing the prompting hierarchy and mastery criterion. The prompting hierarchy should include the type of prompts that will be used and the time-delay between the initial instruction or completion of the prior step and the introduction of a prompt. Regarding determining prompting procedures, there several considerations you should highlight to your supervisees. First, your supervisees should select a time-delay that is most appropriate for their client. If their client requires a longer or shorter latency between being presented with an instruction and initiating engagement in the compliance response, this should be reflected in the selection of a time delay. Second, your supervisees should determine whether vocal prompts will be used. Despite the ease with which vocal prompts can be used, encourage your supervisees to avoid using them, when possible, as they can be difficult to fade. Third, your supervisees should decide whether visual supports should be included within their procedures. As with any prompting procedure, if visual prompts are unnecessary, they should not be included. However, if needed, visual supports can aid the client in completing the behavior chain without requiring additional adult prompting. Fourth, when considering model prompts, your supervisees should consider whether model prompts are appropriate based on their client's imitative repertoire. Finally, physical guidance should be reserved for situations where the client readily accepts physical prompts without displaying any signs of discomfort.

Transition to the discussion of mastery criteria. Your supervisees should determine when the behavior chain will be considered mastered. It is important for your supervisees to select a mastery criterion that will allow the client to be successful in the natural environment. That is, because the terminal reinforcer is only available once all steps in the chain are completed, the client should engage in the behavior at a level which will reliably result in the terminal reinforcer. If your supervisees are using forward or backward chaining, remind them that they will also need to specify criteria for mastery of individual steps. This criterion should be sufficiently stringent to promote success, but also flexible enough to allow for increasing the number of steps the client needs to complete.

Developing a Task Analysis Activity

For this activity, select a chain of responses that can be completed in the environment in which your meeting occurs. Engage in the behavior chain while your supervisees are observing. Ask your supervisees to write down all the responses in which

you engage. Following the observation, provide your supervisees the opportunity to independently create two task analyses, one with more detail and the other with fewer steps and less detail. After the task analyses have been created, ask your supervisees to share them with the group and you can provide feedback as needed.

Name the Chaining Procedure Activity

For this activity, read the vignettes provided here or develop your own. Present the vignettes to your supervisees and ask them to determine whether the clinician is using forward chaining, backward chaining, or total task presentation.

Example 1 (backward): Rylee is teaching Liam to load the dishwasher. She provides the instruction "do the dishes" and waits 5 seconds before modeling shutting the preloaded dishwasher. After Liam shuts the preloaded dishwasher, Rylee provides reinforcement. Once Liam can shut the preloaded dishwasher independently, she will teach him to push in the bottom loaded drawer.

Example 2 (forward): Aliyah is teaching her client to clean the mirror in the bathroom. Aliyah provides the instruction "clean the mirror" and waits 5 seconds before pointing to the spray. After her client sprays the mirror, Aliyah completes the remaining steps of the chain. Once her client independently sprays the mirror, Aliyah will teach her client to wipe the mirror with a towel.

Example 3 (total task presentation): Naoki is teaching her client to sort laundry. Naoki provides the instruction "sort the laundry" and waits 5 seconds before providing a model prompt for every step. In subsequent sessions, Naoki will continue to wait 5 seconds before providing a model prompt for every step until her client masters the chain.

Example 4 (forward): Ella is teaching Atticus to clean up his toys. Ella provides the instruction "clean up toys," waits 5 seconds, and then physically guides Atticus to put the first toy in the toy chest. Once Atticus independently puts away one toy, Ella will teach him to put away two toys.

Example 5 (total task presentation): Senita is teaching Javier to wash his hands. Senita provides the instruction "wash your hands" and waits 5 seconds before physically guiding Javier to complete each step. In subsequent sessions, Senita will continue to wait 5 seconds before providing physical guidance for every step until Javier masters the chain.

Example 6 (backward): Tonya is teaching her client to set the table. She provides the instruction "set the table" and waits 5 seconds before pointing to the fork. After her client puts the fork on the napkin, Tonya provides reinforcement. Once her cli-

ent can place the fork on the napkin independently, Tonya will teach him to put the knife on the other side of the plate.

Collecting and Graphing Chaining Data

For this activity, use the vignette provided in Appendix A or develop a scenario that better aligns with the population with whom your supervisees work. Ask your supervisees to create a data sheet which they will use to collect data using the response pattern provided below. Examine the created data sheet and ensure they have (a) all the steps from the task analysis, (b) the correct number of sessions, and (c) recorded the data accurately.

Use the following vignette for this activity:

Joseph is teaching his client Edgar to wash his car using chaining. He collected baseline data using the multiple-opportunity probe and decided to use total task presentation as the chaining method. Edgar has a strong imitative repertoire; therefore, Joseph has decided to use a 5-second time-delay to a model prompt. Joseph has decided that the mastery criterion will be 90% correct responding across three sessions.

Joseph has developed the following task analysis:

1. Spray the car with a hose
2. Wipe the entire car with a soapy towel
3. Rinse soap off the car with a hose
4. Dry the car with a towel

The transcript of six sessions is provided below:

Session 1—BL
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph picks up the hose and sprays the car. Another 5 seconds elapses and Joseph wipes the car with the soapy towel. Edgar does not pick up the hose, so Joseph rinses the car with hose. After another 5 seconds, Joseph dries the car.

Session 2—BL
Joseph gives the instruction "wash your car." After 5 seconds elapses, Joseph picks up the hose and sprays the car. Joseph waits 5 seconds and Edgar does not wipe the car with a soapy towel, so Joseph wipes the car. Another 5 seconds elapses and Edgar does not pick up the hose, so Joseph rinses the car with hose. After another 5 seconds, Joseph dries the car.

Session 3—BL
Joseph gives the instruction "wash your car." Edgar does not pick up the hose within 5 seconds, so Joseph sprays the car. Another 5 seconds elapses and Joseph wipes the car with the soapy towel. After 5 seconds, Joseph rinses the car. Joseph waits 5 seconds and Edgar does not dry the car, so Joseph dries the car.

Session 4—TX
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph models spraying the car and then Edgar sprays the car. Another 5 seconds elapses and Joseph models wiping the car with the soapy towel. Edgar still does not pick up the soapy towel. Joseph provides light physical guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car. After 5 seconds, Joseph models drying the car and Edgar dries the car.

Session 5—TX
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph models spraying the car and then Edgar sprays the car. Another 5 seconds elapses and Joseph models wiping the car with the soapy towel. Edgar still does not pick up the soapy towel. Joseph provides light physical guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car and then immediately dries the car.

Session 6—TX
Joseph gives the instruction "wash your car." Edgar picks up the hose and sprays the car. After 5 seconds elapses, Joseph models wiping the car with the soapy towel. Edgar still does not initiate the response. Joseph provides light physical guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car. Joseph waits 5 seconds and models drying the car. Edgar picks up the towel and dries the car.

Knowledge Check

1. What are the two functions of the stimulus change within a chain schedule?
2. Identify and describe the three methods of chaining.
3. Identify one method for developing a task analysis.
4. Describe single- and multiple-opportunity assessment procedures.

Homework for Individual Supervision without a Client

1. Graph the data collected during group supervision.
2. Develop a task analysis for a behavior chain to target with a client.

Individual Supervision Meeting Without a Client #1

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Graphing and Interpreting Data
10:00–30:00	Client-Directed Activities

Materials Needed

- Appendix B: *Mock Graph*
- Appendix C: *Graph Component Checklist*
- Appendix D: *Chaining Procedural Fidelity Checklist*
- Supervisee's graph
- Task analysis for client goal

Graphing and Interpreting Data

Prior to this meeting, your supervisee should have graphed the data collected during group supervision. These data can be graphed using an application such as Microsoft Excel or using paper and pencil. Examine your supervisee's graph and evaluate their accuracy of graphing using the corresponding graph we provide (Appendix B). Once you have determined that the graph is an accurate depiction of the data, review the quality of the graph using the *Graph Component Checklist* (see Appendix C). Provide specific feedback to your supervisee on how they can improve their future graphs.

Transition the discussion to analyzing and interpreting the data sheets and graph. Using data to make decisions is important for all behavioral interventions; however, there are multiple levels of analysis required when using chaining procedures. Thus, providing practice opportunities for these discussions is of extreme importance. Use this opportunity to consider multiple outcomes and strategies for addressing potential difficulties.

Client-Directed Activities

Review the task analysis your supervisee developed. Provide feedback on whether additional steps should be included or steps should be combined based on the client's skill level. As a team, determine which assessment probe and chaining method (e.g., forward chaining) will be most effective for the client. Discuss the prompting hierarchy and specify the type of prompts that will be used and the length of the time delay. Also, select an appropriate mastery criterion for the behavior chain and individual steps (only for forward and backward chaining). During this meeting, you and your supervisee should develop a procedural fidelity checklist that you can use to evaluate your supervisee's performance when implementing the procedures with their client (see Appendix D).

In addition to the procedural fidelity checklist, you and your supervisee should develop a data sheet for collecting data on the client's behavior during the behavior chain. This data sheet will be used to collect baseline data before your next individual meeting with a client. Following the meeting, your supervisee should finalize the procedural fidelity checklist and data sheet.

Homework for Individual Supervision with a Client

1. Finalize data sheet and collect data on the client's engagement in the behavior chain for 3–5 sessions.
2. Graph the collected data (3–5 baseline sessions) to display the current level of the behavior before introducing the chaining procedure. This assignment should be submitted and approved before the scheduled meeting.
3. Finalize *Chaining Procedural Fidelity Checklist* (Appendix D).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–15:00	Chaining Administration
15:00–30:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix D: *Chaining Procedural Fidelity Checklist*

Prior to your meeting with your supervisee, they should have sent you the baseline data for your approval. After analyzing the data, you should determine that it is appropriate to introduce the chaining procedure.

Chaining Administration

Your supervisee should have finalized the *Chaining Procedural Fidelity Checklist* and the client data sheet and provided you with a copy of both. Join your supervisee's session to observe the administration of the chaining procedure and collect data simultaneously. Following the administration of the chaining procedure, provide specific feedback based on data collected using the procedural fidelity checklist.

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist. When providing corrective feedback, include a justification as to why a behavior needs to change. Finally, provide an opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, the second individual supervision meeting without a client should include intensive role play and feedback. Then, another observation with performance feedback should be conducted.

Individual Supervision Meeting Without a Client #2

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–20:00	Graphing and Decision-Making
20:00–30:00	Client-Directed Activities

Materials Needed

- Graph of client responding
- Appendix C: *Graph Component Checklist*

Graphing and Decision-Making

After your supervisee has conducted three to five intervention sessions, ask your supervisee to graph the data collected on the client's behavior. During the meeting, ensure your supervisee has entered the data accurately and that their graph meets the requirements provided in the *Graph Component Checklist* (Appendix C). Provide specific feedback according to the checklist. Following this discussion, ask your supervisee to analyze the data and describe their process for moving forward (e.g., two more sessions and then check in with supervisor). Use this opportunity to plan for potential issues which may arise.

Client-Directed Activities

If the mastery criterion was not met during the individual meeting with a client, you should role-play the procedures with your supervisee. Provide behavior-specific feedback following the role play using the procedural fidelity checklist. Ensure they meet the criterion of implementing the procedures with 80% fidelity during the role play before working with their client.

Future Growth

- ☐ Observe your supervisee implement a different chaining procedure than the one implemented.
- ☐ Observe your supervisee provide feedback to another trainee on their implementation of a chaining protocol.

Appendix A: Chaining Data Collection Practice

Create a data sheet and collect data on Edgar's responding using the description provided below. You will need to graph these data prior to individual supervision meeting without a client.

Use the following vignette for this activity:

Joseph is teaching his client Edgar to wash his car using chaining. He collected baseline data using the multiple-opportunity probe and decided to use total task presentation as the chaining method. Edgar has a strong imitative repertoire; therefore, Joseph has decided to use a 5-s time-delay to a model prompt. Joseph has decided that the mastery criterion will be 90% correct responding across three sessions.

Joseph has developed this task analysis:

1. Spray the car with a hose
2. Wipe the entire car with a soapy towel
3. Rinse soap off the car with a hose
4. Dry the car with a towel

The transcript of six sessions is provided below:

Session 1—BL
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph picks up the hose and sprays the car. Another 5 seconds elapses and Joseph wipes the car with the soapy towel. Edgar does not pick up the hose, so Joseph rinses the car with hose. After another 5 seconds, Joseph dries the car.

Session 2—BL
Joseph gives the instruction "wash your car." After 5 seconds elapses, Joseph picks up the hose and sprays the car. Joseph waits 5 seconds and Edgar does not wipe the car with a soapy towel, so Joseph wipes the car. Another 5 seconds elapses and Edgar does not pick up the hose, so Joseph rinses the car with hose. After another 5 seconds, Joseph dries the car.

Session 3—BL
Joseph gives the instruction "wash your car." Edgar does not pick up the hose within 5 seconds, so Joseph sprays the car. Another 5 seconds elapses and Joseph wipes the car with the soapy towel. After 5 seconds, Joseph rinses the car. Joseph waits 5 seconds and Edgar does not dry the car, so Joseph dries the car.

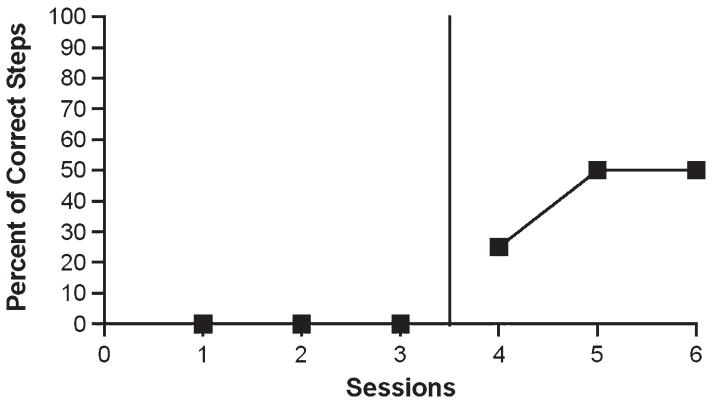
Session 4—TX
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph models spraying the car and then Edgar sprays the car. Another 5 seconds elapses and Joseph models wiping the car with the soapy towel. Edgar still does not pick up the soapy towel. Joseph provides light physical

guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car. After 5 seconds Joseph models drying the car and Edgar dries the car.

Session 5—TX
Joseph gives the instruction "wash your car." Joseph waits 5 seconds and Edgar does not pick up the hose. Joseph models spraying the car and then Edgar sprays the car. Another 5 seconds elapses and Joseph models wiping the car with the soapy towel. Edgar still does not pick up the soapy towel. Joseph provides light physical guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car and then immediately dries the car.

Session 6—TX
Joseph gives the instruction "wash your car." Edgar picks up the hose and sprays the car. After 5 seconds elapses, Joseph models wiping the car with the soapy towel. Edgar still does not initiate the response. Joseph provides light physical guidance and Edgar wipes down the car. Edgar picks up the hose and rinses the car. Joseph waits 5 seconds and models drying the car. Edgar picks up the towel and dries the car.

Appendix B: Mock Graph



Appendix C: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizonal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is in black and white	Y N	

Appendix D: Chaining Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Alexander, J. L., Smith, K. A., Mataras, T., Shepley, S. B., & Ayres, K. M. (2015). A meta-analysis and systematic review of the literature to evaluate potential threats to internal validity in probe procedures for chained tasks. *The Journal of Special Education, 49*(3), 135–145. https://doi.org/10.1177/0022466914550096

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied Behavior Analysis*, eBook. Pearson Higher Ed.

Pierce, W. D., & Cheney, C. D. (2017). *Behavior analysis and learning: A biobehavioral approach*, Sixth edition. New York, NY, US: Routledge.

Slocum, S. K., & Tiger, J. H. (2011). An assessment of the efficiency of and child preference for forward and backward chaining. *Journal of Applied Behavior Analysis, 44*(4), 793–805. https://doi.org/10.1901/jaba.2011.44-793

Spooner, F., & Spooner, D. (1984). A review of chaining techniques: Implications for future research and practice. *Education and Training of the Mentally Retarded*, 114–124.

Chapter 20
Stimulus Control

Topics Covered Within This Chapter

Topics
Establishing Stimulus Control
Simple Discriminations
Conditional Discriminations

The three-term contingency, antecedent–behavior–consequence, is a fundamental concept in the analysis of operant behavior. Antecedents play an important role in this contingency. Reinforcement is only available for responses under certain circumstances and antecedent stimuli signal the availability and unavailability of reinforcement (Glenn et al., 1992). For example, despite being Irene's favorite meal, she does not request, "I'll have the filet mignon" while sitting in class, walking down the street, or even as she passes through the entry of her favorite steak restaurant. On the contrary, Irene only places a request for her favorite meal when she is dining at a restaurant that serves filet mignon and a server requests her order. Similarly, despite Aamir enjoying social interactions with friends, he does not pick up his phone and say, "hello" indiscriminately throughout the day. In fact, he only picks up his phone, places it to his ear, and answers, "hello" when the phone is ringing and the caller is known to him.

A discriminative stimulus (S^D) is an environmental event that signals the availability of reinforcement for a target behavior. Whereas a stimulus delta (S^Δ) indicates (a) the unavailability of reinforcement, (b) reinforcement on a leaner schedule relative to that available in the presence of the S^D, or (c) a lower quality of reinforcement relative to that available in the presence of the S^D. It is our experience that many supervisees share a common misunderstanding that an S^Δ always signals the

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_20].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_20

unavailability of reinforcement (i.e., extinction), so this may be a topic in need of thorough discussion within your supervision activities.

Establishing Stimulus Control

It is important for your supervisees to understand how stimuli come to control behavior. Stress to your supervisees that stimuli only exert control over behavior due to a history of reinforcement. A behavior is considered to be under stimulus control when the frequency, latency, duration, or magnitude of a response is different when an S^D is present versus absent (Dinsmoor, 1995a). Controlling stimuli can be visual, auditory, tactile, olfactory, or gustatory. Much of the research is limited to establishing visual or auditory stimuli as discriminative stimuli; however, this does not preclude the other modalities from effectively controlling behavior.

The establishment of stimulus control is dependent on several factors. First, the stimulus must be salient (Dinsmoor, 1995b). That is, the stimulus must stand out from the other stimuli in the individual's environment. For example, the "no parking" sign at the library has a prominent red background that is distinct from the white stone wall to which it is affixed. Moreover, no other signs are placed in its vicinity, further improving the saliency. As a result, it is more likely to control the parking behavior of library visitors. It is possible to inadvertently establish faulty stimulus control in which the individual is responding to an irrelevant feature of the stimulus. Therefore, clinicians must be mindful when selecting antecedent stimuli to use during teaching trials. Second, the stimulus must be associated with differential consequences. For example, Ms. Montoya informed her algebra students that they were expected to work independently for the first 20 minutes of the math assignment, which she would signal with a red posterboard placed on the dry erase board. When the 20 minutes had elapsed and the red posterboard was removed, they would be allowed to ask her for help with difficult problems. However, the red posterboard would only achieve stimulus control over question-asking behavior if Ms. Montoya was steadfast in her refusal to answer questions when the red posterboard was on display, and her openness to answer questions when the red posterboard was removed. Third, the behavior for which a stimulus is to gain control must be within the individual's repertoire. For example, Mr. Nolan hopes to teach Ella to discriminate between photographs of preferred snacks by accurately and vocally tacting the snack name upon presentation of a photograph of that snack. If Ella's vocal repertoire does not include vocalizations of "cracker," "animal cookies," "cheese stick," and "applesauce," no procedures will be effective in the establishing the control of the photographs over the vocalization of the snack names.

Simple Discriminations

Discrimination refers to an individual engaging in a behavior in the presence of one stimulus and not engaging in the behavior in the presence of a different stimulus. The most basic approach to establishing stimulus control is to establish control by a single stimulus. To establish control by a single stimulus, the three aforementioned factors should be considered. Additionally, the clinician should consider the following recommendations. First, reinforcement should be delivered immediately after the behavior is emitted when the stimulus is present. Second, extinction should occur when the stimulus is not present. Third, no other stimuli should be associated with reinforcement and non-reinforcement. Finally, the clinician should vary the timing of the presentation of the controlling stimulus to prevent the establishment of temporal discrimination (Spradlin & Simon, 2011).

Simple discriminations may also include more than one stimulus. The most basic discrimination arrangements include reinforcing lever pressing or key pecking in the presence of one stimulus (e.g., green light) and withholding reinforcement for lever pressing or key pecking in the presence of another stimulus (e.g., red light). After the behavior has contacted reinforcement and extinction in the presence of these stimuli for a sufficient number of trials, we should observe more responses in the presence of the green light and fewer in the presence of the red light. An applied example might include a multiple schedule which specifies that in the presence of a blue card requests for a break are reinforced and in the presence of a yellow card requests for a break are not reinforced. After a sufficient number of trials, the client should request a break when the blue card is present and refrain from asking for a break when the yellow card is present. Both of these arrangements (i.e., basic and applied) are examples of simple-successive discriminations because the stimuli are presented successively (i.e., one at a time). Another type of simple discrimination arrangement is when the two stimuli are presented simultaneously. For example, when teaching clients to make requests by exchanging picture cards, one common step is to present two cards, one with a picture of the preferred item and one that is blank. Both cards are simultaneously available and handing the picture card to the conversation partner results in reinforcement and handing the blank card to the conversation partner will not result in reinforcement. After a sufficient number of trials, the client should request by exchanging the picture card and never attempt to exchange the blank card.

Conditional Discriminations

Many discriminations we encounter in our daily lives are highly dependent on the context. For these discriminations, the same stimulus can serve as an S^D or S^Δ based on an additional stimulus. A coworker may serve as an S^D for social interactions if they are sitting by themselves in the lunchroom; however, that same coworker may serve as an S^Δ for social interactions if they are in a meeting with your boss. A

restaurant may serve as an S^D for access to food if an open sign is displayed; however, the same restaurant may serve as an S^Δ for access to food if a closed sign is displayed. These are referred to as conditional discriminations because the discrimination is conditional based on the context. It is important to remember that conditional discriminations include the same behavior with differential consequences, and this is separate from motivating variables. If the value of the consequence is altered rather than the consequence itself, this is not a conditional discrimination. For example, if the behavior is opening the door and the reinforcer is going outside, the fact that it is currently raining alters the value of going outside as opposed to availability of accessing outside. Even if it is raining, opening the door will still result in being outside, the only thing that has changed is that going outside is less desirable because everything is wet.

Behavior analysts regularly promote engagement in conditional responding with their students and clients. For example, if you're teaching a college student to match technical terms to their definition, the selection of the definition is conditional based on the provided technical term. The arrangement might entail presenting three written definitions and laying them in front of the college student and then handing the student one written technical term for each trial. Each of the written definitions will serve as an S^D or S^Δ based on the written technical term. In Fig. 20.1, we see three written definitions and one written technical term. In this example, the written definition that reads *everything an organism does* serves as an S^D and the other two definitions serve as S^Δs. That is, in the presence of the term *behavior*, selection of the definition *everything an organism does* will result in reinforcement and selection of either of the other two definitions would not result in reinforcement. If, however, the term was *punisher*, the definition *a stimulus that decreases the frequency of an operant that produces it*, would serve as the S^D and the other two definitions would serve as S^Δs.

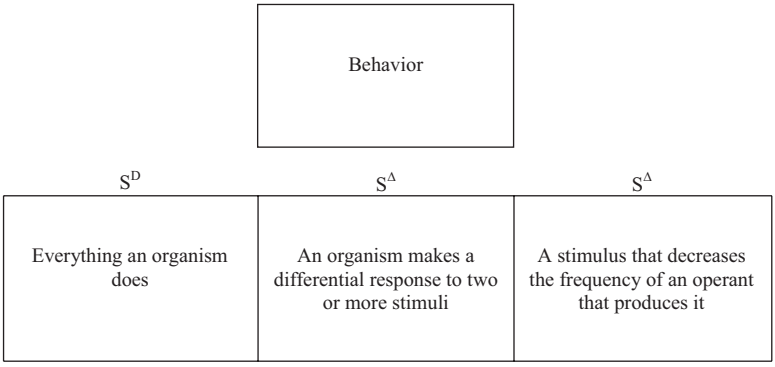


Fig. 20.1 An example of stimuli for teaching conditional discrimination

In teaching new skills to early-learners, we often target auditory-visual conditional discriminations. An example of an auditory-visual discrimination could be teaching an individual to identify different animals from an array of three pictures. If there are visual stimuli including a dog, a cat, and a rabbit, the stimulus that serves as the S^D is conditional based on the spoken name of the animal (i.e., auditory

stimulus). If the instructor says "touch dog," the picture of the dog serves as the S^D, while the pictures of the cat and rabbit serve as S^Δs. In contrast, if the instructor says "touch cat," the picture of the cat serves the S^D, while the pictures of the dog and rabbit serve as S^Δs.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	What is the S^D?
30:00–40:00	Simple or Conditional
40:00–55:00	Establishing Faulty Stimulus Control
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *S^D Worksheet,* 1 copy for each supervisee
- Appendix B: *Simple or Conditional* sheet, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Bergmann et al. (2017)
- Dinsmoor (1995a, b)
- Grow and LeBlanc (2013)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with stimulus control including simple discriminations, conditional discriminations, and faulty stimulus control. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

First, remind your students of the definition of stimulus control.

1. *Stimulus Control:* When the frequency, latency, or duration of a behavior is altered by the presence or absence of an antecedent stimulus.

Review the importance of a history of reinforcement for establishing stimulus control. Ensure your supervisees do not mistake the source of control to originate from the stimulus itself as this is a common misunderstanding. Provide your supervisees with several examples of stimulus control and have your supervisees come up with additional examples. Establishing stimulus control includes both S^Ds and S^Δs.

1. *S^D:* A stimulus in the presence of which a given behavior has been reinforced and in the absence of which that behavior has not been reinforced (Cooper et al., 2020).
2. *S^Δ:* A stimulus in the presence of which a given behavior has not produced reinforcement, or has produced reinforcement of lower quality in the past (Cooper et al., 2020).

Next, discuss the behavioral evidence of stimulus control which is discrimination. That is, behavior occurs in the presence of some stimuli and not in the absence or presence of other stimuli. Discuss the two types of discriminations including simple and conditional.

1. *Simple Discrimination:* Responding is under stimulus control of a single antecedent stimulus condition (Cooper et al., 2020).
2. *Conditional Discrimination:* Reinforcement of a response in the presence of a stimulus is dependent on the presence or absence of other stimuli (Spradlin & Simon, 2011).

Provide multiple examples of each and ask your supervisees to come up with additional examples. When discussing examples for simple discriminations use the following steps (a) identify the target behavior, (b) describe the differential consequences (i.e., reinforcement is or is not provided), and (c) identify whether the stimuli are presented simultaneously or successively. When discussing examples for conditional discriminations, we recommend using the following steps (a) identify the target behavior, (b) describe the differential consequences (i.e., reinforcement is or is not provided), (c) identify the conditional stimulus that results in this target serving as the S^D, (d) identify the conditional stimulus/stimuli that result in this target serving as the S^Δ, and (e) ensure the conditional stimulus is not a motivating variable.

What's the S^D?

For the first part of this activity, provide your supervisees with the *S^D Worksheet* (Appendix A) and ask them to underline the portion of the goal that is the S^D. They should complete the worksheet independently and then give one another feedback on their responses in pairs or as a large group.

For the second part of the activity, ask your supervisees to select five potential target behaviors appropriate for their clients. Following the identification of the behaviors, discuss the antecedent stimuli that should occasion each response and stimuli that should reduce the likelihood of the response. See Table 20.1 for an example. Guide this discussion to ensure your supervisees have a clear understanding of what contextual variables are included within the S^D.

Table 20.1 Discriminative stimuli

Behavior: writing your name	S^Ds	S^Δs
	"Write your name"	"Draw a triangle"
	Pen/pencil	Pen without ink/broken pencil
	Line at the top of the paper	Line that has the word date under it

Simple or Conditional

For this activity, provide each supervisee with a copy of the *Simple or Conditional* sheet (Appendix B). The sheet includes six vignettes, three of which are simple discriminations and three of which are conditional discriminations. If the provided vignettes do not properly align with the population with whom your supervisees work, create your own. Ask your supervisees to read the vignettes independently and determine which are examples of simple discriminations and which are examples of conditional discriminations. As a group discuss your supervisees' answers and provide feedback as necessary.

1. A rat accesses pellets for pressing the lever when the light is on; however, when the light is off the rat will not access reinforcement for lever presses.
2. A 15-year-old with a developmental disability is taught that their requests for help with their assignment from their teacher will be reinforced when their teacher is walking around the classroom; however, their requests for help with their assignment from their teacher will not be reinforced when their teacher is sitting at their desk.
3. A man with a traumatic brain injury is taught that when the cafeteria lights are on and a staff member is present, his request for a snack will be reinforced; however, when the cafeteria lights are off and a staff member is present, his requests for a snack will not be reinforced.
4. A student who engages in escape-maintained challenging behavior is taught that touching a card will result in access to a break when the picture on the wall says "break," but touching a card will not result in a break when the when the picture is not on the wall.
5. In the presence of a blue light, the pigeon pecks the triangle key to access reinforcement, and in the presence of a red light, the pigeon pecks the square key to access reinforcement.

6. A child with a developmental disability receives reinforcement for requests for edible items, but not tangible items in the presence of a blue placemat. However, in the presence of a yellow placemat, this child receives reinforcement for requests for tangible items and not edible items.

Establishing Faulty Stimulus Control

For this activity, have your supervisees identify the mistakes presented in the vignette that might result in establishing faulty stimulus control. We present the example in the PowerPoint and have identified the mistakes below. Use the provided vignette or develop an example that is more appropriate to the population with whom your supervisees work. Use the recommendations from Grow and LeBlanc (2013) to guide this discussion. We have numbered the mistakes and provide a description of each below.

Mr. Wong is teaching Maya to identify letters receptively. Mr. Wong has decided to first teach Maya to identify the letter A. Once she masters A, he will teach the letter B, and after she masters the letter B, he will teach the letter C (1). Mr. Wong presents the three stimulus cards (i.e., A, B, C), and the letter A is larger than letters B and C (see Fig. 20.2). Mr. Wong points to the correct letter after 3 seconds of no response or after an incorrect response. He provides praise and a cookie after Maya responds independently or following a prompt (3). Without intending to, on 50% of the trials Mr. Wong places the stimulus letter A in the middle (4). After several teaching trials Maya is still only responding correctly during 25–30% of trials. On many trials, Maya is selecting a stimulus without looking at the stimuli in the array (5).

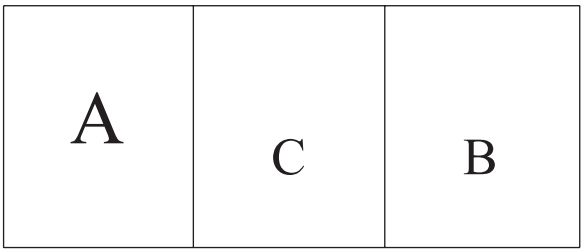


Fig. 20.2 Stimulus array

1. Mr. Wong should introduce multiple targets simultaneously
2. Mr. Wong should ensure that the stimuli are equal sizes
3. Mr. Wong should differentially reinforce independent and prompted responses
4. Mr. Wong should ensure the target stimulus is presented in all three positions on an equal number of trials
5. Mr. Wong should ensure that Maya scans the stimuli before making a selection

Knowledge Check

1. How is a conditional discrimination different from a simple discrimination?
2. Provide five examples of S^Ds.
3. How do stimuli come to control behavior?
4. Provide an example of faulty stimulus control.

Homework for Individual Supervision without a Client

1. Prepare five examples of conditional discriminations.
2. Develop a potential client goal that targets conditional discriminations.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Conditional Discriminations
10:00–30:00	Client-Directed Activities

Materials Needed

- Five examples of conditional discriminations
- Goal targeting conditional discrimination
- Appendix C: *Goal Component Checklist*
- Appendix D: *Conditional Discrimination Procedural Fidelity Checklist*

Conditional Discriminations

Review the five examples of conditional discriminations developed by your supervisee. If all five examples are auditory-visual discriminations, encourage your supervisee to think of another example to ensure they have a clear understanding. Provide feedback on the examples and ensure your supervisee clearly understands the topic. Use the following to evaluate their examples: (a) the target behavior is identified, (b) the differential consequences are identified, (c) the conditional stimulus that results in this target serving as the S^D is identified, (d) the conditional stimulus/stimuli that result in this target serving as the S^Δ is/are identified, and (e) the conditional stimulus is not a motivating variable.

Client-Directed Activities

Discuss the goal developed by your supervisee. Determine whether the goal is the most appropriate skill to target for your supervisee's client. Your supervisee should also identify specific stimuli to teach. Evaluate the quality of the goal using the *Goal Component Checklist* (Appendix C) and the five criteria described above. Provide specific feedback related to missing components or components that should be edited. In addition, offer feedback that will aide your supervisee in their future goal development. During this meeting, you and your supervisee should develop a procedural fidelity checklist for implementing the teaching procedures for the goal (see Appendix D). Require your supervisee to implement the protocol with at least 80% fidelity during role play. Following this meeting, your supervisee should finalize the procedural fidelity checklist and develop a data sheet for collecting data on the client's responding. Before your observation with a client, your supervisee should have collected data on three to five baseline sessions and sent you the graph to receive your approval to introduce intervention.

Homework for Individual Supervision with a Client

1. Prepare data sheets for conditional discrimination protocol.
2. Finalize *Conditional Discrimination Procedural Fidelity Checklist* (Appendix D).
3. Conduct baseline sessions before supervisor observation.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–15:00	Conditional Discrimination Protocol Administration
15:00–45:00	Session Procedures
45:00–60:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix D: *Conditional Discrimination Procedural Fidelity Checklist*
- Supervision Observation Form

Conditional Discrimination Protocol Administration

Before conducting your observation, review the graphed baseline data to ensure that introducing the intervention is appropriate. Your supervisee should have finalized the procedural fidelity checklist and their data sheet for the conditional discrimination protocol and provided you with a copy of each. Observe your supervisee administer the protocol and collect data simultaneously. Using the *Conditional Discrimination Procedural Fidelity Checklist* and client data sheet your supervisee developed during the supervision without a client meeting. Ensure that your supervisee conducts multiple teaching trials (e.g., at least 10) with two or more target stimuli.

Session Procedures

Following your supervisee's administration of the protocol for a sufficient number of teaching trials, continue to observe your supervisee target other goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist for conditional

discrimination protocol and the *Supervision Observation Form*. When providing corrective feedback, include a justification as to why a behavior needs to change. If time allows, you may offer to model and/or role play and provide feedback to adjust behaviors in need of improvement. Finally, end this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback. Then, a second observation with performance feedback should be conducted.

Future Growth

- ☐ Observe your supervisee problem solve in a situation in which faulty stimulus control has been established.
- ☐ Observe your supervisee provide feedback to another trainee on their teaching of conditional discriminations.

Appendix A: S^D Worksheet

Instructions: Read each goal and underline the portion of the goal that is the S^D.

1. When presented with a facial expression and asked "how do I feel," the client will identify the correct emotion (happy, sad, surprised) within 5 seconds on 80% of opportunities across three consecutive sessions.
2. When presented with shoes with laces and given the instruction "tie your shoes," the client will complete the steps in the task analysis correctly and independently within 3–5 seconds, with 80% accuracy across three consecutive sessions.
3. When presented with an item and asked the question "What is it?", the client vocally identifies the item within 3–5 seconds on 80% of opportunities across three consecutive sessions.
4. When instructed to "take a bite," and provided with a solid food (e.g., grapes or raisins), the client will pick up the food (either using fingers, a fork, or spoon), bring the food to their lips, put the food in their mouth, chew the food, then swallow the food with 80% accuracy across three consecutive sessions.
5. When presented with an activity and instructed "let's do this activity now," the client will independently leave the activity they are engaging in and transition to the new activity within 3–5 seconds, with 80% accuracy across three consecutive sessions.
6. When presented with socks and instructed "put on socks" the client will independently engage in steps from the *putting on socks* task analysis with 80% accuracy across three consecutive sessions.
7. When asked "What is your phone number?", the child will vocally recite their phone number within 3–5 seconds, with 80% accuracy across three consecutive sessions.
8. When presented with a gross motor action and instruction, "do this," the client will independently imitate the gross motor action within 3–5 seconds on 80% of opportunities across three consecutive sessions.
9. When presented with three word cards, one picture and the instruction "match," the client will independently place the picture on top of the corresponding word within 3–5 seconds with 80% accuracy across three consecutive sessions.
10. When presented a picture of a community helper and the instruction "who is it," the client will vocally identify the corresponding community helper within 3–5 seconds with 80% accuracy across three consecutive sessions.

Appendix B: Simple or Conditional

Determine which vignettes are examples of simple discriminations and conditional discriminations. Circle the answer.

1. A rat accesses pellets for pressing the lever when the light is on; however, when the light is off the rat will not access reinforcement for lever presses.

   Simple Conditional

2. A 15-year-old with a developmental disability is taught that their requests for help with their assignment from their teacher will be reinforced when their teacher is walking around the classroom; however, their requests for help with their assignment from their teacher will not be reinforced when their teacher is sitting at their desk.

   Simple Conditional

3. A man with a traumatic brain injury is taught that when the cafeteria lights are on and a staff member is present, his request for a snack will be reinforced; however, when the cafeteria lights are off and a staff member is present, his requests for a snack will not be reinforced.

   Simple Conditional

4. A student who engages in escape-maintained challenging behavior is taught that touching a card will result in access to a break when the picture on the wall says “break,” but touching a card will not result in a break when the when the picture is not on the wall.

   Simple Conditional

5. In the presence of a blue light the pigeon pecks the triangle key to access reinforcement and in the presence of a red light the pigeon pecks the square key to access reinforcement.

Simple Conditional

6. A child with a developmental disability receives reinforcement for requests for edible items, but not tangible items in the presence of a blue placemat. However, in the presence of a yellow placemat this child receives reinforcement for requests for tangible items and not edible items.

Simple Conditional

Appendix C: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizontal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix D: Conditional Discrimination Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes – = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Bergmann, S. C., Kodak, T. M., & LeBlanc, B. A. (2017). Effects of programmed errors of omission and commission during auditory-visual conditional discrimination training with typically developing children. *The Psychological Record, 67*(1), 109–119. https://doi.org/10.1007/s40732-016-0211-2

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied Behavior Analysis*, eBook. Pearson Higher Ed.

Dinsmoor, J. A. (1995a). Stimulus control: Part II. *The Behavior Analyst, 18*(2), 253–269.

Dinsmoor, J. A. (1995b). Stimulus control: Part I. *The Behavior Analyst, 18*(1), 51–68.

Glenn, S. S., Ellis, J., & Greenspoon, J. (1992). On the revolutionary nature of the operant as a unit of behavioral selection. *American Psychologist, 47*(11), 1329.

Grow, L., & LeBlanc, L. (2013). Teaching receptive language skills. *Behavior Analysis in Practice, 6*(1), 56–75. https://doi.org/10.1007/BF03391791

Spradlin, J. E., & Simon, J. L. (2011). Stimulus control and generalization. In *Handbook of applied behavior analysis* (pp. 76–91).

Chapter 21
Equivalence-Based Instruction

Topics Covered Within This Chapter

Topics
Stimulus Equivalence
Reflexivity, Symmetry, and Transitivity
Equivalence-Based Instruction Procedures

Stimulus Equivalence

This chapter will provide a brief overview of stimulus equivalence and effective procedures for establishing emergent performances. In 1971, Sidman conducted the first study on establishing stimulus equivalence. Specifically, the participant, a 17-year-old male diagnosed with intellectual disability, entered the experiment with the ability to vocally name pictures and select the corresponding picture when presented with the spoken word. Then, Sidman taught the participant to identify the written word when presented with the spoken word. Following this training, testing revealed that the participant could vocally identify the written words as well as bidirectionally match written words and pictures. These results were ground breaking and have spurred a research agenda that changed the field of behavior analysis. This phenomenon is referred to as stimulus equivalence because after directly teaching some stimulus relations, learners can equate the other members without being taught to do so, also referred to as derived relational responding.

Match-to-sample procedures are used to train and test across multiple relations (Miguel & Petursdottir, 2009). The general procedures include the implementer

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_21].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_21

presenting a sample stimulus (e.g., "red") and then presenting comparison stimuli (e.g., three different colored blocks) from which the learner can select the correct stimulus (e.g., red block). Match-to-sample procedures are used to teach conditional discriminations which is why this description might sound familiar from the chapter on stimulus control (see Chap. 20).

Reflexivity, Symmetry, and Transitivity

There are three stimulus-to-stimulus relations that are assessed to determine whether the individual demonstrates stimulus equivalence including reflexivity, symmetry, and transitivity (Cooper et al., 2020). Refer to Fig. 21.1 as we provide an example of each stimulus–stimulus relation. Reflexivity is demonstrated when the learner can match two identical stimuli (i.e., identity matching). For example, when presented with the sample stimulus of a picture of a car [A], the learner will match the sample stimulus to the corresponding comparison stimulus which is a picture of a car [A]. Therefore, reflexivity relations are A = A, B = B, and C = C. Symmetry is demonstrated when the learner can respond correctly to an untaught relation that is the reverse of a taught relation. For example, first the learner is taught when they are presented with the sample stimulus of a picture of a car [A], they must select the correct comparison stimulus which is the written word CAR [B]. Then, without being taught to do so, the learner selects the correct comparison stimulus which is a picture of a car [A] when presented with the sample stimulus written word CAR [B]. Therefore, symmetry relations include if A = B then B = A and if A = C then C = A. Transitivity is demonstrated when the learner can respond correctly to relations between two stimuli after being taught to respond correctly to two other stimulus–stimulus relations. For example, first the learner is taught when they are presented with the sample stimulus of a picture of a car [A], they must select the correct comparison stimulus which is written word CAR [B], AND when they are presented with the sample stimulus of a picture of a car [A], they must select the correct comparison stimulus which is a 3D model car [C]. Then, without being taught to do so, the learner selects the correct comparison stimulus which is the written word CAR [B] when presented with the sample stimulus of a 3D model car [C] AND the learner selects the correct comparison stimulus which is the 3D model car [C] when presented with the sample stimulus written word CAR [B]. Therefore, transitivity relations include if A = B and A = C, then C = B and B = C.

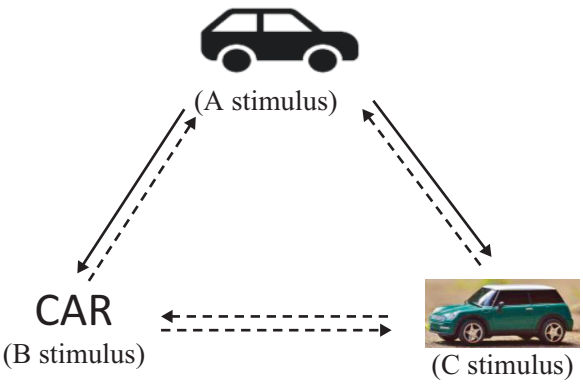


Fig. 21.1 Example of symmetry and transitivity

Equivalence-Based Instruction Procedures

There are several considerations required for arranging successful equivalence-based instruction. The general idea of stimulus equivalence may be relatively easy for supervisees to understand; however, difficulties arise when supervisees attempt to use equivalence-based instruction in practice. Therefore, we provide a list of steps for developing a plan for implementing stimulus equivalence and an example of each step to aid in understanding.

First, your supervisee must select which stimuli they will use to establish stimulus classes. Your supervisee should consider including a minimum of three classes to ensure proper stimulus control is established. There are examples in the literature in which only two classes were established (e.g., dangerous and nondangerous; Giannakakos et al., 2021); however, when possible, include at least three stimuli to decrease the likelihood of the learner guessing the correct response.

Second, your supervisee must determine the number of class members that will be taught. A minimum of three class members must be included to allow for the demonstration of symmetry and transitivity. Class member identification should include whether the stimulus presentation will be visual, auditory, olfactory, gustatory, or tactile. Within the literature, the class members frequently include visual and auditory stimuli, but this is not required.

Third, your supervisee should develop a visual (e.g., table, figure, flowchart) to display the relations including the different stimuli and class members. Clear identification of the different relations will be useful when selecting probing and training procedures.

Fourth, your supervisees should determine which training structure they will use. The two primary training structures include one-to-many (e.g., Stanley et al., 2018) or many-to-one (e.g., Giannakakos et al., 2021). For either training structure, your supervisee must ensure one node (i.e., stimulus set) is held constant. For example, if stimulus set A is selected as the node, the training structure one-to-many would include directly teaching A = B and A = C, whereas the many-to-one training

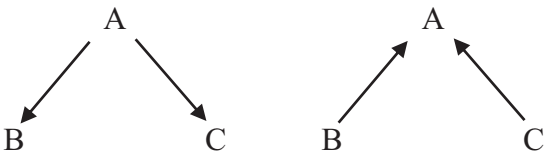


Fig. 21.2 One-to-many and many-to-one

structure would include directly teaching B = A and C = A. Figure 21.2 presents a visual display of the two training structures with the A stimulus set serving as the node. Once your supervisee has selected a training structure, they should specify the node stimulus set and identify the relations they will directly teach.

Fifth, your supervisee should describe what probe trials will entail for each relation. This includes the implementer behavior, the sample and comparison stimuli, and the learner behavior. For these trials, your supervisee will not provide any prompts or consequences. Your supervisees will need to specify which instructions will be presented to occasion responses to different relations. For example, "touch [target]," "match," or "what is it?". These will depend on the specific relations being probed. The manner in which probes will be conducted should be determined. That is, how many times will each stimulus relation be presented, how will the order of the trials be determined, and will mastered trials be mixed in to provide the learner with opportunities to contact reinforcement.

Sixth, your supervisee will need to describe the teaching procedures for the relations that will be directly taught. This includes the implementer behavior, the sample and comparison stimuli, the learner behavior, prompt hierarchies, and the schedule of reinforcement. They should determine the appropriate number of teaching trials for each session based upon the number of stimuli being taught.

Seventh, your supervisee will need to select criterion for mastery of taught relations and class formation. Selecting a mastery criterion for taught relations will be similar to other goals; however, it may be necessary to have a more stringent criterion to increase the likelihood of emergent performances. The mastery criterion for class formation should be evaluated based on performance for each relation separately (i.e., taught and untaught relations). As with the taught relations, a sufficiently stringent criterion should be met before determining that class formation has been achieved.

Finally, your supervisees should develop a schedule for conducting post-training probes. It has been suggested that for clinicians implementing equivalence-based instruction a simple-to-complex protocol may be ideal (Cooper et al., 2020). This protocol specifies that probes are conducted first for symmetry following mastery of each taught relation (e.g., probe B = A relation after learner masters A = B relation) and then probing for transitivity after symmetrical relations have been observed. This schedule may be appealing to clinicians because it allows for fewer probe trials to be conducted at once and the clinician will quickly identify if the learner is going to need additional relations to be directly taught.

Example of Equivalence-Based Instruction Procedures

Below we provide an example of completing the teaching plan.

1. Identify stimuli to include—at least three.
   - The three stimuli will include cat, bird, and rabbit.
2. Identify the class members—at least three.

	1	2	3
A	"cat" (vocal response)	"bird" (vocal response)	"rabbit" (vocal response)
B			
C	CAT (written word)	BIRD (written word)	RABBIT (written word)

Fig. 21.3 Example of visual displaying the stimulus classes (i.e., cat, bird, and rabbit) and class members (i.e., vocal response, picture, and written word)

   - A stimuli include spoken words, B stimuli include pictures, and C stimuli include written words.
3. Create a visual with all the relations including classes and class members. See Fig. 21.3 for an example.
4. Determine which training structure will be used and which relations will be directly taught.
   - One-to-many: A = B and A = C
5. Describe probes for all relations. During these trials, the implementer will not provide any prompts or consequences for correct or incorrect responses.
   - Relation 1, A = B: Implementer lays three picture cards (i.e., cat, bird, and rabbit) in front of the learner. The implementer says the name of the target stimulus (e.g., "cat") and waits for the learner to select one of the pictures. This would be repeated for nine trials, three for each stimulus (i.e., cat, bird, and rabbit).
   - Relation 2, B = A: Implementer presents a picture card of the target stimulus (e.g., bird) and says, "what is it?". They then wait for the learner to respond vocally (e.g., "bird"). This would be repeated for nine trials, three for each stimulus. See Fig. 21.4 for an example data sheet.
   - Relation 3, B = C: Implementer lays out three different word cards (i.e., cat, bird, and rabbit) in front of the learner. Implementer presents a picture card

(e.g., rabbit) and says, "match." They then wait for the learner to select a word card. This would be repeated for nine trials, three for each stimulus.

- Relation 4, C = B: Implementer lays out three picture cards (i.e., cat, bird, and rabbit) in front of the learner. Implementer presents a word card (e.g., rabbit) and says, "match." They then wait for the learner to select a picture card. This would be repeated for nine trials, three for each stimulus.
- Relation 5, C = A: Implementer presents a word card of the target stimulus (e.g., cat) and says, "read." They then wait for the learner to respond vocally (e.g., "cat"). This would be repeated for nine trials, three for each stimulus.
- Relation 6, A = C: Implementer lays out three different word cards (i.e., cat, bird, and rabbit) in front of the learner. The implementer says the name of the target stimulus (e.g., "cat") and waits for the learner to select one of the word cards. This would be repeated for nine trials, three for each stimulus.

Relation: B→A
Instruction: "what is it" while holding picture card

Target	Trial #	Response		
Bird	1	**Correct**	Incorrect	No Response
Rabbit	2	Correct	**Incorrect**	No Response
Cat	3	Correct	**Incorrect**	No Response
Cat	4	Correct	**Incorrect**	No Response
Rabbit	5	Correct	Incorrect	**No Response**
Bird	6	**Correct**	Incorrect	No Response
Bird	7	Correct	**Incorrect**	No Response
Cat	8	Correct	**Incorrect**	No Response
Rabbit	9	Correct	Incorrect	**No Response**
		% Correct:		

Fig. 21.4 Example of data sheet for probing relation B = A. The three stimuli have been randomized using block randomization. These are probe trials so no prompting procedures are implemented, thus data will be collected on whether the learner responded correctly (e.g., on trial 1 and 6 when shown the picture of the bird the learner said "bird"), incorrectly (e.g., on trials 2, 3, 4, 7, 8, the learner said "dog" or "duck" when shown pictures of the three target animals), or no response (e.g., on trials 5 and 9 when shown, the picture of the rabbit the learner did not say anything)

6. Describe teaching procedures

- The prompt hierarchy: independent → model → physical
- Schedule of reinforcement and type of reinforcement: FR1 praise and token for independent responding
- Relation 1, A = B: Implementer lays out three picture cards (i.e., cat, bird, and rabbit) in front of the learner. The implementer says the name of the target stimulus (e.g., "cat") and waits for the learner to select one of the pictures. If the learner responds incorrectly or does not respond within 5 seconds, the implementer points to the correct picture. If the learner responds incorrectly again or still does not respond within 5 seconds of the prompt, the implementer physically guides the response. If the learner selects the correct stimulus before a prompt, the implementer provides praise and a token. If the learner selects the correct stimulus following a prompt, the implementer pro-

vides praise. Conduct a total of nine trials (three for each stimulus). Randomize the trial order and stimulus location before the session.

- Relation 6, A = C: Implementer lays out three different word cards (i.e., cat, bird, and rabbit) in front of the learner. The implementer says the name of the target stimulus (e.g., "cat") and waits for the learner to select one of the word cards. If the learner responds incorrectly or does not respond within 5 seconds, the implementer points to the correct word. If the learner responds incorrectly again or still does not respond within 5 seconds of the prompt, the implementer physically guides the response. If the learner selects the correct stimulus before a prompt, the implementer provides praise and a token. If the learner selects the correct stimulus following a prompt, the implementer provides praise. Conduct a total of nine trials (three for each stimulus). Randomize the trial order and stimulus location before the session. See Fig. 21.5 for an example data sheet.

Relation: A=C
Instruction: "[target]"

Target	Trial #	Target position	Response
Cat	1	L M **R**	**Independent** Model Physical
Rabbit	2	L **M** R	Independent **Model** Physical
Bird	3	**L** M R	**Independent** Model Physical
Bird	4	L **M** R	Independent **Model** Physical
Rabbit	5	**L** M R	**Independent** Model Physical
Cat	6	L M **R**	Independent Model **Physical**
Cat	7	**L** M R	Independent **Model** Physical
Rabbit	8	L M **R**	**Independent** Model Physical
Bird	9	L **M** R	**Independent** Model Physical
		% Correct: 55%	

Fig. 21.5 Example of data sheet for teaching relation A = C. The three stimuli and the position for the correct response have been randomized using block randomization. Data are collected on whether the learner responded correctly (e.g., on trials 1, 3, 5, 8, and 9 when presented with the name of the animal, the learner selected the corresponding word), following a model prompt (e.g., on trials 2, 4, and 7 when presented with the name of the animal, the learner selected the corresponding word after the implementer modeled the correct response), or with physical guidance (e.g., on trial 6 when presented with the name of the animal, the learner selected the corresponding word after being physically guided to do so)

7. Determine mastery criterion for taught relations and class formation.
   - Taught relations: Three consecutive sessions with 80% accuracy across 2 days and two different implementers.
   - Class formation: 80% accuracy across all relations across 2 days and two different implementers.
8. Plan for post-training probes.
   - Once A = B relation is mastered, conduct probes for B = A.
   - Once A = C relation is mastered, conduct probes for C = A.
   - Conduct mixed trials of A = B and A = C relations.

- Once mixed trials of A = B and A = C relations are mastered, conduct probes for B = C and C = B.

If at any point the learner does not achieve 80% accuracy during a probe session, conduct up to three probe sessions and then introduce teaching procedures.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–25:00	Teach or Probe
25:00–30:00	Create a Visual
30:00–45:00	Teaching Plan Development
45:00–55:00	Equivalence Class Identification
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Probe or Teach*, 1 copy for each supervisee
- Appendix B: *Create a Visual*, 1 copy for each supervisee
- Appendix C: *EBI Teaching Plan*, 1 copy for each supervisee
- Appendix D: *Hypothetical Data*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Giannakakos et al. (2021)
- Hanson et al. (2022)
- Hill et al. (2020)
- Sidman (1971)
- Sidman (2018)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with equivalence-based instruction including selecting stimuli, specifying training structures, and conducting teaching and probe procedures. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

First, remind your supervisees of the definitions of stimulus equivalence, reflexivity, symmetry, and transitivity.

1. *Stimulus Equivalence:* the emergence of responding to untaught stimulus–stimulus relations following the reinforcement of some stimulus–stimulus relations (Cooper et al., 2020).
2. *Reflexivity:* A type of stimulus–stimulus relation in which the learner, without any direct teaching, selects the corresponding comparison stimulus when presented with the same sample stimulus (Cooper et al., 2020). A = A, B = B, and C = C.
3. *Symmetry:* A type of stimulus–stimulus relationship in which the learner, without direct teaching, demonstrates the reversibility of matched sample and comparison stimuli (Cooper et al., 2020). If A = B then B = A; if A = C then C = A.
4. *Transitivity:* The demonstration of derived stimulus–stimulus relations that emerge as a product of training two other stimulus–stimulus relations (Cooper et al., 2020). If A = B and A = C, then B = C and C = B.

Ensure your supervisees thoroughly understand each term. Provide your supervisees with several examples of stimulus classes and class members. For each example, draw the relations (see Fig. 21.1) and specify which relations will be taught and which relations will be assessed without teaching. Have your supervisees identify which relations are examples of symmetry and which are examples of transitivity.

Once your supervisees have demonstrated a clear understanding of stimulus equivalence and the three stimulus–stimulus relations, transition to a discussion of the necessary steps for using equivalence-based instruction.

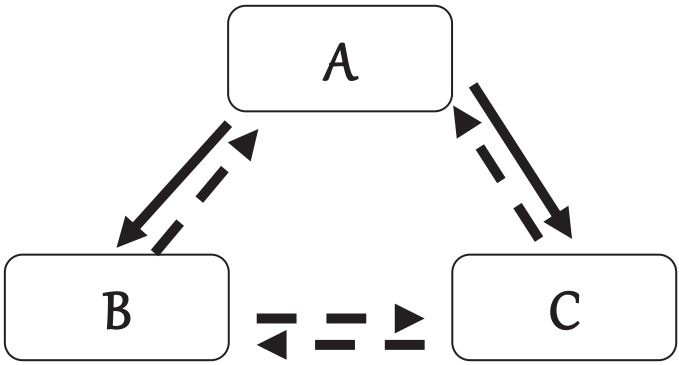
1. Select stimuli to establish as stimulus classes.
   (a) At least three (e.g., kitchen utensils: fork, spoon, knife)
2. Identify class members.
   (a) At least three (e.g., picture, item, written word)
3. Develop a visual (e.g., table or figure) to display stimuli and class members.
4. Select training structure.
   (a) One-to-many
   (b) Many-to-one

5. Describe probe trials.
   (a) Instructions
   (b) Number of trials
   (c) Order of trials
   (d) Opportunities for reinforcement
6. Describe teaching trials.
   (a) Instructions
   (b) Prompt hierarchy
   (c) Schedule of reinforcement
   (d) Number of trials
   (e) Order of trials
7. Mastery criterion.
   (a) Taught relations
   (b) Class formation
8. Post-training probe description.
   (a) When and how relations will be probed following training

Following the description of each of the steps, answer any questions posed by your supervisees and ensure they understand the requirements for each step.

Teach or Probe

For this activity, ask your supervisees to identify one stimulus class with three members. Have them specify the three members (e.g., A stimulus = picture of candy, B stimulus = sign for candy, and C stimulus = piece of candy). Then ask them to use the provided diagram (Appendix A) to identify which relations will be taught and which will be probed. Have your supervisees describe the trials for each relation (e.g., A = B: Implementer presents the picture of candy and waits for the learner to engage in the sign for candy. If the learner does not engage in the sign within 5 seconds of the presentation of the picture, the implementer will model the sign).



A stimulus = _____

B stimulus = _____

C stimulus = _____

Specify the relations to be taught and the relations to be probed. Describe the trials for each.

Teach:

Teach:

Probe:

Probe:

Probe:

Probe:

Create a Visual

For this activity, your supervisees should practice identifying three class members and three stimuli for class formation using foods. That is, they should identify three different food items and three different class members and fill in the table (Appendix B).

	1	2	3
A			
B			
C			

Teaching Plan Development

For this activity, have your supervisees complete the *EBI Teaching Plan* (Appendix C). Provide your supervisees with several examples of categories they might teach using equivalence-based instruction. We provide a few examples below; however, we encourage selection of stimuli that are most relevant to the clients with whom your supervisees work.

- Cleaning items (e.g., broom, mop, rag)
- Colors (e.g., red, blue, yellow)
- Letters (e.g., a, b, c)
- Emotions (e.g., happy, sad, mad)

Equivalence Class Identification

For this activity, your supervisees should brainstorm potential equivalence classes to target with the clients with whom they work. Have them work individually and then in groups to discuss which equivalence class might be most appropriate for their client. Provide feedback and guidance as necessary. Your supervisees will need to complete the *EBI Teaching Plan* prior to their individual supervision meeting.

Homework

Provide each of your supervisees with the *Hypothetical Data* (see Appendix D) sheet. Prior to their individual meeting they will need to graph these data. We suggest using a bar graph for ease; however, you can decide which graph you believe may be most appropriate for your supervisees. These data can be graphed using an application such as Microsoft Excel or using paper and pencil.

Knowledge Check

1. Define and provide an example of symmetry.
2. Define and provide an example of transitivity.
3. What is the difference between one-to-many and many-to-one training structures?
4. Provide an example of three class members.

Homework for Individual Supervision without a Client
1. Graph *Hypothetical Data* (Appendix D).
2. Prepare *EBI Teaching Plan* (Appendix C).

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Graphing and Data Collection
15:00–30:00	Client-Directed Activities

Materials Needed

- Appendix C: *EBI Teaching Plan*
- Appendix D: *Hypothetical Data*
- Appendix E: *Graph Component Checklist*
- Appendix F: *EBI Procedural Fidelity Checklist*
- Predetermined stimuli and class members (at least three of each)

Graphing and Data Collection

Prior to the meeting, you should have provided your supervisee with the *Hypothetical Data* (see Appendix D) and asked them to graph these data. Examine your supervisee's graph and evaluate their accuracy of graphing using the corresponding graph we provide (see Appendix D). Once you have determined that the graph is an accurate depiction of the data, review the quality of the graph using the *Graph Component Checklist* (Appendix E). Provide specific feedback to your supervisee on how they can improve their future graphs.

During this meeting, provide your supervisee with stimuli to establish stimulus classes and class members. Ask your supervisee to develop a data sheet to probe one relation. Ensure that your supervisee randomizes the trials and includes equal assessment of all the stimuli.

Client-Directed Activities

Discuss the *EBI Teaching Plan* developed by your supervisee. Determine whether the selected equivalence class is appropriate to target with your supervisee's client. Evaluate the teaching plan to ensure each portion of the plan is present and will be feasible given the context in which teaching will be implemented. During this meeting, you and your supervisee should develop the *EBI Procedural Fidelity Checklist* (Appendix F) for implementing the probe trials and teaching trials for each relation (e.g., A = B, C = A). Require your supervisee to implement the protocol with at least 80% fidelity during role play. Following the meeting, your supervisee should finalize the procedural fidelity checklist and develop a data sheet for collecting data on the client's responding.

Homework for Individual Supervision with a Client

1. Finalize *EBI Procedural Fidelity Checklist* and client data sheets
2. Develop any necessary materials for instruction and probe sessions.

Individual Supervision Meeting with a Client #1

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–20:00	Equivalence-Based Instruction Protocol Administration
20:00–30:00	Performance Feedback

Materials Needed

- Appendix F: *EBI Procedural Fidelity Checklist*
- Data sheets for client responding, 2 copies

Equivalence-Based Instruction Protocol Administration

Before your observation, your supervisee should have finalized the *EBI Procedural Fidelity Checklist* and their data sheets for the probe sessions. Ensure the data sheets for the probe trials are randomized and contain all the relations. Join your supervisee's session in order to observe the probe sessions and collect data simultaneously. Ensure that your supervisee is conducting probe sessions in the absence of prompting and consequences.

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the *EBI Procedural Fidelity Checklist*. When providing corrective feedback, include a justification as to why a behavior needs to change. If time allows, you may offer to model and/or role play and provide feedback to address behaviors in need of improvement. Finally, end this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback.

Homework for Individual Supervision with a Client #2

1. Graph probe sessions. Receive approval to move to teaching.
2. Prepare data sheets for teaching trials.

Individual Supervision Meeting with a Client #2

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–20:00	Equivalence-Based Instruction Protocol Administration Part 2
20:00–30:00	Performance Feedback

Materials Needed

- Appendix E: *Graph Component Checklist*
- Graphed data of probe trials
- Appendix F: *EBI Procedural Fidelity Checklist*
- Data sheets for client responding, 2 copies

Equivalence-Based Instruction Protocol Administration Part 2

Before your observation, your supervisee should have graphed the probe sessions and received your approval to transition to teaching trials with the designated relation(s). Examine your supervisee's graphs and review the quality of the graph using the *Graph Component Checklist* (Appendix E). Provide specific feedback to your supervisee on how they can improve their graph. Then, ensure the data sheets for the teaching trials are randomized and contain the relevant relations. Observe your supervisee's session and collect data simultaneously.

Performance Feedback

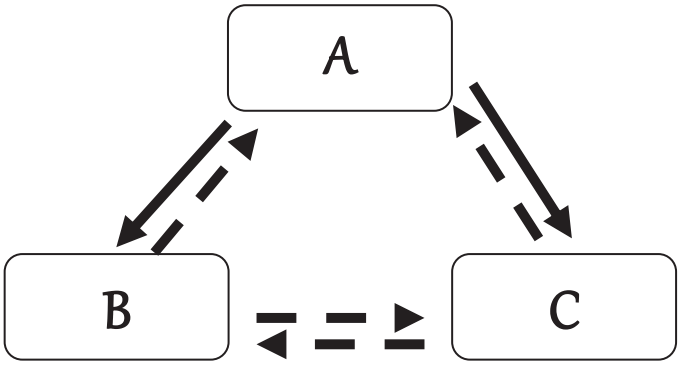
After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and your supervisee's data. Then, provide feedback to your supervisee according to the *EBI Procedural Fidelity Checklist*. Feedback should include praise for correctly implemented components and corrective feedback for incorrectly implemented components. Model the components in need of correction and provide the opportunity for role play and questions.

Mastery Criterion: In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role play and feedback.

Future Growth

☐ Observe your supervisee conduct post-teaching probes.
☐ Observe your supervisee provide feedback to another trainee on their use of equivalence-based instruction.

Appendix A: Teach or Probe



A stimulus = _____

B stimulus = _____

C stimulus = _____

Specify the relations to be taught and the relations to be probed. Describe the trials for each.

Teach:

Teach:

Probe:

Probe:

Probe:

Probe:

Appendix B: Create a Visual

	1	2	3
A			
B			
C			

Appendix C: Stimulus Equivalence Teaching Plan

1. Identify stimuli for class formation (at least three).

2. Identify class members (at least three).

3. Develop a table specifying stimuli and class members.

4. Determine training structure (i.e., one-to-many or many-to-one). Select node stimulus set and specify which relations will be directly taught.

   Training structure:

   Node stimulus set:

5. Describe probe trials including implementer behavior, sample and comparison stimuli and the learner behavior.

6. Describe teaching procedures including implementer behavior, sample and comparison stimuli, prompt hierarchies, schedule of reinforcement, and the learner behavior.

7. Select mastery criterion for taught relations and class formation.

8. Plan for post-training probes.

Appendix D: Hypothetical Data

	1	2	3
A	CHAT	CHIEN	POISSON
B	KATZE	HUND	FISCH
C	CAT	DOG	FISH

Pretraining probe

Relation: A=C Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Chat	1	L M R	Correct	Incorrect	No Response
Chien	2	L M R	Correct	Incorrect	No Response
Poisson	3	L M R	Correct	Incorrect	No Response
Poisson	4	L M R	Correct	Incorrect	No Response
Chien	5	L M R	Correct	Incorrect	No Response
Chat	6	L M R	Correct	Incorrect	No Response
Chat	7	L M R	Correct	Incorrect	No Response
Chien	8	L M R	Correct	Incorrect	No Response
Poisson	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: A=C Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Chien	1	L M R	Correct	Incorrect	No Response
Poisson	2	L M R	Correct	Incorrect	No Response
Chat	3	L M R	Correct	Incorrect	No Response
Poisson	4	L M R	Correct	Incorrect	No Response
Chien	5	L M R	Correct	Incorrect	No Response
Chat	6	L M R	Correct	Incorrect	No Response
Chat	7	L M R	Correct	Incorrect	No Response
Poisson	8	L M R	Correct	Incorrect	No Response
Chien	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Pretraining probe

Relation: A=B Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Chat	1	L M R	Correct	Incorrect	No Response
Chien	2	L M R	Correct	Incorrect	No Response
Poisson	3	L M R	Correct	Incorrect	No Response
Poisson	4	L M R	Correct	Incorrect	No Response
Chien	5	L M R	Correct	Incorrect	No Response
Chat	6	L M R	Correct	Incorrect	No Response
Chat	7	L M R	Correct	Incorrect	No Response
Chien	8	L M R	Correct	Incorrect	No Response
Poisson	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: A=B Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Chien	1	L M R	Correct	Incorrect	No Response
Poisson	2	L M R	Correct	Incorrect	No Response
Chat	3	L M R	Correct	Incorrect	No Response
Poisson	4	L M R	Correct	Incorrect	No Response
Chien	5	L M R	Correct	Incorrect	No Response
Chat	6	L M R	Correct	Incorrect	No Response
Chat	7	L M R	Correct	Incorrect	No Response
Poisson	8	L M R	Correct	Incorrect	No Response
Chien	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Pretraining probe

Relation: B=A Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Katze	1	L M R	Correct	Incorrect	No Response
Hund	2	L M R	Correct	Incorrect	No Response
Fisch	3	L M R	Correct	Incorrect	No Response
Katze	4	L M R	Correct	Incorrect	No Response
Fisch	5	L M R	Correct	Incorrect	No Response
Hund	6	L M R	Correct	Incorrect	No Response
Hund	7	L M R	Correct	Incorrect	No Response
Katze	8	L M R	Correct	Incorrect	No Response
Fisch	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: B=A Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Fisch	1	L M R	Correct	Incorrect	No Response
Katze	2	L M R	Correct	Incorrect	No Response
Hund	3	L M R	Correct	Incorrect	No Response
Hund	4	L M R	Correct	Incorrect	No Response
Fisch	5	L M R	Correct	Incorrect	No Response
Katze	6	L M R	Correct	Incorrect	No Response
Katze	7	L M R	Correct	Incorrect	No Response
Fisch	8	L M R	Correct	Incorrect	No Response
Hund	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Pretraining probe

Relation: B=C Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Katze	1	L M R	Correct	Incorrect	No Response
Hund	2	L M R	Correct	Incorrect	No Response
Fisch	3	L M R	Correct	Incorrect	No Response
Katze	4	L M R	Correct	Incorrect	No Response
Fisch	5	L M R	Correct	Incorrect	No Response
Hund	6	L M R	Correct	Incorrect	No Response
Hund	7	L M R	Correct	Incorrect	No Response
Katze	8	L M R	Correct	Incorrect	No Response
Fisch	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: B=C Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Fisch	1	L M R	Correct	Incorrect	No Response
Katze	2	L M R	Correct	Incorrect	No Response
Hund	3	L M R	Correct	Incorrect	No Response
Hund	4	L M R	Correct	Incorrect	No Response
Fisch	5	L M R	Correct	Incorrect	No Response
Katze	6	L M R	Correct	Incorrect	No Response
Katze	7	L M R	Correct	Incorrect	No Response
Fisch	8	L M R	Correct	Incorrect	No Response
Hund	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Pretraining probe

Relation: C=A Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Dog	1	L M R	Correct	Incorrect	No Response
Cat	2	L M R	Correct	Incorrect	No Response
Fish	3	L M R	Correct	Incorrect	No Response
Cat	4	L M R	Correct	Incorrect	No Response
Dog	5	L M R	Correct	Incorrect	No Response
Fish	6	L M R	Correct	Incorrect	No Response
Dog	7	L M R	Correct	Incorrect	No Response
Fish	8	L M R	Correct	Incorrect	No Response
Cat	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: C=A Instruction: “Find [target]”					
Target	Trial #	Target position	Response		
Fish	1	L M R	Correct	Incorrect	No Response
Cat	2	L M R	Correct	Incorrect	No Response
Dog	3	L M R	Correct	Incorrect	No Response
Dog	4	L M R	Correct	Incorrect	No Response
Fish	5	L M R	Correct	Incorrect	No Response
Cat	6	L M R	Correct	Incorrect	No Response
Cat	7	L M R	Correct	Incorrect	No Response
Dog	8	L M R	Correct	Incorrect	No Response
Fish	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Pretraining probe

Relation: C=B Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Dog	1	L M R	Correct	Incorrect	No Response
Cat	2	L M R	Correct	Incorrect	No Response
Fish	3	L M R	Correct	Incorrect	No Response
Cat	4	L M R	Correct	Incorrect	No Response
Dog	5	L M R	Correct	Incorrect	No Response
Fish	6	L M R	Correct	Incorrect	No Response
Dog	7	L M R	Correct	Incorrect	No Response
Fish	8	L M R	Correct	Incorrect	No Response
Cat	9	L M R	Correct	Incorrect	No Response
		% Correct:			

Post-training probe

Relation: C=B Instruction: "Find [target]"					
Target	Trial #	Target position	Response		
Fish	1	L M R	Correct	Incorrect	No Response
Cat	2	L M R	Correct	Incorrect	No Response
Dog	3	L M R	Correct	Incorrect	No Response
Dog	4	L M R	Correct	Incorrect	No Response
Fish	5	L M R	Correct	Incorrect	No Response
Cat	6	L M R	Correct	Incorrect	No Response
Cat	7	L M R	Correct	Incorrect	No Response
Dog	8	L M R	Correct	Incorrect	No Response
Fish	9	L M R	Correct	Incorrect	No Response
		% Correct:			

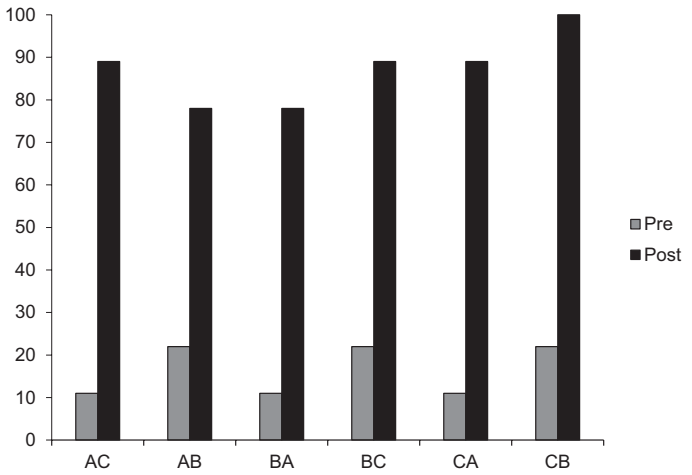


Fig. D.1 *Note.* This is not the only way to graph these data. We wanted to provide one example to support your instruction

Appendix E: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizontal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix F: EBI Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes – = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied Behavior Analysis*, eBook. Pearson Higher Ed.

Giannakakos, A. R., Vladescu, J. C., Reeve, K. F., Kisamore, A. N., Fienup, D. M., & Carrow, J. N. (2021). Using behavioral skills training and equivalence-based instruction to teach children safe responding to dangerous stimuli: A proof of concept. *The Psychological Record, 71*(1), 119–131. https://doi.org/10.1007/s40732-020-00380-8

Hanson, R. J., Sordello, J., Engell, T. S., & Miguel, C. F. (2022). The use of the go/no-go successive matching-to-sample procedure with nonverbal auditory stimuli to establish equivalence classes and speaker behavior. *The Analysis of Verbal Behavior*, 1–11. https://doi.org/10.1007/s40616-022-00165-w

Hill, K. E., Griffith, K. R., & Miguel, C. F. (2020). Using equivalence-based instruction to teach piano skills to children. *Journal of Applied Behavior Analysis, 53*(1), 188–208. https://doi.org/10.1002/jaba.547

Miguel, C. F., & Petursdottir, A. I. (2009). Naming and frames of coordination. In *Derived relational responding: Applications for learners with autism and other developmental disabilities* (pp. 129–148).

Sidman, M. (1971). Reading and auditory-visual equivalences. *Journal of Speech and Hearing Research, 14*(1), 5–13. https://doi.org/10.1044/jshr.1401.05

Sidman, M. (2018). What is interesting about equivalence relations and behavior? *Perspectives on Behavior Science, 41*(1), 33–43. https://doi.org/10.1007/s40614-018-0147-8

Stanley, C. R., Belisle, J., & Dixon, M. R. (2018). Equivalence-based instruction of academic skills: Application to adolescents with autism. *Journal of Applied Behavior Analysis, 51*(2), 352–335. https://doi.org/10.1002/jaba.446

Chapter 22
High-P Instructional Sequence

Topics Covered Within This Chapter

Topics
Introduction
Practical Recommendations
Advantages and Disadvantages

Antecedent-based interventions to reduce challenging behavior are those in which the intervention is applied prior to the occurrence of the challenging behavior. Antecedent-based interventions have many advantages, particularly in the treatment of noncompliant behavior. First and foremost, if effective, antecedent-based interventions prevent a challenging behavior from occurring. Many challenging behaviors are associated with risks, such as harm to self or others, or stigmatization; therefore, prevention is highly beneficial. Second, commonly used consequence-based interventions may inadvertently reinforce challenging behavior. For example, parents and teachers may deliver a vocal reprimand in response to noncompliant behavior, which is actually maintained by attention; thus, unintentionally strengthening the attention-maintained noncompliant behavior. Similarly, clinicians may deliver a time out contingent upon disruptive behavior, unknowingly strengthening escape-maintained disruptive behavior. With such significant advantages to antecedent-based interventions, your supervisees should hone their skills in developing and implementing antecedent-based interventions.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_22].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_22

A high-probability instructional sequence is an antecedent-based intervention that has been successfully applied to numerous topographies of challenging behavior within various settings (Lipschultz & Wilder, 2017). A high-probability instructional sequence consists of the rapid presentation of several high-probability (high-p) instructions (i.e., instructions with which the client is likely to comply) followed by a low-probability (low-p) instruction (i.e., instruction with which the client is unlikely to comply; Mace et al., 1988).

The mechanism by which a high-p instructional sequence is effective is based upon the behavior momentum theory (Nevin et al., 1983; Nevin, 1996). The behavior momentum theory is a metaphor based upon the concept of physical momentum. That is, objects with a greater mass and velocity have a stronger resistance to environmental changes relative to objects with a lesser mass and velocity. Behavior momentum postulates that increasing the rate of reinforcement in the presence of a discriminative stimulus increases resistance to behavior disruptions such as punishment or extinction (Nevin & Grace, 2000; Nevin & Shahan, 2011). An additional theory is that the high-p instructional sequence serves as an abolishing operation that reduces the potency of reinforcement, likely escape, for challenging behavior frequently occasioned by a low-p request (Michael, 1993). See Chap. 13 for a thorough review of motivating operations.

High-p instructional sequences are implemented to both reduce noncompliant challenging behavior (e.g., property destruction, crying, aggression) and to increase compliance with instructions. High-p instructional sequences have been successfully implemented with individual of all ages and variety of diagnoses as well as implemented in a myriad of settings (Lee, 2005; Lipschultz & Wilder, 2017). Moreover, high-p instructional sequences have improved compliance with a variety of tasks. These include increased compliance with academic tasks (e.g., Lee et al., 2004), classroom behavior expectations (e.g., Axelrod & Zank, 2012), daily living tasks (e.g., Bullock & Normand, 2006), social interactions (e.g., Jung et al., 2008), food acceptance (Silbaugh et al., 2020), and medical procedures (e.g., Riviere et al., 2011).

Practical Recommendations

High-p instructional sequences have been well studied, which provides many evidence-based, practical recommendations for clinicians. First, high-p instructions should both be in the client's repertoire and should be empirically validated. Generally, instructions in which the client complies at least 80% of opportunities are considered a high-p instruction (Axelrod & Zank, 2012; Belfiore et al., 2008; Mace et al., 1988). On the other hand, if a client complies with an instruction 40% of opportunities or less, it is typically considered a low-p instruction. See Axelrod and Zank (2012) for a complete description of procedures to evaluate instructions for potential inclusion into the high-p sequence.

Clinicians should deliver 3–5 high-p instructions prior to delivering a low-p instruction (Mace, 1996). Moreover, instructions should be delivered rapidly, with only a 1- to -5-second interval between instructions (Pitts & Dymond, 2012; Wilder et al., 2015). As compliance with low-p instructions begins to increase, the number of high-p instructions can be decreased, but the rapid succession of high-p instructions should be held constant. Axelrod and Zank (2012) initiated a high-p instructional sequence with a 3:1 high-p to low-p ratio for two participants. They successfully faded to a 1:1 ratio for one participant while maintaining high compliance with the low-p instruction, but did not achieve similar success with the other participant. Consequently, encourage your supervisees to vigilantly track compliance data if attempting to fade the ratio of high-p to low-p instructions.

Reinforcement of the high-p instructional sequence is a critical component to success. While it is important to recognize and praise compliance with high-p instructions, Mace and Belfiore (1990) found that praise for high-p compliance is often insufficient. Compliance with low-p instructions is improved when high-p compliance is reinforced with access to preferred stimuli and activities, rather than praise alone (Pitts & Dymond, 2012). Moreover, higher preferred reinforcement of high-p compliance increases compliance with low-p instructions relative to lower preferred reinforcement of high-p compliance (Wilder et al., 2015). In other words, simply selecting a verified reinforcer is not sufficient; clinicians must select highly preferred reinforcers to deliver contingent upon compliance with high-p instructions.

Interestingly, some research has discovered that the delivery of preferred consequences on a fixed-time schedule, independent of compliance with high-p instructions, had a similar effect as high-p instructions followed by reinforcement (Bullock & Normand, 2006; Normand & Beaulieu, 2011). For example, Normand and Beaulieu (2011) delivered preferred items on a fixed-time schedule (i.e., every 10 seconds) prior to delivering a low-p instruction. Compliance improved for one of the three low-p instructions across both participants. This suggests that the contingency between high-p instruction compliance and access to preferred stimuli is, in some cases, unnecessary for effectiveness. Unfortunately, more research is necessary to differentiate between circumstances facilitating the success of a fixed-time delivery of preferred stimuli as opposed to contingent reinforcement for high-p compliance. Therefore, clinicians who apply the fixed-time approach should carefully monitor low-p compliance data.

As with any intervention, a high-p instructional sequence is not a silver bullet to improve compliance and decrease challenging behavior in all cases (e.g., Rortvedt & Miltenberger, 1994). In situations in which a high-p instruction sequence does not result in acceptable levels of behavior change, clinicians have improved the effectiveness of the intervention by combining it with additional strategies such as escape extinction (e.g., Dawson et al., 2003; Zarcone et al., 1993).

Advantages and Disadvantages

High-p instructional sequences possess all the aforementioned advantages associated with antecedent-based interventions. These include the possibility of preventing challenging behavior, which decreases risk of injury, disruption, and stigmatization. Additionally, commonly implemented punishment procedures (e.g., reprimand, time-out) run the risk of inadvertent reinforcement of challenging behavior, particularly if functional analysis results are unavailable. On the contrary, high-p instructional sequences can be safely applied to challenging behavior for which the function is unknown without such risk of inadvertent reinforcement. That being said, high-p instructional sequences are particularly well suited for escape-maintained challenging behavior. In addition to general advantages of antecedent-based interventions, a high-p instructional sequence may specifically be favored for clients who find physical guidance aversive. Noncompliant behavior is frequently addressed with physical prompting or physical guidance, followed by differential reinforcement. However, for some clients, physical prompting is aversive and would likely only serve as an establishing operation for escape; thus, exacerbating the challenging behavior evoked by the instruction and subsequent prompting.

High-p instructional sequences also present some disadvantages. First and foremost, they are not effective in all situations. Unfortunately, research has not thoroughly distinguished between characteristics of the participant, setting, challenging behavior, or other relevant variables that may influence the success of a high-p instructional sequence, or the lack thereof. Similarly, there are many procedural variations across the literature (e.g., number of high-p instructions, speed at which high-p instructions are delivered). Current research determining the best practices across these variations is continuing to unfold. As a result, clinicians may have to make professional judgments when finalizing procedures associated with a high-p instructional sequence and be prepared to monitor and modify as needed.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Introduction to High-P Instructional Sequence
15:00–40:00	Role Play
40:00–55:00	Identifying High-P Instructions
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *High-P Instructional Sequence Procedural Fidelity Checklist*, 2 copies per supervisee
- One primary color identification flashcards (may use colored construction paper if needed)
- Appendix B: *High-P Instructional Sequence Demonstration and Role-Play Guide*, 1 copy for supervisor
- Appendix C: *High-P Instructional Sequence Data Sheet*, 2 copies per supervisee
- Appendix D: *Role-Play Instructions*, 2 copies per supervisee
- Appendix E: *Identifying High-P and Low-P Instructions Data Sheet*, 1 copy per supervisee
- Appendix F: *Example Identifying High-P and Low-P Instructions Data Sheet*, 1 copy per supervisee
- Set of flashcards with numerals 0–9 (can be homemade with index cards), one set per two supervisees

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Axelrod and Zank (2012)
- Lipschultz and Wilder (2017)
- Riviere et al. (2011)
- Zarcone et al. (1993)

Introduction to High-P Instructional Sequence

Begin your supervision meeting by asking your supervisees to describe the difference between antecedent-based and consequence-based interventions. Ensure that they have a solid conceptualization of the distinction between the two categories by soliciting examples of antecedent-based and consequence-based interventions to reduce challenging behavior. It may also be helpful to have supervisees explain why a specific intervention is considered an antecedent-based versus a consequence-based intervention.

Introduce the steps to delivering a high-p instructional sequence. Distribute two copies of *High-P Instructional Sequence Procedural Fidelity Checklist* (Appendix A) to each of your supervisees as you review the steps (the second copy will be used in the upcoming role-play activity). Vocally review the steps and then solicit questions from your supervisees. After answering any questions, ask for a volunteer to assist you in demonstrating the implementation of a high-p instructional sequence.

As you begin your demonstration, inform your supervisees that the target low-p instructions are identifying primary colors when presented on flashcards, but for the purpose of this activity, we will limit to a single target (e.g., red) to simplify the demonstration and focus on the critical features of a high-p instructional sequence. Second, inform your supervisees that you have previously identified high-p instructions. These include the following: (a) touch nose, (b) touch ear, (c) clap, (d) when is your birthday, (e) stand on one foot, (f) how old are you, (g) show me a smile, (h) how many fingers (2), (i) what is your name, and (j) how many fingers (3). Additionally, inform your supervisees that after completing a preference assessment, you confirmed that high fives and fist bumps are highly preferred reinforcers and 10-second access to a tablet or smart phone is the highest preferred reinforcer. Ask the supervisee assisting you with the demonstration to comply to the vast majority of high-p instructions and most low-p instructions. Additionally, ask the supervisee to engage the challenging behavior, stomping the floor, during a few trials. The purpose of high, but not perfect, compliance and low, but not zero, levels of challenging behavior is so that supervisees can focus their attention on how the high-p instruction sequence should be delivered in the best case scenario (i.e., when effective). Troubleshooting for instances in which a high-p instructional sequence is not as effective will be addressed after this demonstration.

Once the ground rules have been established, use *High-P Instruction Demonstration Guidance* (Appendix B) to guide your demonstration. We provided guidance for five trials. If after the first three trials, your supervisee who is role playing as a client has complied to all high-p and low-p instructions and/or failed to engage in challenging behavior, remind them to do so in upcoming trials. Feel free to add additional trials in the demonstration if needed.

If you have time remaining after sufficient demonstration of the procedures, use the last few minutes to demonstrate how you would fade the number of high-p instructions. Although the current literature base lacks clarity regarding the most effective fading procedure, we recommend teaching your supervisees to reduce by one high-p instruction while continuing to monitor compliance and challenging behavior. For example, if initially implementing a high-p instructional sequence in which the client must comply with four consecutive high-p instructions prior to delivery of the low-p instruction, reduce that criterion to three consecutive high-p instructions. If both compliance and challenging behavior remain similar to levels when more high-p instructions were delivered, continue to remove one high-p instruction at a time. Remind supervisees that the ratio of high-p to low-p instructions required for effectiveness will vary across clients.

Finally, introduce the *High-P Instructional Sequence Data Sheet* (Appendix C). Quickly review the components of the form and allow supervisees to ask questions for clarification. After a thorough review, repeat the demonstration, but encourage the supervisee role playing as the client to fail to comply to low-p instructions or emit challenging behavior in response to the low-p instructions in about half of the demonstration trials. After demonstrating the first trial, pause the demonstration and report to your supervisees how data should have collected on the form. Repeat the second trial in a similar fashion. Slowly reduce support across trials until your

supervisees are able to reliably collect data across a few trials, with no pauses to offer guidance or feedback. This may require you to repeat the five trials presented in Appendix B a few times.

After completing the demonstrations, spend a few minutes discussing how to modify a high-p instructional sequence if compliance and/or challenging behavior fails to meet desired levels. Specifically, explain that the high-p instructional sequence can be combined with other procedures (e.g., escape extinction). Discuss the Zarcone et al. (1993) study in which additional procedures were required for optimal outcomes.

Role Play

For the next 25 minutes, you will provide your supervisees with an opportunity to role-play. Randomly assign supervisees to groups of three. One supervisee will implement the high-p instructional sequence and collect data on the confederate client's behavior, one supervisee will role-play as the client, and the last supervisee will collect data on both the client's behavior and the supervisee's fidelity of implementation. In some cases, you may need to join a group of supervisees (e.g., if you only have two supervisees in your group supervision meeting). Distribute and review the *Role-Play Instructions* (Appendix D) with your supervisees, pointing out the client's learning objective (i.e., low-p instruction), operational definitions of compliance and challenging behavior, previously validated high-p instructions, the low-p instructions, and the client's preferred reinforcers. Instruct each supervisee to randomly assign high-p instructions across the 15 trials. We highly recommend you use a random number generator to do so. Each supervisee should complete their own document so the group has three unique guides.

Inform your supervisees that they will have 6 minutes to complete the first role play consisting of 15 trials. Ask them to assign who will play each role in the first role play and then instruct them to begin. One minute prior to the end of the first role play, notify your supervises that they have 1 minute remaining. After the 6 minutes has elapsed, allow your supervisees 2 minutes to discuss data. Your supervisees should determine the inter-rater reliability of client data between the supervisee serving as the implementer and the supervisee also collecting data on client behavior. Additionally, the supervisee collecting data on fidelity of implementation should share those data with the supervisee who implemented, providing specific guidance on how to improve the implementation, when applicable. Repeat this 8-minute block (6-minute role play, 2-minute discussion) two more times so that each supervisee has completed each of the three tasks/roles. As supervisees complete the role-play activity, be sure to move between each group to offer additional guidance and feedback.

Identifying High-P Instructions

After completing the role play, you will prepare your supervisees for identifying high-p instructions. Distribute the *Identifying High-P and Low-P Instructions Data Sheet* (Appendix E). Review the instructions with supervisees. Emphasize that this assessment is to be conducted across multiple sessions so that the instructions can be embedded into ongoing activities. Review how to (a) collect data, (b) calculate the percent of trials with compliance, and (c) identify high-p or low-p instructions based on this percentage. Provide supervisees ample opportunity to ask questions.

Next, distribute the *Example: Identifying High-P and Low-P Instructions Data Sheet* (Appendix F). Explain that this is an example of a data sheet and that they will use this to practice administering the assessment. Remind your supervisees that this practice differs from real implementation because in practice they will rapidly present trials one after another; whereas in real application, they will deliver instructions throughout multiple sessions, embedded as seamlessly into natural routines and activities as possible. However, for the sake of efficiency, they are unable to practice administration in this fashion. Despite the modification to mass trials, this role play will allow your supervisees to gain experience delivering instructions without prompts, praise, reinforcement, or correction. Additionally, the practice provides supervisees an opportunity to gain experience collecting data.

Ask your supervisees to divide into pairs. During this role play, one supervisee will administer the assessment, while the other will role-play as a client. Instruct your supervisees role playing as the client to comply with some instructions, but not with others. Explain that while it is possible some instructions will evoke challenging behavior in real-life administration, ask your supervisees to refrain from frequent or significant challenging behavior so that their partner can concentrate on learning the assessment process before also learning how to administer the assessment while managing additional challenges. Moreover, instruct the supervisee role playing as a client to provide feedback to the supervisee administering the assessment, particularly if they observe errors in implementation. This is particularly important because procedural fidelity is not being measured during this activity, so they must rely on one another's anecdotal feedback.

Each supervisee will have 5 minutes to practice administration. During this time, they should aim to deliver each instruction at least twice and in a random order. You will monitor their time while they role-play, providing a notification when 1 minute is remaining. After the 5 minutes is completed, instruct supervisees to work together to calculate the percent compliance for each instruction and discuss feedback regarding implementation. When completed, switch roles and conduct an additional 5-minute role play followed by data analysis and feedback. Use the last 1 or 2 minutes of this activity to discuss questions or comments as a group.

Knowledge Check

1. What is the difference between an antecedent-based and consequence-based intervention?
2. For what two behaviors are data collected when implementing a high-p instructional sequence?
3. How many high-p instructions should be delivered prior to the low-p instruction?
4. What is the ideal duration of time between instructions?
5. What criterion is used to identify a high-p instruction? What is the assessment process for applying this criterion?

Homework for Individual Supervision without a Client

1. Develop an assessment to identify high-p and low-p instructions for a client using Appendix E. At least 48 hours prior to the next meeting, send the assessment to your supervisor.
2. Review the steps to implementing a high-p instructional sequence to prepare for a role-play evaluation.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 40-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review the Completed Identifying High-P and Low-P Instructions Data Sheet
10:00–20:00	Calculate Example Data on High-P and Low-P Data Sheet
20:00–30:00	Develop High-P Instructional Sequence
30:00–40:00	Role Play Delivering High-P Instructional Sequence

Materials Needed

- Appendix A: *High-P Instructional Sequence Procedural Fidelity Checklist*, 1 copy
- Appendix C: *High-P Instructional Sequence Data Sheet*, 1 copy
- Appendix E: *Identifying High-P and Low-P Instructions Data Sheet*, 2 copies (one for supervisor and one for supervisee)
- Appendix G: *Identifying High-P Instructions Data Sheet: Data Analysis Practice*, 2 copies
- Appendix H: *High-P Instructional Sequence Planning Guide*, 1 copy
- Set of flashcards with numerals 0–9 (one set)
- Pen or pencil
- 10 scrap pieces of paper (that can be tossed into the trash)

Review High-P and Low-P Instructions Data Sheet Completed by Supervisee

Your supervisee should send you the completed *Identifying High-P and Low-P Instructions Data Sheet* (Appendix E) for their client's assessment at least 48 hours prior to the meeting. Prior to the meeting, review the form and note any questions, praises, or corrections you have regarding the plan. When you begin the meeting, spend the first 10 minutes discussing the client's assessment. When you determine your supervisee's plan is of sufficient quality to implement with their client, move to the next activity.

Calculate Example Data on High-P and Low-P Data Sheet

Using the *Identifying High-P and Low-P Instructions Data Collection Sheet: Data Analysis Practice* (Appendix G), you and your supervisee will calculate the percent compliance for each instruction. We recommend demonstrating how to calculate the percent compliance for the first few instructions. Then ask your supervisee to calculate the percent compliance for several instructions, one-at-a time, so you can verify the accuracy of their calculation. Once your supervisee has calculated the percent compliance correctly for a few instructions, allow them to complete the calculation for the remaining instructions. Once the calculations are complete, ask your

supervisee to identify the high-p and low-p instructions, based on these data. Below is an answer sheet to quickly check the work.

Instruction	Percent correct	Instruction type
Pick up [writing utensil].	100%	High-P
Put down [writing utensil].	40%	Low-P
Slide chair to table/desk.	20%	Low-P
Put hands on table/desk.	90%	High-P
Put hands in lap.	80%	High-P
Smile.	40%	Low-P
Look at me.	20%	Low-P
Stand up.	90%	High-P
Sit down.	100%	High-P
Put [item] in trash.	10%	Low-P
Walk to table/desk/chair.	50%	
Put [material] away.	50%	
Hand me [material].	40%	Low-P
Read numeral 1 from flashcard.	100%	High-P
Read numeral 2 from flashcard.	100%	High-P
Read numeral 3 from flashcard.	100%	High-P
Read numeral 4 from flashcard.	90%	High-P
Read numeral 5 from flashcard.	100%	High-P
Read numeral 6 from flashcard.	90%	High-P
Read numeral 7 from flashcard.	100%	High-P
Read numeral 8 from flashcard.	90%	High-P
Read numeral 0 from flashcard.	100%	High-P
Raise your hand.	70%	
Draw a circle.	60%	
Draw a square.	60%	
Draw a triangle.	40%	Low-P
Write your name.	80%	High-P
Touch your nose.	100%	High-P
Touch your knee.	90%	High-P
Touch your elbow.	80%	High-P
Touch your ears.	100%	High-P
Take 2 steps forward.	50%	
Take 2 steps backward.	60%	
Take 2 steps to the side.	30%	Low-P
What is your name?	90%	High-P
How many? (holding up 1 finger)	100%	High-P
How many? (holding up 2 fingers)	100%	High-P
How many? (holding up 3 fingers)	100%	High-P
How many? (holding up 4 fingers)	90%	High-P
How many? (holding up 5 fingers)	90%	High-P

Develop a High-P Instructional Sequence

In order to gain experience empirically identifying high-p and low-p instructions, you will work collaboratively with your supervisee to develop a fictional high-p instructional sequence plan using Appendix H. After identifying the high-p and low-p instructions in the previous activity, provide your supervisee with Appendix H. Review the instructions together. Encourage your supervisee to complete the planning guide with as much independence as possible, providing prompts, praise, and correction as needed. We highly encourage you and your supervisee to use a random number generator to randomly select and order of the high-p instruction for each of the 15 trials.

Role Play High-P Instructional Sequence

Now that you and your supervisee developed a high-p instructional sequence, you will provide your supervisee with the opportunity to implement. You will play the role of the client. You will also discretely collect data on procedural fidelity using Appendix A. Your supervisee will implement and collect data using Appendix C. We have allotted 10 minutes for the role-play activity. This should be divided into about 5–7 minutes of role play and 3–5 minutes to review the accuracy of data collection and deliver feedback regarding implementation fidelity.

Homework Review

During your upcoming supervision meeting with a client, you will observe your supervisee implementing a high-p instructional sequence with a client. In order to implement this intervention, they must first identify high-p and low-p instructions, using Appendix E. It is likely that your supervisee has anecdotally identified some instructions for which the client demonstrates low compliance. Remind your supervisee that such instructions need to be validated; therefore, included in the assessment. After empirically identifying high-p and low-p instructions, your supervisee should select a single low-p instruction to target. Using the information gathered, your supervisee can prepare both a high-p instructional sequence plan (Appendix H) and use this to develop a procedural fidelity checklist using Appendix A. Finally, they will need to develop a data sheet (Appendix C).

Homework for Individual Supervision with a Client

1. Identify high-p and low-p instructions, using Appendix E.
2. Develop high-p instructional sequence plan, using Appendix H.
3. Prepare a data sheet, using Appendix C.
4. At least 48 hours prior to the meeting, share all three documents with your supervisor.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 50-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–10:00	Provide Feedback Regarding Instructional Plan and Data Collection
10:00–40:00	Observe High-P Instructional Sequence
40:00–50:00	Performance Feedback

Materials Needed

- Supervisee-developed High-p Instructional Sequence Plan
- Supervisee developed High-p Instructional Sequence Procedural Fidelity Checklist
- Supervisee-developed data sheet
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Instructional Plan and Data Collection

Your supervisee should have provided you with a completed high-p and low-p identification assessment (Appendix E), an instructional plan (Appendix H), a procedural fidelity checklist (Appendix A), and data sheet (Appendix C) 48 hours prior to this meeting. Review these documents to confirm that your supervisee has completed the assessment and planning accurately. Note items to praise for accuracy and items to correct prior to the high-p instructional sequence being implemented. For the first 10 minutes of this session, meet with your supervisee to discuss your feedback. We recommend meeting without the client present so that all attention can be directed to this discussion. For example, perhaps you meet with your supervisee prior to client's arrival that morning, during a break in your supervisee's schedule, or over lunch prior to the client's session. If significant changes must be made, the supervision meeting with a client will need to be postponed in order to give your supervisee ample time to prepare. However, we do not anticipate that will often be the case.

Observe High-P Instructional Sequence

You will observe your supervisee implementing a high-p instructional sequence for up to 30 minutes. You may wish to divide this 30-minute observation to two 15-minute observations or three 10-minute observations based on the needs of the client and supervisee. Similarly, you are welcome to extend the total duration of observation.

During the observation, measure procedural fidelity using Appendix A and collect data on the client behavior using individualized data sheet your supervisee developed, using the template provided in Appendix C. If it is difficult to measure both supervisee and client behaviors simultaneously, divide your observation period in half, collect client data during the first half and supervisee procedural fidelity data during the second half. We recommend collecting client data first to improve the ease in which you can align your data sheet with that of your supervisees for accurate calculation of IOA.

Performance Feedback

During your final 10 minutes, you will provide performance feedback to your supervisee. Deliver feedback when you will not disrupt ongoing client services so that your supervisee will be able to allocate full attention to the feedback. Begin by delivering performance feedback regarding the fidelity of implementation. As always, praise steps completed accurately and correct errors. Provide rationales regarding why correction is needed. Invite your supervisee to ask questions and role-play steps in which your supervisee needs continued support. Next, compare data collected on client behavior. Ask you supervisee to calculate IOA. Discuss discrepancies and any possible steps for improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must implement a high-p instruction sequence and (a) accurately collect data with at least 80% agreement and (b) implement the high-p instructional sequence with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement a high-p instructional sequence with the same client, but with two or more low-p instructions targeted during each session.
- ☐ Evaluate your supervisee's ability to implement a high-p instructional sequence with a different client.
- ☐ Evaluate your supervisee's ability to teach a caregiver or new service provider how to implement a high-p instructional sequence.

Appendix A: High-P Instructional Sequence Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

	Step	Implemented Correctly? + = Yes – = No
1	Prior to implementation, at least 10 high-p instructions have been empirically validated.	
2	Prior to implementation, randomized blocks of 5–10 high-p instructions are established.	
3	The supervisee delivers a high-p instruction every 1–5 seconds.	
4	Contingent upon compliance with a high-p instruction, the supervisee delivers praise and [insert-high preferred reinforcer].	
5	If the client fails to comply with a high-p instruction, the supervisee ignores the noncompliance and delivers another high-p instruction within 5 seconds.	
6	The supervisee continues to deliver high-p instructions until the client complies with at least 3 consecutive high-p instructions, but as many as 5 consecutive high-p instructions.	
7	After compliance with 3 – 5 consecutive high-p instructions, the supervisee delivers a low-p instruction.	
8	Contingent upon compliance with a low-p instruction, the supervisee delivers praise and [insert highest-preferred reinforcer].	
9	If the client fails to comply with a low-p instruction, the supervisee ignores the noncompliance and the trial is terminated.	
10	The supervisee ignores challenging behavior (unless otherwise stated in a behavior reduction plan).	

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Appendix B: High-P Instructional Sequence Demonstration and Role-Play Guide

Instructions: Follow the order of high-p instructions for each trial. After compliance with the 3–5 consecutive high-p instructions, deliver the low-p instruction, color identification. For the purpose of simplifying the role play, maintain a single low-p instruction target throughout trials (e.g., only present the red flashcard). High-p instructions include 6 instructions per trial for trials in case the 3-instruction-compliance criterion is not met within first three instructions.

Trial 1

1. Stand on one foot.
2. How many fingers (holding 3 fingers)?
3. Touch your ear.
4. How old are you?
5. When is your birthday?
6. Touch your nose.

Trial 2

1. Touch your ear.
2. Touch your nose.
3. How many fingers (holding 3 fingers)?
4. Show me a smile.
5. Stand on one foot.
6. When is your birthday?

Trial 3

1. How many fingers (holding 2 fingers)?
2. Stand on one foot.
3. Touch your ear.
4. How old are you?
5. Show me a smile.
6. Clap your hands.

Trial 4

1. Stand on one foot.
2. Clap your hands.
3. Touch your nose.
4. What is your name?
5. Touch your ear.
6. How old are you?

Trial 5

1. What is your name?
2. When is your birthday?
3. What is your name?
4. How many fingers (holding 2 fingers)?
5. Touch your ear.
6. How many fingers (holding 3 fingers)?

Appendix C: High-P Instructional Sequence Data Sheet

Client: _____

Date: _____ Time: _____

Observer One: _____ Observer Two: _____

Compliance (operational definition): _____

_____

Challenging Behavior (operational definition): _____

_____

Instructions: For each trial, circle if the client complied with the low-p instruction and if the client engaged in challenging behavior. Calculate percent correct on bottom row. If teaching multiple targets, note the target for each trial in the notes column and calculate the percent correct per target, when applicable.

Trial	Low-P Compliance?		Challenging Behavior?		Notes
1	Yes	No	Yes	No	
2	Yes	No	Yes	No	
3	Yes	No	Yes	No	
4	Yes	No	Yes	No	
5	Yes	No	Yes	No	
6	Yes	No	Yes	No	
7	Yes	No	Yes	No	
8	Yes	No	Yes	No	
9	Yes	No	Yes	No	
10	Yes	No	Yes	No	
11	Yes	No	Yes	No	
12	Yes	No	Yes	No	
13	Yes	No	Yes	No	
14	Yes	No	Yes	No	
15	Yes	No	Yes	No	
Percent of Trials with Compliance:					
Percent of Trials with Challenging Behavior:					

Appendix D: Role-Play Instructions

Instructions: You will role-play implementing a high-p instructional sequence with a fellow supervisee. Prior to beginning, use the list of high-p instructions below to randomize 15 trials that consist of at least 6 high-p instruction. Note that we suggest at least 6 high-p instructions per trial in case the client does not comply with the first 3–5 high-p instructions, thus failing to immediately meet the criteria to deliver a low-p instruction. Keep the low-p instruction constant across trials in order to simplify your first experience implementing a high-p instructional sequence. You may begin to vary targets in future role-play experiences.

Learning Objective: When asked, "What is your birthdate?", your client will vocally and accurately report the month, day, and year of their birthday 100% of opportunities across three consecutive sessions.

Compliance Operational Definition: Vocally stating the accurate month, day, and year of birth (e.g., *February 20, 1982*) within 4 seconds of being asked, "What is your birthdate?"

Challenging Behavior Definition: Forcefully striking table, chair, or desk with palm of hand.

Previously Validated High-P Instructions:

1. Vocally stating name when asked, "What is your name?"
2. Clapping hands when instructed, "Clap your hands."
3. Blinking eyes when instructed, "Blink your eyes."
4. Vocally stating color when asked, "What color is this?" while behavior analyst points to a solid color object (e.g., their own t-shirt).
5. Touching nose when instructed, "Touch your nose."
6. Vocally stating "triangle" when asked, "What shape has three sides?"
7. Touching ears when instructed, "Touch your ears."
8. Vocally stating "green" when asked, "What color is grass?"
9. Vocally stating "blue" when asked, "What color is the sky?"
10. Vocally stating "two" when asked, "What is one plus one?"

Previously Validated Highly Preferred Stimuli (highest preferred indicated with an asterisk):

- High Five
- Rapid clapping
- Pat on the shoulder or back
- Fist Bump*

Trial 1

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 2

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 3

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 4

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 5

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 6

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 7

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 8

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 9

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 10

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 11

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 12

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 13

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 14

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 15

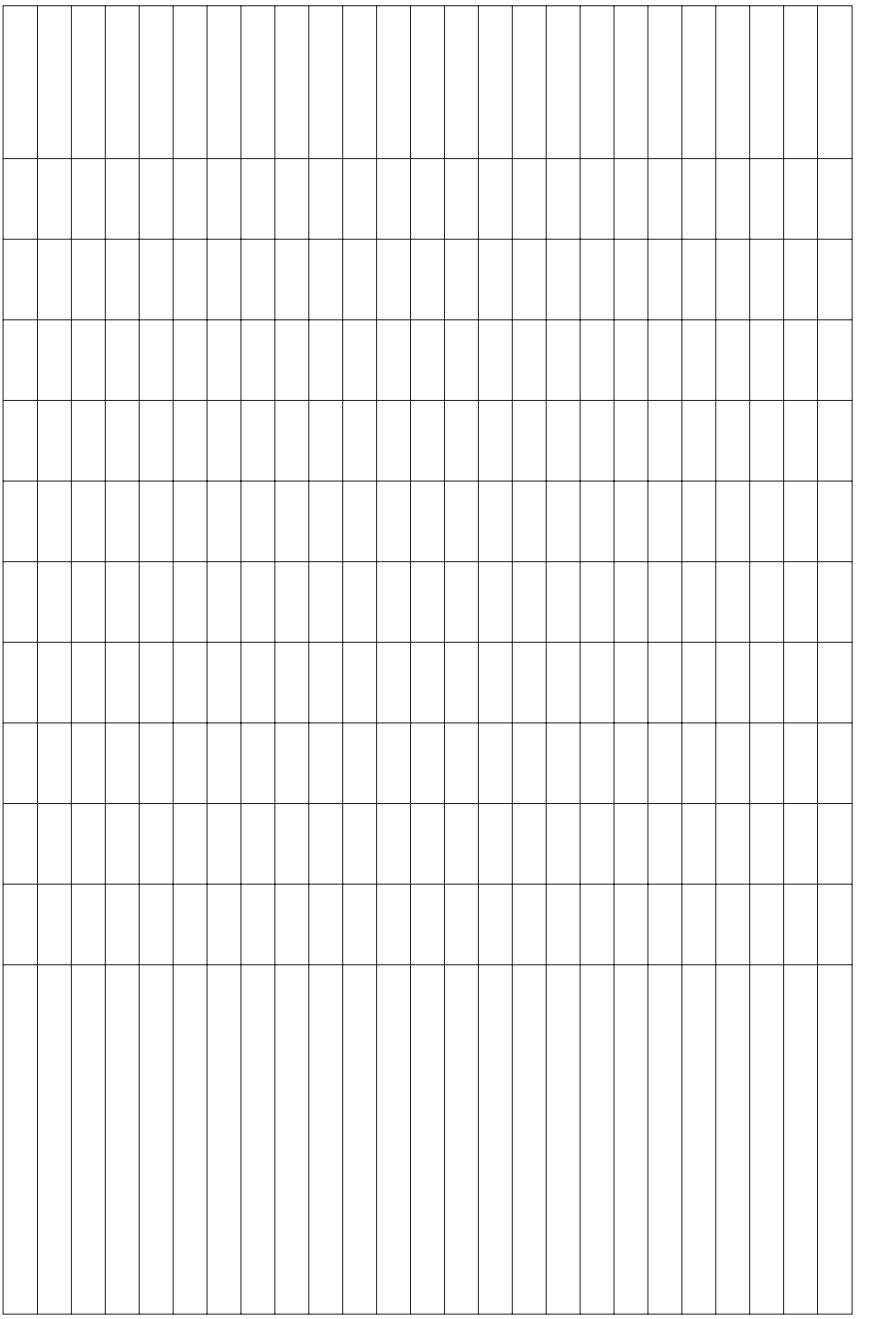
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Appendix E: Identifying High-P and Low-P Instructions Data Sheet

Instructions: Randomly provide each instruction 10 times across 1–10 sessions with the client. Do not provide prompts or assistance to comply with the instruction. Make an effort to embed instructions into normal routines rather than delivering instruction in a mass trial format. Do not praise or reinforce compliance. Similarly, do not correct errors or noncompliance.

For each trial, record a "+" if the client complied with the instruction and a "–" if they did not. After delivering each instruction 10 times, calculate the percent of compliance across trials. Instructions complied with at least 80% of the time will be considered high-p instructions. Instructions complied with 40% of the time or less will be considered low-p instructions. All remaining instructions that do not meet either of these criteria will not be used for subsequent high-p instructional sequence.

Instruction	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Percent Compliance



Appendix F: Example: Identifying High-P and Low-P Instructions Data Sheet

Instructions: Randomly provide each instruction 10 times across 1–10 sessions with the client. Do not provide prompts or assistance to comply with the instruction. Make an effort to embed instructions into normal routines rather than delivering instruction in a mass trial format. Do not praise or reinforce compliance. Similarly, do not correct errors or noncompliance.

For each trial, record a "+" if the client complied with the instruction and a "–" if they did not. After delivering each instruction 10 times, calculate the percent of compliance across trials. Instructions complied with at least 80% of the time will be considered high-p instructions. Instructions complied with 40% of the time or less will be considered low-p instructions. All remaining instructions that do not meet either of these criteria will not be used for subsequent high-p instructional sequence.

Instruction	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Percent Compliance
Pick up [writing utensil].											
Put down [writing utensil].											
Slide chair to table/desk.											
Put hands on table/desk.											
Put hands in lap.											
Smile.											
Look at me.											
Stand up.											
Sit down.											
Put [item] in trash.											
Walk to table/desk/chair.											
Put [material] away.											
Hand me [material].											
Read numeral 1 from flashcard.											
Read numeral 2 from flashcard.											

Read numeral 3 from flashcard.											
Read numeral 4 from flashcard.											
Read numeral 5 from flashcard.											
Read numeral 6 from flashcard.											
Read numeral 7 from flashcard.											
Read numeral 8 from flashcard.											
Read numeral 0 from flashcard.											
Push in chair (under table/desk).											
Raise your hand.											

Appendix G: Identifying High-P Instructions Data Sheet

Data Analysis Practice

Instructions: Randomly provide each instruction 10 times across 1–10 sessions with the client. Do not provide prompts or assistance to comply with the instruction. Make an effort to embed instructions into normal routines rather than delivering instruction in a mass trial format. Do not praise or reinforce compliance. Similarly, do not correct errors or noncompliance.

For each trial, record a "+" if the client complied with the instruction and a "–" if they did not. After delivering each instruction 10 times, calculate the percent of compliance across trials. Instructions complied with at least 80% of the time will be considered high-p instructions. Instructions complied with 40% of the time or less will be considered low-p instructions. All remaining instructions that do not meet either of these criteria will not be used for subsequent high-p instructional sequence.

Instruction	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Percent Compliance
Pick up [writing utensil].	+	+	+	+	+	+	+	+	+	+	
Put down [writing utensil].	+	-	+	-	+	-	-	-	+	-	
Slide chair to table/desk.	-	-	-	-	-	+	+	-	-	-	
Put hands on table/desk.	+	+	+	+	+	+	+	+	-	+	
Put hands in lap.	+	-	+	+	+	+	+	+	-	+	
Smile.	-	-	+	-	-	+	-	+	+	-	
Look at me.	-	-	-	+	-	-	-	-	+	-	
Stand up.	+	+	+	+	-	+	+	+	+	+	
Sit down.	+	+	+	+	+	+	+	+	+	+	
Put [item] in trash.	-	+	-	-	-	-	-	-	-	-	
Walk to table/desk/chair.	+	-	+	-	-	+	+	-	+	-	
Put [material] away.	-	-	-	-	-	+	+	+	+	+	
Hand me [material].	+	-	+	+	-	-	-	-	-	+	
Read numeral 1 from flashcard.	+	+	+	+	+	+	+	+	+	+	

Read numeral 2 from flashcard.	+	+	+	+	+	+	+	+	+	+	+	
Read numeral 3 from flashcard.	+	+	+	+	+	+	+	+	+	+	+	
Read numeral 4 from flashcard.	+	+	+	-	+	+	+	+	+	+	+	
Read numeral 5 from flashcard.	+	+	+	+	+	+	+	+	+	+	+	
Read numeral 6 from flashcard.	+	+	+	+	+	+	+	-	+	+	+	
Read numeral 7 from flashcard.	+	+	+	+	+	+	+	+	+	+	+	
Read numeral 8 from flashcard.	+	+	+	-	+	+	+	+	+	+	+	
Read numeral 0 from flashcard.	+	+	+	+	+	+	+	+	+	+	+	
Raise your hand.	+	-	+	+	+	-	-	+	+	+	+	
Draw a circle.	+	+	+	-	-	+	+	-	-	+	-	
Draw a square.	+	-	-	-	+	+	+	-	-	+	+	
Draw a triangle.	-	-	+	+	+	+	-	-	-	-	-	
Write your name.	+	+	+	+	-	+	-	+	+	+	+	
Touch your nose.	+	+	+	+	+	+	+	+	+	+	+	
Touch your knee.	+	-	+	+	+	+	+	+	+	+	+	
Touch your elbow.	-	+	+	-	+	+	+	+	+	+	+	
Touch your ears.	+	+	+	+	+	+	+	+	+	+	+	
Take 2 steps forward.	+	-	+	+	-	-	-	+	+	+	-	
Take 2 steps backward.	-	-	+	+	+	-	+	-	-	+	+	
Take 2 steps to the side.	-	-	-	-	+	-	-	-	-	+	+	
What is your name?	+	+	+	+	+	+	-	+	+	+	+	
How many? (holding up 1 finger)	+	+	+	+	+	+	+	+	+	+	+	
How many? (holding up 2 fingers)	+	+	+	+	+	+	+	+	+	+	+	
How many? (holding up 3 fingers)	+	+	+	+	+	+	+	+	+	+	+	
How many? (holding up 4 fingers)	+	-	+	+	+	+	+	+	+	+	+	
How many? (holding up 5 fingers)	+	+	+	-	+	+	+	+	+	+	+	

High-P Instructional Sequence Planning Guide

Instructions: Using the data you analyzed select one low-p instruction to target using the high-p instructional sequence. Based on this low-p instruction, write a goal and operational definition of compliance. Because this is a fictional instruction plan, you do not need to operationally define challenging behavior. Next, use the identified high-p instructions to develop 15 trials that consist of at least 6 randomized high-p instructions. Note that we suggest at least 6 high-p instructions per trial in case the client does not comply with the first 3–5 high-p instructions, thus failing to immediately meet the criteria to deliver a low-p instruction.

Goal: _____

_____

_____

Compliance Operational Definition: _____

_____

_____

Challenging Behavior Definition: N/A

Previously Validated High-p Instructions:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

Trial 1

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 2

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 3

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 4

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 5

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 6

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 7

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 8

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 9

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 10

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 11

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 12

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 13

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 14

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Trial 15

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

References

Axelrod, M. I., & Zank, A. J. (2012). Increasing classroom compliance: Using a high-probability command sequence with noncompliant students. *Journal of Behavioral Education, 21*, 119–133. https://doi.org/10.1007/s10864-011-9145-6

Belfiore, P., Basile, S., & Lee, D. (2008). Using a high-probability command sequence to increase classroom compliance: The role of behavioral momentum. *Journal of Behavioral Education, 17*, 160–171. https://doi.org/10.1007/s10864-007-9054-x

Bullock, C., & Normand, M. P. (2006). The effects of the high-probability instructional sequence and response-independent reinforcer delivery on child compliance. *Journal of Applied Behavior Analysis, 39*, 495–499. https://doi.org/10.1901/jaba.2006.115-0

Dawson, J. E., Piazza, C. C., Sevin, B. M., Gulotta, C. S., Lerman, D., & Kelley, M. L. (2003). Use of the high-probability instructional sequence and escape extinction in a child with food refusal. *Journal of Applied Behavior Analysis, 36*, 105–108. https://doi.org/10.1901/jaba.2003.36-105

Jung, S., Sainato, D. M., & Davis, C. A. (2008). Using high-probability request sequences to increase social interactions in young children with autism. *Journal of Early Intervention, 30*, 163–187. https://doi.org/10.1177/1053815108317970

Lee, D. L. (2005). Increasing compliance: A quantitative synthesis of applied research on high-probability request sequences. *Exceptionality, 13*(3), 141–154.

Lee, D. L., Belfiore, P. J., Scheeler, M. C., Hua, Y., & Smith, R. (2004). Behavioral momentum in academics: Using embedded high-p sequences to increase academic productivity. *Psychology in the Schools, 41*, 789–801. https://doi.org/10.1002/pits.20014

Lipschultz, J., & Wilder, D. A. (2017). Recent research on the high-probability instructional sequence: A brief review. *Journal of Applied Behavior Analysis, 50*(2), 424–428.

Mace, F. C. (1996). In pursuit of general behavioral relations. *Journal of Applied Behavior Analysis, 29*(4), 557–563.

Mace, F. C., & Belfiore, P. (1990). Behavioral momentum in the treatment of escape-motivated stereotypy. *Journal of Applied Behavior Analysis, 23*(4), 507–514.

Mace, F. C., Hock, M. L., Lalli, J. S., West, B. J., Belfiore, P., Pinter, E., & Brown, D. K. (1988). Behavioral momentum in the treatment of noncompliance. *Journal of Applied Behavior Analysis, 21*, 123–141. https://doi.org/10.1901/jaba.1988.21-123

Michael, J. (1993). Establishing operations. *The Behavior Analyst, 16*(2), 191–206.

Nevin, J. (1996). The momentum of compliance. *Journal of Applied Behavior Analysis, 29*, 535–547.

Nevin, J. A., & Grace, R. C. (2000). Behavioral momentum and the law of effect. *Behavioral and Brain Sciences, 23*, 73–130.

Nevin, J. A., & Shahan, T. A. (2011). Behavioral momentum theory: Equations and applications. *Journal of Applied Behavior Analysis, 44*(4), 877–895.

Nevin, J. A., Mandell, C., & Atak, J. R. (1983). The analysis of behavioral momentum. *Journal of the Experimental Analysis of Behavior, 39*, 49–59.

Normand, M. P., & Beaulieu, L. (2011). Further evaluation of response-independent delivery of preferred stimuli and child compliance. *Journal of Applied Behavior Analysis, 44*, 665–669. https://doi.org/10.1901/jaba.2011.44-665

Pitts, L., & Dymond, S. (2012). Increasing compliance of children with autism: Effects of programmed reinforcement for high-probability requests and varied inter-instruction intervals. *Research in Autism Spectrum Disorders, 6*, 135–143. https://doi.org/10.1016/j.rasd.2011.03.013

Riviere, V., Becquet, M., Peltret, E., Facon, B., & Darcheville, J. C. (2011). Increasing compliance with medical examination requests directed to children with autism: Effects of a high-probability request procedure. *Journal of Applied Behavior Analysis, 44*, 193–197. https://doi.org/10.1901/jaba.2011.44-193

Rortvedt, A. K., & Miltenberger, R. G. (1994). Analysis of a high-probability instructional sequence and timeout in the treatment of child noncompliance. *Journal of Applied Behavior Analysis, 27*, 327–330. https://doi.org/10.1901/jaba.1994.27-327

Silbaugh, B. C., Calderon, G. A., & Eslava, V. H. (2020). Effects of the high-probability instructional sequence in children with feeding disorders: A synthesis. *Behavior Modification, 44*(6), 927–954.

Wilder, D. A., Majdalany, L., Sturkie, L., & Smeltz, L. (2015). Further evaluation of the high-probability instructional sequence with and without programmed reinforcement. *Journal of Applied Behavior Analysis, 48*, 511–522. https://doi.org/10.1002/jaba.218

Zarcone, J. R., Iwata, B. A., Hughes, C. E., & Vollmer, T. R. (1993). Momentum versus extinction effects in the treatment of self-injurious escape behavior. *Journal of Applied Behavior Analysis, 26*(1), 135–136.

Chapter 23
Extinction and Noncontingent Reinforcement

Topics Covered Within This Chapter

Topics
Introduction to Extinction
Applications of Extinction
Introduction to Noncontingent Reinforcement
Applications of Noncontingent Reinforcement

Introduction to Extinction

Extinction is the discontinuation of reinforcement (Catania, 1992; Skinner, 1953). Simply put, extinction terminates the response–reinforcer relation; the response no longer contacts reinforcement. In order to implement extinction, a functional analysis must have first identified the consequence maintaining the behavior, and then that consequence must be withheld contingent upon the response.

Procedurally, extinction varies based on the specific reinforcement originally maintaining the behavior. If a behavior was maintained by social positive reinforcement, extinction involves withholding the consequence. For example, if aggression was maintained by access to preferred videos, extinction would involve no longer delivering access to videos after displays of aggressive behavior. Similarly, if tantrums were maintained by attention, to implement extinction, the caregiver would no longer attend to tantrums.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_23].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_23

If a response is maintained by social negative reinforcement, extinction involves no longer withdrawing the aversive stimulus contingent upon the target response. This procedure is often described as *escape extinction*. For example, if instructing Jackson to clean his room evoked crying, and this crying has been previously reinforced by his mother removing the demand and cleaning the room herself, then to implement escape extinction, his mother would continue to hold the demand to clean his room when Jackson began crying. In other words, Jackson would no longer be able to escape the aversive event of cleaning his room.

Extinction has also been applied to automatically maintained challenging behaviors; however, this is often difficult to implement as clinicians do not control access to the reinforcer. On the contrary, reinforcement is a direct result of the behavior. Moreover, it is often difficult, if not impossible, to determine the exact consequences reinforcing automatically maintained challenging behavior. For example, hand biting may be reinforced by the endorphins released contingent upon the bite (positive reinforcement) or may attenuate pain in the hand, mouth, or elsewhere (negative reinforcement). The inability to precisely identify or control variables reinforcing automatically maintained challenging behavior presents challenges in implementing extinction. To implement extinction for automatically maintained challenging behavior, often referred to as *sensory extinction*, the source of automatic reinforcement must be blocked in some way. For example, Rincover (1978) implemented extinction for automatically maintained object spinning. With the hypothesis that spinning was reinforced by auditory feedback, extinction was implemented by covering the table with carpet to reduce or eliminate this auditory feedback. It is important to make the distinction between response blocking and extinction of automatically maintained behavior. With response blocking, the response itself is blocked from occurring. With extinction, the response can occur, but the putative reinforcer is blocked.

There are many common misconceptions about extinction. We recommend you listen carefully as your supervisees discuss and implement extinction so that you can identify and correct any of these misconceptions. First, extinction is often described as ignoring a challenging behavior. We have likely all received the following advice in managing challenging behavior, "if you ignore [behavior], it will stop." For attention-maintained challenging behavior, extinction essentially involves ignoring the challenging behavior (i.e., withholding attention). However, for behaviors negatively or automatically reinforced, extinction does not involve ignoring the challenging behavior. On the contrary, if a clinician was to ignore a negatively reinforced challenging behavior, it is likely the behavior would strengthen because ignoring the behavior would allow the individual to escape the aversive event. Back to the previous example of Jackson whose crying was maintained by escaping the task of cleaning his room, when Jackson's mother instructed him to clean his room and Jackson cried, his mother walking away to ignore the crying would likely provide Jackson the freedom to not clean because his mother would not be present to hold the cleaning demand in place. Thus, crying will likely be strengthened. Similarly, ignoring an automatically maintained challenging behavior is most likely incompatible with blocking the putative sensory reinforcer. Back to the Rincover

(1978) example, if the implementer simply ignored object spinning, there would be no disruption between the response (plate spinning) reinforcer (auditory feedback) relation; therefore, object spinning would likely be strengthened.

A second common misunderstanding associated with extinction is that clinicians often overuse the term extinction to describe any decrease in behavior. However, many procedures can affect behavior reduction, including punishment and differential reinforcement. It is important for behavior analysts to be able to distinguish between the various behavior change technologies so that they can select and apply the best fit interventions.

Applications of Extinction

Factors That Influence Extinction Efficacy

When implementing extinction, your supervisees should be aware of the factors that influence the effectiveness of extinction and possible side effects. The following may influence the effectiveness of extinction: (a) schedule of reinforcement prior to extinction, (b) parameters of reinforcement prior to extinction, (c) previous exposure to extinction, and (d) motivating operations.

First, the schedule of reinforcement prior to extinction can affect resistance to extinction. Behavior that was reinforced on an intermittent schedule of reinforcement is more resistant to extinction than behavior that was continuously reinforced. Moreover, variable reinforcement schedules produce a stronger resistance to extinction than fixed schedules (Keller & Schoenfeld, 1950). As a result, in most cases, it is recommended to place a behavior on a continuous schedule of reinforcement prior to implementing extinction. Not only does this reduce the overall rate of behavior prior to extinction (Ferster & Skinner, 1957), but it also results in more rapid extinction effects.

Second, various parameters of reinforcement prior to extinction can influence resistance to extinction. A longer history of reinforcement produces greater resistance to extinction relative to a shorter history (Nevin et al., 1990). Similarly, delays to reinforcement that are unpredictable and variable produce greater resistance to extinction than those that are predictable and consistent (Lerman & Iwata, 1996). Additionally, a prior history of high quality reinforcement will produce a greater resistance to extinction than a prior history of low-quality reinforcement. While not all of these parameters can be altered prior to implementing extinction in all cases, they should be considered and manipulated when feasible.

Extinction is likely to be more efficient if the behavior has previously contacted extinction. This is particularly true if the participant can discriminate the onset of extinction, for example, if the contingencies are vocally shared with the client or stimuli indicate that extinction will take place. This phenomenon does not mean that clinicians should first place behavior on extinction and then reinforce the behavior

for a period of time before reinstating extinction simply for the sake of influencing a rapid response to the second application of extinction. However, in many cases, a behavior that has previously contacted extinction may be inadvertently reinforced. In those cases, clinicians can anticipate more rapid reduction during the second application of extinction.

Motivating operations can also affect resistance to extinction. If an establishing operation is in place, resistance to extinction will be greater (Keller & Schoenfeld, 1950). Your supervisees should consider how to manipulate establishing and abolishing operations to facilitate rapid extinction effects.

Side Effects of Extinction

Your supervisees should be aware of the possible side effects of extinction. This will help them determine if extinction is indicated and if so, what provisions should be put in place to prevent or respond to the possible side effects. These side effects include, (a) extinction burst, (b) response variation, (c) spontaneous recovery, and (d) resurgence.

The most commonly recognized, but perhaps also misunderstood, potential side effect of extinction is the extinction burst. An extinction burst is an increase in responding during initial applications of extinction that are above the rate of responding observed prior to extinction (Lerman et al., 1999). It is important to confirm that an extinction burst can be safely tolerated by the implementers and in the setting in which extinction will be implemented. An extinction burst can derail an extinction intervention in one of two ways. First, the increased level of challenging behavior may compromise the implementers willingness to follow-through with the intervention. If the individuals implementing extinction are unaware of the possibility of an extinction burst, they may interpret the extinction burst as evidence that extinction is ineffective and discontinue its application. Even if implementers are aware that they may observe an extinction burst, it may be too difficult to manage while implementing extinction with fidelity. For example, if a student makes inappropriate comments in class to gain teacher attention, the teacher may intend to implement extinction by withholding attention to the comments. However, if the comments increase in rate and/or inappropriateness so dramatically that she simply cannot deliver instruction to the other students, she is likely to forgo extinction. The extinction burst is also problematic if the target behavior is dangerous. It is quite possible that increases in rates of aggression or self-injury, for example, may threaten the health and safety of the client or the implementer and, therefore, cannot be tolerated. Despite some serious drawbacks of an extinction burst, they do not occur as readily as some clinicians may believe. In fact, extinction bursts have been reported in 36–62% of cases across studies (Lerman et al., 1999; Lerman & Iwata, 1995).

Challenging behavior may not only increase in response to extinction, but response variation may also occur (Vollmer & Athens, 2011). This phenomenon,

known as *extinction-induced variability*, may produce a diverse and novel set of behaviors. It is important to note that the novel behaviors may be undesirable, such as aggression or crying, but other times the novel behavior evoked by extinction-induced variability may be adaptive and socially appropriate. For example, a child unable to access their favorite toy with aggression maintained by toy access may produce socially acceptable means of requesting the item such a pointing or leading the adult to the toy. Nonetheless, your supervisees should consider the possibility that novel behaviors that occur in response to extinction may be maladaptive or challenging and ensure that safety can be maintained if this does occur.

Extinction will eventually result in decreased or zero-levels of the target behavior. If after a period of time in which the behavior occurs at low levels or has ceased completely, it is possible that the behavior will reappear. This phenomenon is referred to as spontaneous recovery (Rescorla, 2004) and is typically short lived (Goh & Iwata, 1994). However, as with the previously discussed side effects of extinction, it is important that your supervisees are aware of the possibility of spontaneous recovery and ensure those individuals implementing extinction are prepared to respond to spontaneous recovery if it occurs.

The final side effect, resurgence, is the reoccurrence of a behavior when the reinforcement for an alternative behavior maintained by the same reinforcer, also contacts extinction. For example, Claire engaged in disruptive behavior, banging on tables and chairs and throwing utensils, to access preferred foods at mealtime. Her parents were taught to place the disruptive behavior on extinction but reinforce requests for preferred food on Claire's picture communication board. If, for any reason, Claire's picture communication board request also contacts extinction, then it is likely that the disruptive behavior will reoccur. See Lattal and St. Peter Pipkin (2009) for more examples. While resurgence itself is not always undesirable, it certainly can be if challenging behavior resurges.

Recommendations for Applying Extinction

Aside from the considerations discussed above, there are several recommendations your supervisees should consider when implementing extinction. First and foremost, your supervisees should be cautioned against using extinction if increases in level or magnitude of the target behavior could be dangerous to self or others. Additionally, if extinction-inducted response variability is likely to produce behaviors that could be dangerous to self or others, extinction may not be a good fit. Similarly, if another individual, for example another client, may observe and imitate high levels of challenging behavior induced by extinction, then extinction should most likely be should not be considered. The health and safety of all involved is the highest priority.

If extinction is indicated, it should always be combined with another intervention (Vollmer & Athens, 2011). Implementing extinction in combination with another intervention has many positive effects on extinction. First, extinction alone does not

facilitate the acquisition of appropriate, adaptive skills. While extinction-induced response variability may evoke novel adaptive behaviors, it is more likely to evoke maladaptive behaviors. If reinforcement is terminated for one response, it is ethical and in the client's best interest to develop a repertoire of adaptive responses that will contact the same reinforcement. For example, if Branson's disruptive behavior was maintained by his father's attention and disruptive behavior is placed on extinction, it is necessary that Branson acquires new responses to obtain his father's attention. Combining extinction with DRA, for example, can facilitate extinction by prompting and reinforcing new responses to contact the same reinforcer. Second, additional interventions can facilitate the effectiveness of extinction. This is particularly true if extinction is combined with positive reinforcement. Third, combining extinction with additional interventions can reduce the side effects such as an extinction burst and extinction-induced maladaptive behavior such as aggression.

Additionally, when implementing extinction, the implementer should involve all caregivers in the client's environment to ensure the consistent application of extinction. For example, if one parent implements extinction, but the other does not, the reduction of the target challenging behavior would be significantly compromised. Therefore, it is important for all individuals who interact with the client withhold reinforcement (i.e., implement extinction). If implementing extinction with clients with vocal verbal behavior, your supervisees should provide vocal instructions describing the extinction contingency (e.g., "if you are whining, I will wait until you stop to talk to you"). Instructions will likely facilitate a faster diminishing of the response.

Introduction to Noncontingent Reinforcement

Noncontingent reinforcement (NCR) is the delivery or removal of an event or stimulus that has been identified as a reinforcer on a time-based schedule, independent of the occurrence of challenging behavior. Often, it is the reinforcing event or stimulus maintaining challenging behavior is delivered on a fixed-time schedule, but this is not necessary (Smith, 2011). NCR is commonly implemented with extinction. The term *noncontingent reinforcement* has been criticized because (a) reinforcement, by definition, must be delivered contingent upon a response and (b) it is not clear if any response is being reinforced with this approach (Poling & Normand, 1999). There are two hypotheses regarding the mechanism by which NCR is effective. The first theory is that the dense access to the reinforcer maintaining challenging behavior serves as an abolishing operation and abates challenging behavior. The second is that NCR disrupts the response–reinforcer relation, particularly if combined with extinction. Regardless of the mechanism, NCR is highly effective and an excellent tool to use in combination with extinction to maximize the advantages and minimize the disadvantages of each approach.

NCR can be applied to challenging behavior maintained by positive reinforcement, negative reinforcement, or automatic reinforcement. NCR for challenging

behavior, maintained by positive reinforcement, would consist of a time-based delivery of a stimulus or event that serves as a reinforcer. On the other hand, NCR applied to challenging behavior, maintained by negative reinforcement, provides breaks from aversive stimuli or events on a time-based schedule. Finally, NCR to reduce challenging behavior maintained by automatic reinforcement would typically involve identifying stimuli that match the functional properties of the automatic reinforcement, or at least presumably do so. As with extinction, NCR for automatically maintained challenging behavior can be difficult to implement because identifying the specific reinforcer maintaining challenging behavior is difficult. However, there have been successful demonstrations of NCR in the literature (e.g., Favell et al., 1982; Lindberg et al., 2003). In fact, some studies indicate that stimuli delivered on the time-based schedule do not necessarily need to match the functional properties of the reinforcer maintaining challenging behavior. In fact, other stimuli may compete with the challenging behavior (e.g., Ringdahl et al., 1997; Shore et al., 1997).

Applications of Noncontingent Reinforcement

To implement NCR effectively, it is best to first identify the consequences maintaining challenging behavior with a functional behavior assessment. As previously mentioned, research indicates that the addition or removal of nonfunctional stimuli and events on a time-based schedule may also decrease challenging behavior. However, in many applications of NCR, the functional reinforcer is delivered on a time-based schedule. Next, the clinician must determine the initial schedule of reinforcement. This includes deciding to implement NCR on a fixed-or variable time schedule and selecting a reinforcement interval that is sufficiently dense (Kahng et al., 2000; Van Camp et al., 2000). The initial schedule of reinforcement should be based upon baseline levels of the challenging behavior. Specifically, divide the duration of baseline sessions by the number of occurrences of challenging behavior to determine a mean inter-response interval. The initial NCR schedule should be slightly denser than this (Cooper et al., 2020).

After implementing NCR at the initial dense schedule of reinforcement, it will be necessary to gradually thin this schedule to be more manageable. This can be done by increasing the reinforcement interval by a constant or proportional amount. For example, increasing the duration of the interval by 1 minute or by 5%, respectively. Alternatively, the clinician may change the schedule, increasing or decreasing the interval length, based on the rate of challenging behavior in the prior session. This would require determining the inter-response interval after each session to determine the interval length for the upcoming session (Cooper et al., 2020).

NCR is an excellent antecedent intervention to reduce challenging behavior. It is particularly well suited to combine with extinction. The effects can be rapid, and it can mitigate the aforementioned drawbacks of extinction. On the other hand, NCR does not establish alternate responses. As previously discussed, in many cases, the

prompting and reinforcing of alternative responses to access functional reinforcers is a high priority in a behavior reduction program and NCR is not designed to do this.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Introduction to Extinction
20:00–35:00	Case Scenarios: Apply Extinction
35:00–45:00	Introduction to Noncontingent Reinforcement
45:00–55:00	Planning NCR Schedules and Schedule Thinning
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Applying Extinction*, 1 copy per supervisee or presented via PowerPoint
- Appendix B: *Extinction or Something Else*, 1 copy per supervisee or presented via PowerPoint
- Appendix C: *Extinction Considerations*, 1 copy per pair of supervisees
- Appendix D: *Applying Noncontingent Reinforcement*, 1 copy per pair of supervisees
- Appendix E: *NCR: Schedules and Schedule Thinning*, 1 copy per pair of supervisees

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Lerman et al. (1999)
- Poling and Normand (1999)
- Vollmer et al. (1993)

Introduction to Extinction

Begin your group supervision meeting by asking a supervisee to volunteer to define extinction. Ask them to share experiences implementing extinction. As they share, ask them to identify if extinction was implemented as a sole intervention or in combination with other intervention components. Highlight the fact that extinction is rarely implemented as a singular intervention. Next, describe for your supervisees how extinction procedures vary based on the functions of challenging behavior: (a) social positive reinforcement, (b) social negative reinforcement, and (c) automatic reinforcement. Note the specific differences between extinction for behavior maintained by social positive and social negative reinforcement. When describing the procedural variations based on function, discuss the over-simplification of extinction when described as *planned ignoring*. Moreover, explain how extinction may be implemented for automatically maintained challenging behaviors, making a clear distinction between extinction and response blocking. Distribute the *Applying Extinction* worksheet (Appendix A) or present the case scenarios on the PowerPoint slides. Work as a whole group to answer the questions for scenario one, Amelia. You may want to answer the questions to scenario two in a similar fashion. When you determine that your supervisees have enough knowledge to complete the activity, instruct your supervisees to complete all remaining scenarios individually, then regroup to share their responses.

Remind your supervisees that extinction is one of many approaches to decrease behavior and ask them to identify other methods. Their responses should include punishment and differential reinforcement, among others. Explain that a common misunderstanding of extinction is to attribute any decrease in behavior as extinction. Emphasize the importance of technical knowledge among behavior analysts. We must understand the various technologies so that we can apply the best intervention with any given scenario. Distribute *Extinction or Something Else?* (Appendix B) or present the activity on the PowerPoint slides. Similar to the prior activity, complete the first scenario as a group. You can continue to complete the remaining scenarios as a group, or have your supervisees complete individually or in pairs and share after they complete the scenarios.

Introduce the four factors that may influence extinction efficacy: (a) schedule of reinforcement prior to extinction, (b) parameters of reinforcement prior to extinction, (c) previous exposure to extinction, and (d) motivating operations. Review each factor and how they affect extinction.

Transition to a quick discussion of side effects: (a) extinction burst, (b) response variation, (c) spontaneous recovery, and (d) resurgence. For each side effect, call on a supervisee to define the side effect and ask another supervisee to describe how one should take this side effect into consideration when contemplating whether or not to use extinction. For example, “What does *extinction burst* mean?” and “When contemplating the use of extinction, how does an extinction burst affect your decision to use extinction or how do you go about implementing extinction?” If your

supervisees have difficulty with any of these topics, feel free to provide direct instruction rather than facilitating the conversation among supervisees.

Case Scenarios: Apply Extinction

To conclude the discussion of extinction, review the following recommendations when considering extinction. For each recommendation, discuss why the recommendation is made. When possible, use examples from your own career as to when you have applied these considerations, maintaining client confidentiality, of course.

1. Do not use extinction if an increased level or magnitude of the behavior could be dangerous to the client or others.
2. Do not use extinction if there is any indication that extinction-induced response variability could evoke behaviors that are dangerous to the client or others.
3. Do not use extinction if other individuals may imitate dangerous behaviors evoked by an extinction burst or extinction-induced response variability.
4. Combine extinction with another intervention.
5. Involve all caregivers or potential implementers in extinction procedures.

To practice utilizing these considerations, divide your supervisees into pairs. Distribute *Extinction Considerations* (Appendix C) to each pair. Allow them to work on the two case studies for about 10 minutes. At that time, return to the whole group and have them share their responses to the case studies as a group. Use this time to praise correct responses, correct errors, and provide rationale when errors are corrected.

Introduction to Noncontingent Reinforcement

Introduce the definition of NCR to your supervisees. Inform them that the term *noncontingent reinforcement* has been criticized and ask them to discuss why they believe this is the case. If they fail to identify why NCR is a misnomer, lead a discussion about the Poling and Normand (1999) paper that they read prior to this meeting. Next, ask them to volunteer to describe the mechanisms by which NCR is effective. If they fail to identify abolishing operations and the disruption of the response–reinforcer relation, explain both theories in full detail. Finally, briefly review how NCR would be applied to challenging behavior maintained by positive reinforcement, negative reinforcement, and automatic reinforcement. Divide your supervisees into pairs and distribute *Applying Noncontingent Reinforcement* (Appendix D) to each pair. This handout includes the scenarios they first used to apply extinction. Instruct your supervisees to determine how to apply NCR to each scenario. Remind them that they do not need to determine the exact frequency in which stimuli or events identified as a reinforcer will be delivered or removed, but

rather identify exactly what should be presented or removed. Your supervisees should only need a few minutes to complete this task. Once they complete it, regroup, and have volunteers share their responses to the questions for each scenario.

Planning NCR Schedules and Schedule Thinning

Describe for your supervisees the two options for an NCR schedule: fixed or variable time. Then describe how to determine the initial schedule of reinforcement, based upon baseline levels of challenging behavior. The PowerPoint slide contains a few example baseline data set. Use the first data set to model determining the initial schedule of reinforcement. For the remaining two data sets, ask your supervisees to calculate independently and then share their responses so that you can check for understanding.

Lead a discussion about the drawbacks of a dense schedule of noncontingent reinforcement, which will likely be necessary at the beginning of any NCR application. Inform your supervisees of the two most common approaches for thinning this schedule: constant or proportional. The PowerPoint slides contain the same three examples from the last activity. For the first example, model how to calculate the next three increments of schedule thinning using the constant and proportional approaches. For the remaining two schedules, ask your supervisees to calculate the next three increments of schedule thinning using the constant and proportional approaches and share their responses. Finally, point out that simply identifying the increments is only half of the process of schedule thinning. Not only must one identify the incremental steps for thinning, but they must also determine a criterion for implementing each increment toward a thinner schedule. Discuss the pros and cons of various criteria levels that are typically calculated on baseline levels (e.g., 80% reduction of baseline vs. 95% reduction), as well as what information they may consider when determining this criterion. Note that we did not include a demonstration of how to thin the schedule session-by-session. Because this approach is more intensive and less common in practice, we only included the constant and proportional approaches in the demonstration and practice. Feel free to supplement with session-by-session incremental changes if it is appropriate for your supervisees.

The final activity for your group supervision meeting allows your supervisees to practice (a) determining the initial schedule of reinforcement, (b) determining a criterion for schedule thinning, and (c) planning schedule thinning increments. Distribute *NCR: Schedules and Schedule Thinning* (Appendix E). Instruct your supervisees to work in pairs to complete this activity. When they complete the activity, regroup to share answers. Praise correct responses, correct errors, and solicit any final questions.

Knowledge Check

1. Is an FBA necessary to implement extinction? Why or why not.
2. What is an extinction burst?
3. What schedule of reinforcement is more resistant to extinction: continuous or intermittent?
4. Why do some consider *noncontingent reinforcement* a misnomer?
5. How does one determine the initial schedule of NCR?

Homework for Individual Supervision without a Client

1. Identify a client for whom a behavior reduction program is indicated.
2. Retrieve and review this client's FBA. At least 48 hours prior to your meeting, share the FBA report with your supervisor.

Individual Supervision Meeting Without a Client, Part 1

Below is a plan for activities to incorporate into a 35-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Role-Play Extinction
15:00–25:00	Review FBA Results
25:00–35:00	Plan Baseline Data Collection

Materials Needed

- FBA report for client, sent to supervisor 48 hours prior to meeting
- Appendix F: Extinction Role Play, 2 copies
- Laptop or tablet for developing baseline data sheets

Introduction

Your individual meetings with and without a client will be divided into two parts. During this meeting, you will review concepts of extinction and begin the planning for NCR implementation. Specifically, you will plan how to collect baseline data at an upcoming supervision meeting with a client. After baseline data have been collected, you will hold a second meeting without the client to finalize the NCR procedures. You will hold a final supervision meeting with a client to observe your supervisee implementing NCR.

Role-Play Extinction

Allocate the first portion of your meeting to discussing and role playing extinction. Prior to the role-play activity, remind your supervisee that extinction is rarely conducted in isolation; instead, extinction is almost always implemented with an additional intervention. However, in order to ensure that they develop the necessary skills to implement extinction in combination with other intervention components, you will role-play implementing extinction in isolation. Provide your supervisee with *Extinction Role Play* (Appendix F). Moreover, we included both a baseline and extinction role play in order to emphasize what exactly constitutes extinction. Read the first scenario, target behaviors, baseline procedures, and intervention procedures aloud while your supervisee follows along. Solicit questions and then begin a 3-minute baseline session followed by a 3-minute extinction intervention session. During both baseline and extinction role plays, engage in the target challenging behavior about twice a minute and nontarget challenging behavior about twice per role play. Use the handout to collect data on the fidelity of implementation. After the baseline and extinction role plays, provide feedback to your supervisee regarding their implementation. Repeat this with the second role play in Appendix F.

Review FBA Results

Review the FBA results with your supervisee. You should have received these prior to the meeting so that your review can simply highlight the most relevant information from the report. The next portion of the field experience cannot be conducted without the FBA results. If you determine that the FBA is insufficient for any reason (e.g., incomplete, outdated, targets a different topography), reschedule this meeting until you have the necessary tools to proceed.

If the FBA is sufficient, proceed with the following steps. Ask your supervisee to identify the function of challenging behavior. Discuss any relevant information that

may have been gathered from this report. Ask your supervisee to describe how to implement extinction for this behavior. Praise and correct as necessary.

Remind your supervisee that extinction is rarely recommended as a single intervention, but rather combined with additional interventions. Nonetheless, it is important to practice applying extinction recommendations because they apply to extinction implemented in isolation or in combination with other interventions. With your supervisee, review the following recommendations and how they would apply specifically to their client's challenging behavior. Remind your supervisee that even if recommendation items 1–3 do not apply, or are not a concern for their client, it is still best practice to combine extinction with another intervention; therefore, your supervisee will implement NCR in conjunction with extinction.

1. Do not use extinction if an increased level or magnitude of the behavior could be dangerous to the client or others.
2. Do not use extinction if there is any indication that extinction-induced response variability could evoke behaviors that are dangerous to the client or others.
3. Do not use extinction if other individuals may imitate dangerous behaviors evoked by an extinction burst or extinction-induced response variability.
4. Combine extinction with another intervention.
5. Involve all caregivers in extinction.

Plan Baseline Data Collection

Instruct your supervisee that they will need to collect baseline data across at least three observations in order to determine the NCR schedule interval. Collaboratively, identify three visits for data collection. Next, develop the data sheets that your supervisee will use during the observation. You can find resources in Chap. 5 but you can also create a data sheet specific to your supervisee's needs. At the very least, the document must include the observation duration and frequency of target behaviors in order to calculate a mean inter-response interval.

Homework Review

Inform your supervisee that they will collect baseline data across three observations. It is ideal to record baseline data when no intervention is in place. However, for clinical purposes, it is possible that a behavior reduction program is already in place for the client. If this is the case, it is acceptable to observe with an intervention in place. Nonetheless, remind your supervisee to observe "business as usual"; that is, do not implement any new or additional interventions during the observation. Confirm that they have a clear understanding of the challenging behavior operational definition and plan for collecting data.

You will observe one of the three sessions in which your supervisee is collecting baseline data as part of your individual supervision meeting with a client. During this session, you will also collect data in order to measure IOA. Inform your supervisee of your upcoming observation and its purpose. Together, select a date for your scheduled supervision observation. Your supervisee may have some final touches to add to their baseline data sheet. Remind your supervisee that you will need a copy of the final baseline data sheet at least 48 hours prior to your scheduled observation. End by giving your supervisee an opportunity to seek clarification or ask questions.

Homework for Individual Supervision with a Client

1. If needed, revise procedural fidelity checklist.
2. Finalize baseline data sheet.
3. At least 48 hours prior to the next meeting, send both documents to your supervisor.

Individual Supervision Meeting with a Client, Part 1

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Independently Collect Baseline Data on Client's Challenging Behavior

Materials Needed

- Supervisee-developed Baseline Data Sheet, 2 copies
- Clipboard
- Pen/Pencil

Independently Collect Baseline Data on Client's Challenging Behavior

You will observe your supervisee to independently collect baseline data regarding the client's challenging behavior to be treated with NCR. Your supervisee should have sent you the data sheet to use at least 48 hours prior to this observation. If not, reschedule this meeting until you have had sufficient time to review the data sheet.

During this observation, you will collect data independent of your supervisee so that you can measure IOA. As a result, try to position yourself in the room so that you can see the client, disrupting the session as little as possible, but are unlikely to catch a glimpse of your supervisee's data collection recording. Be sure that you and your supervisee have identified the start and stop time of the observation so that you begin and end recording data at the exact same time. After the session is complete, store your baseline data sheet and plan to bring it to the next meeting. Immediately after session, contact your supervisee and remind them to do the same.

Individual Supervision Meeting Without a Client, Part 2

Below is a plan for activities to incorporate into a 35-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–5:00	Calculate IOA
5:00–10:00	Determine Initial NCR Schedule
10:00–15:00	Develop NCR Procedural Fidelity Checklist
15:00–30:00	Role-Play NCR
30:00–35:00	Determine NCR Schedule Thinning

Materials Needed

- Completed Baseline Data Sheets, supervisee brings all three and supervisor brings one for IOA calculation
- Appendix G: *NCR Procedural Fidelity Checklist Template*, 2 copies (electronic recommended)
- Computer for editing documents

Calculate IOA

Your supervisee should bring the data sheet for all three baseline observations to the meeting. Provide your supervisee with your baseline data sheet. Ask them to calculate IOA. See Chap. 5 for more guidance. Observe the calculation. Praise correct responses and immediately correct errors if necessary. If IOA is below 80%, all three observations need to be repeated until IOA is at or above 80%. Use this time to also praise correct implementation of baseline procedures and any other positive clinician behaviors you observed.

Determine Initial NCR Schedule

Using the three baseline observations, ask your supervisee to determine the initial NCR schedule using the process discussed in the group supervision meeting. Observe their process. Praise correct responses and immediately correct errors if necessary.

Develop NCR Procedural Fidelity Checklist

Provide your supervisee with *NCR Procedural Fidelity Checklist Template* (Appendix G). Instruct your supervisee to edit the template to develop a procedural fidelity checklist for implementing NCR with their client. Observe this process. Praise correct responses and immediately correct errors if necessary. If possible, print or email the document so that you and both have a copy of the individualized procedural fidelity checklist.

Role-Play NCR

You will conduct two role plays. Begin with a 5-minute role play in which you role-play as the client and your supervisee implements NCR. During the role play, attempt to be authentic. Be sure to engage in a few instances of target and nontarget challenging behavior. During the role play, you will simultaneously collect data on your supervisee's fidelity of implementation using the recently created procedural fidelity checklist. Attempt to do so discretely. At the end of the first role play, provide performance feedback for about 3 minutes. Praise the steps your supervisee completed correctly and correct errors. Repeat the role play again. If your supervisee made errors in the first role play, be sure to role-play in a way that gives them plenty of opportunities to practice correct implementation. For example, if your supervisee responded to nontarget challenging behavior in the role play, engage in sufficient levels in the second role play so that they can practice ignoring nontarget challenging behavior. As with the previous role play, after the 5-minute session, provide performance feedback.

Determine NCR Schedule Thinning

The last 5 minutes of this meeting will be allocated to planning for NCR schedule thinning. Ask your supervisee if they would like thin the schedule with a constant or proportional approach. Then, have them calculate what would be the first three

incremental changes in the NCR interval and determine the criterion for increasing the interval. Use your experience and expertise to provide guidance regarding the length of incremental increases and how stringent the interval increase criterion should be. Remind your supervisee that they most likely will not implement this schedule thinning in the first few applications of NCR, but that it is helpful to have the plan ready for future sessions.

Homework for Individual Supervision with a Client

1. Finalize the NCR procedural fidelity checklist. Send to your supervisor at least 48 hours prior to the individual supervision meeting with a client.
2. Practice implementing NCR by role playing with a peer.

Individual Supervision Meeting with a Client, Part 2

Below is a plan for activities to incorporate into a 45-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Observe NCR Implementation
30:00–45:00	Performance Feedback

Materials Needed

- Supervisee-developed Data Sheet, 2 copies
- Clipboard
- Pen/Pencil

Observe NCR Implementation

You will observe your supervisee implementing NCR for at least 30 minutes. Feel free to extend the duration of the observation beyond 30 minutes when appropriate. During the observation, measure procedural fidelity using the NCR procedural fidelity checklist you and your supervisee created, and collect data on the challenging behavior using the same data sheet your supervisee used to collect baseline data. If it is difficult to measure both supervisee and client behaviors simultaneously, measure client behavior for the first 15 minutes and then supervisee behavior for the next 15 minutes.

Performance Feedback

After your observation, you will provide your supervisee with performance feedback. We recommend doing so with no clients present in order to minimize distractions. Begin by praising correct implementation and correcting errors. Solicit questions and invite your supervisee to role-play any steps which they implemented with poor fidelity. End by comparing the data you and your supervisee collected on client challenging behavior. Ask your supervisee to calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following while implementing NCR: (a) accurately collect data with at least 80% agreement and (b) implement NCR with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to thin the NCR schedule using the criteria and steps you developed collaboratively.
- ☐ Evaluate your supervisee's ability to implement NCR with a different client.
- ☐ Evaluate your supervisee's ability to teach another individual (e.g., parent, teacher, other clinician) how to implement NCR with this client.

Appendix A: Applying Extinction

Scenario One: Amelia engages in property destruction. An FBA concluded Amelia's challenging behavior is maintained by access to attention, specifically, attention from her favorite teacher, Ms. Rollo.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement extinction: _____

_____

_____

Is planned ignoring recommended for this client?

Yes No

Scenario Two: Mateo attends a clinic after school, where his clinician assists him in completing his math homework. Mateo engages in whining and crying when instructed by his clinician to complete his homework. An FBA concluded Mateo's challenging behavior is maintained by access to escape from his homework.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement extinction: _____

_____

_____

Is planned ignoring recommended for this client?

Yes No

Scenario Three: Hassan hits walls and furniture. He has damaged both walls and furniture. According to Hassan's mother, this aggression most frequently occurs when she turns off or takes away his gaming system. An FBA concluded Hassan's challenging behavior is maintained by access to tangibles, specifically, the gaming system.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement extinction: _____

_____

_____

Is planned ignoring recommended for this client?

Yes No

Scenario Four: Aaron is a 5-year-old male with autism. He frequently flicks the lights in his room on and off with the light switch. Aaron has a history of flicking the lights on and off, for up to an hour straight, disrupting the family's activities. Aaron's caregivers have expressed the desire to decrease this behavior. An FBA concluded Aaron's challenging behavior is automatically maintained.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement extinction: _____

_____

_____

Is planned ignoring recommended for this client?

Yes No

Appendix B: Extinction or Something Else?

Scenario One: During independent work time at her desk, Mika frequently elopes from her seat at the desk. She typically walks to the indoor playroom that is shared by several classrooms with slides, swings, and other gross motor activities. A functional analysis concludes elopement is maintained by access to the toys in the indoor playroom. The BCBA at Mika's school implements an intervention program in which Mika can earn free time in the indoor playroom by sitting at her desk. For every 5 minutes Mika is at her desk, she earns a token. Each token can be exchanged for 1 minute of free time in the playroom later that afternoon. Mika's elopement decreased from a mean of 5 elopements per day (during independent work time) to 0.5 elopements per day.

Is this extinction? Yes No

If not, what intervention is in place? _____

_____

_____

Scenario Two: Enrique is 17 years old and just began his first job, with the support of a job coach. He works at a local ice cream shop. While Enrique is excelling at most aspects of his first job, he reports disliking sweeping and mopping at closing time. His boss reports that when Enrique is instructed to clean the floors at closing, he will curse, whine, and occasionally kick chairs and tables. Typically, the ice cream shop employs two to three people for closing and Enrique's boss is concerned that the other employees are taking on the sweeping and mopping to avoid Enrique's outbursts. The job coach enlists the help of a behavior analyst who conducts a FA that concludes Enrique's cursing, whining, and property destruction are maintained by escape from cleaning tasks. The job coach works with the ice cream shop manager to inform all employees that they will not be swapping closing duties from this point forward. For the next month, the job coach attends all of Enrique's closing shifts. If the manager has assigned Enrique to sweep and mop, the job coach prompts Enrique to complete these tasks. He makes sure that regardless of Enrique's behavior, no coworker swaps closing tasks with him. He also stays as long as it takes for Enrique to finish the task. Prior to this behavior reduction program, cursing, whining, and/or kicking chairs and tables occurred 100% of shifts in which Enrique was assigned to sweep and mop. After 1 month with the behavior reduction program, cursing, whining, and/or kicking tables and chairs has occurred 15% of shifts in which he was assigned to sweep and mop.

Is this extinction? Yes No

If not, what intervention is in place? _____

_____

_____

Scenario Three: Izzy is a 6-year-old girl receiving ABA services at a clinic. Her parents report if given a hard plastic toy, Izzy will frequently hit herself on the ear or in the eye with the toy. She is extremely concerning to her parents. A brief FA concludes that the head hitting is automatically maintained. To verify a possible intervention, Izzy's BCBA conducts baseline sessions in which hard plastic toys are freely available to her as usual. During these sessions, the rate of head hitting is 2 per minute. During intervention sessions, the BCBA affixes toys to the table so that they cannot be lifted; no other toys are made available. Needless to say, Izzy's head hitting is at 0 during these five sessions.

Is this extinction? Yes No

If not, what intervention is in place? _____

_____

_____

Scenario Four: Noah is a 9-year-old male with autism. He receives ABA services at a clinic in which he and a same-age peer, Liam, work on social skills. His BCBA, Suzy, typically has the children play interactive games so they can work on turn-taking and conversation skills as they play. During the game play, Noah frequently engages in disruptive behaviors like throwing game pieces, falling out of his chair, or putting his head down in the middle of the game board. In attempts to decrease the disruptive behavior, Suzy has made Noah sit out his next turn contingent upon disruptive behavior. In order to determine if this intervention was working, Suzy recorded data on disruptive behavior before and after she implemented this intervention. Before she intervened, disruptive behavior occurred about 0.5 times per minute. After intervention, it occurred 0.02 times per minute.

Is this extinction? Yes No

If not, what intervention is in place? _____

_____

_____

Appendix C: Extinction Considerations

Case Study One

Maggie is a 5-year-old female with Down syndrome. She has been receiving ABA services in a clinical setting for 2 years. Maggie has made great progress, but her parents report concerns that Maggie is not eating a well-balanced diet. In fact, they want Maggie to eat more fruits and vegetables. Maggie's pediatrician confirmed that there are no medical explanations for the food refusal (e.g., swallowing difficulties, food allergies) and that Maggie should be able to safely eat all fruits and vegetables. Ruling out a medical cause for the challenging behavior, they seek help from Maggie's BCBA, Brett. During an interview, Brett learns that Maggie's parents put a few bites of a fruit and a few bites of a vegetable on her plate every night for dinner. They ask Maggie to eat all the fruit and vegetables, but often Maggie begins to cry. Maggie does not have a history of severe challenging behavior, mostly crying, whining, and occasionally dropping to the floor. Maggie's parents report that they were uncertain of how to handle this food refusal and report that most nights Maggie just does not eat the fruits and vegetable bites on her plate. However, they are very eager for change and report to Brett they will try any intervention he suggests. Brett conducts a functional analysis which concludes that Maggie's crying is maintained by negative reinforcement, specifically, escaping eating fruits and vegetables.

Consider the following and determine if extinction is indicated for Maggie. Why or why not? If yes, what recommendations can be made for the extinction plan?

1. Do not use extinction if an increased level or magnitude of the behavior could be dangerous to the client or others.
2. Do not use extinction if there is any indication that extinction-induced response variability could evoke behaviors that are dangerous to the client or others.
3. Do not use extinction if other individuals may imitate dangerous behaviors evoked by an extinction burst or extinction-induced response variability.
4. Combine extinction with another intervention.
5. Involve all caregivers in extinction.

Case Study Two

Logan is a 13-year-old boy who receives in-home and clinic-based ABA services. Logan has a long history of engaging in aggression. When Logan was younger, he damaged things around the home, such as breaking toys and furniture, but never seriously injured anyone, including himself. In the last year, as Logan has grown, this has changed. Logan injured three school staff on three separate occasions to the point that they required medical attention. On one of those occasions, and two additional occasions, Logan badly cut and bruised his arms and hands, likely from

hitting hard objects like tables. Logan's family and teachers describe his aggression as "going from 0 to 60 without warning." Logan's parents are distraught. They were so concerned for his safety and the safety of those around him that they removed him from his school in favor of receiving 40 hours of ABA services per week. Logan's mom also reports that she often allows Logan to do whatever he pleases as much as possible to simply keep the peace at home. Logan has three younger siblings and his mom reports that she just cannot manage all four kids unless "Logan stays happy." She reports willingness to intervene, but that she is concerned that her family cannot manage major aggressive outbursts, both logistically and emotionally. Logan's BCBA has a lot of experience creating effective behavior reduction programs. She conducts a FA and learns that aggression is maintained by escape from nonpreferred tasks, specifically, any work that requires handwriting, which is a frequent requirement of many of his academic tasks.

Consider the following and determine if extinction is indicated for Logan. Why or why not? If yes, what recommendations can be made for the extinction plan?

1. Do not use extinction if an increased level or magnitude of the behavior could be dangerous to the client or others.
2. Do not use extinction if there is any indication that extinction-induced response variability could evoke behaviors that are dangerous to the client or others.
3. Do not use extinction if other individuals may imitate dangerous behaviors evoked by an extinction burst or extinction-induced response variability.
4. Combine extinction with another intervention.
5. Involve all caregivers in extinction.

Appendix D: Applying Noncontingent Reinforcement

Scenario One: Amelia engages in property destruction. A FBA concluded Amelia's challenging behavior is maintained by access to attention, specifically, attention from her favorite teacher, Ms. Rollo.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement NCR: _____

_____

_____

Scenario Two: Mateo attends a clinic after school, where his clinician assists him in completing his math homework. Mateo engages in whining and crying when instructed by his clinician to complete his homework. A FBA concluded Mateo's challenging behavior is maintained by access to escape from his homework.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement NCR: _____

_____

_____

Scenario Three: Hassan hits walls and furniture. He has damaged both walls and furniture. According to Hassan's mother, this aggression most frequently occurs when she turns off or takes away his gaming system. An FBA concluded Hassan's challenging behavior is maintained by access to tangibles, specifically, the gaming system.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement NCR: _____

_____

_____

Scenario Four: Aaron is a 5-year-old male with autism. He frequently flicks the lights in his room on and off with the light switch. Aaron has a history of flicking the lights on and off, for up to an hour straight, disrupting the family's activities. Aaron's caregivers have expressed the desire to decrease this behavior. A FBA concluded Aaron's challenging behavior is automatically maintained.

What is maintaining challenging behavior?

Social Positive Reinforcement Social Negative Reinforcement Automatic Reinforcement

What is the functional reinforcer? _____

Describe how to implement NCR: _____

_____

_____

Appendix E: NCR – Schedules and Schedule Thinning

Scenario One: Amelia is a third grade student in Ms. Rollo's special education classroom. Amelia engages in property destruction. Specifically, she tears papers, breaks crayons, scribbles on books and other school property, and writes on her desk with markers. A FBA concluded Amelia's challenging behavior is maintained by access to attention, specifically, attention from Ms. Rollo. Ms. Rollo requests assistance from the school's BCBA to reduce Amelia's property destruction during the 1-hour work period in Ms. Rollo's class, from 9:30 to 10:30 am. Ms. Rollo reports that this is the time when students should be working, mostly independently, at their desks while Ms. Rollo moves about the room, helping students as needed. Amelia rarely engages in property destruction outside this 1-hour block of time. The BCBA collects baseline data for 1 week, see below:

Day	Observation time	Property destruction frequency
Monday	9:45–10:30 am	16
Tuesday	9:30–10:00 am	11
Wednesday	9:30–10:30 am	18
Thursday	9:30–10:30 am	14
Friday	9:45–10:20 am	13
Totals:		

Baseline Interresponse Interval: _____

Initial NCR Schedule: Fixed Variable

Initial NCR Schedule: _____

Criterion to Thin Schedule: _____

First Three Schedule Increments with constant 30-s Increase:

1. _____
2. _____
3. _____

First Three Schedule Increments with 5% proportional increase:

1. _____
2. _____
3. _____

Scenario Two: Mateo attends a clinic after school, where his clinician assists him in completing his math homework. Mateo engages in whining and crying when instructed by his clinician to complete his homework. Mateo's clinician has dedicated 30 minutes of his sessions to work on math homework. She has not yet identified a successful treatment to reduce crying and whining, so she enlists the help of her supervisor. The supervisor conducts a FBA that concludes Mateo's challenging behavior is maintained by access to escape from his homework. The supervisor also collects baseline data, presented below:

Day	Observation time	Crying/whining frequency
Monday	3:30–4:00 pm	22
Tuesday	3:30–4:00 pm	24
Wednesday	3:30–4:00 pm	18
Thursday	3:30–4:00 pm	20
Friday	3:30–4:00 pm	21
Totals:		

Baseline Interresponse Interval: _____

Initial NCR Schedule: Fixed Variable

Initial NCR Schedule: _____

Criterion to Thin Schedule: _____

First Three Schedule Increments with constant 30-s Increase:

1. _____
2. _____
3. _____

First Three Schedule Increments with 5% proportional increase:

1. _____
2. _____
3. _____

Scenario Three: Aaron is a 5-year-old male with autism. Aaron receives in-home ABA services 3 days per week that consists of both direct services and parent coaching. He frequently flicks the lights in his room on and off with the light switch. Aaron has a history of flicking the lights on and off, for up to an hour straight, disrupting the family's activities. Aaron's caregivers have expressed the desire to decrease this behavior. They emphasized that this is most disruptive during family activities on Wednesday and Friday evenings, when the family plays a game or completes an activity together after dinner, typically 6:30–7:30 pm. An FBA concluded Aaron's challenging behavior is automatically maintained. His BCBA collected data across 4 days of scheduled family activity times.

Day	**Observation time**	**Crying/whining frequency**
Monday	6:30–7:30 pm	32
Wednesday	3:30–4:00 pm	30
Monday	3:30–4:00 pm	28
Wednesday	3:30–4:00 pm	35
Totals:		

Baseline Interresponse Interval: _____

Initial NCR Schedule: Fixed Variable

Initial NCR Schedule: _____

Criterion to Thin Schedule: _____

First Three Schedule Increments with constant 30-s Increase:

1. _____
2. _____
3. _____

First Three Schedule Increments with 5% proportional increase:

1. _____
2. _____
3. _____

Appendix F: Extinction Role Play

Role Play One: Challenging Behavior Maintained by Positive Reinforcement

The supervisor will role-play as a client who engages in property destruction, specifically banging on walls and tables and stomping on the floor (see operational definition below). A FBA confirmed that property destruction is maintained by access to tangibles, specifically access to a smart phone. Using the procedural fidelity sheet outlined below, conduct a 3-min baseline session (before extinction) and a 3-min extinction session.

Target Behaviors:

- Hitting Walls: Forceful contact with any part of hand to wall without obvious adaptive function (e.g., balancing on wall to tie shoe).
- Hitting Table: Forceful contact with any part of hand to table without obvious adaptive function.
- Stomping Floor: Forceful contact with any part of foot to the floor without obvious adaptive function (e.g., stepping on a bug to kill it).

Baseline:

Baseline procedure	Conducted correctly?	
Begin session with smart phone in sight and out of reach.	Yes	No
Contingent upon property damage, return smart phone for 20 s.	Yes	No
After 20 s, retrieve phone, keeping it in sight, but out of reach.	Yes	No
Ignore all other behaviors.	Yes	No
Percent of steps implemented correctly:		

Extinction intervention session:

Baseline procedure	Conducted correctly?	
Begin session with smart phone in sight and out of reach.	Yes	No
Do not provide access to smart phone contingent upon property destruction.	Yes	No
Ignore all other behaviors.	Yes	No
Percent of steps implemented correctly:		

Role Play Two: Challenging Behavior Maintained by Negative Reinforcement

The supervisor will role-play as a client who engages in whining (see operational definition below). A FBA confirmed that property destruction is maintained by escape from work demands, specifically escape from completing fine motor tasks, like the tracing worksheet attached. Using the procedural fidelity sheet outlined below, conduct a 3-min baseline session (before extinction) and a 3-min extinction session.

Target Behaviors:

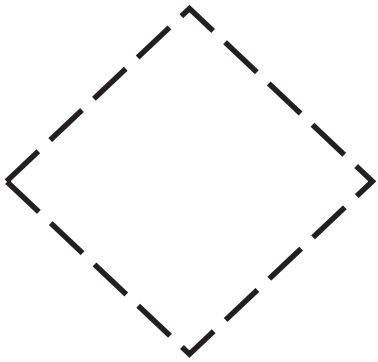
- Whining: any word or nonword vocalization that is above typical speaking volume, above typical speaking pitch, and/or involves a slower pronunciation than typical (e.g., "I don't want tooooooooo" rather than "I don't want to."

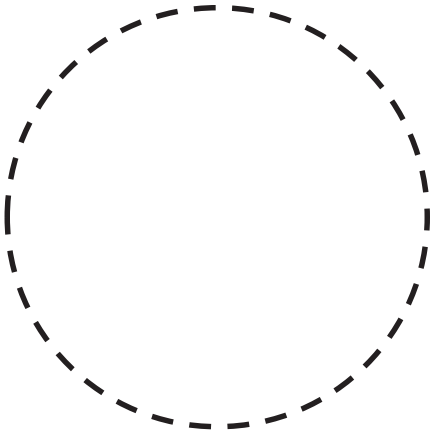
Baseline session:

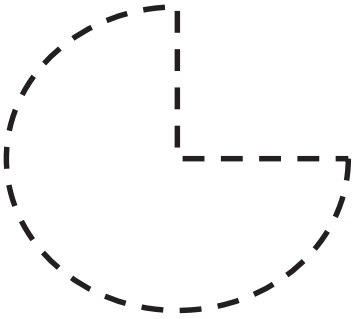
Baseline procedure	Conducted correctly?	
Begin session by instructing client to complete the tracing activity.	Yes	No
Prompt tracing using a least-to-most prompting hierarchy of vocal instructions, model, and physical guidance, with a 5-s delay between prompts.	Yes	No
Contingent upon whining, remove the task and turn away from the client for 20 s.	Yes	No
After 20 s, return the materials, instruct the client to complete the activity, and resume prompting if necessary	Yes	No
Ignore all other behaviors.	Yes	No
Percent of steps implemented correctly:		

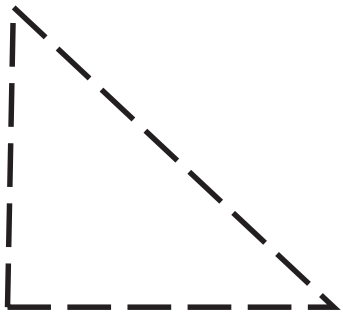
Extinction intervention session:

Baseline procedure	Conducted correctly?	
Begin session by instructing client to complete the tracing activity.	Yes	No
Prompt tracing using a least-to-most prompting hierarchy of vocal instructions, model, and physical guidance, with a 5-s delay between prompts.	Yes	No
If the client engages in whining, continue to provide instructions and the least-to-most prompting hierarchy.	Yes	No
Ignore all other behaviors.	Yes	No
Percent of steps implemented correctly:		









Appendix G: NCR – Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Operational Definitions:
Challenging Behavior: _____

NCR Schedule: _____

	Step	Implemented Correctly? + = Yes – = No
1	[Insert description of establishing operation.]	
2	Every [insert NCR interval], the supervisee [insert the presentation or removal of stimulus/event].	
3	After [insert duration of time with stimulus/event that serves as reinforcer], the supervisee [removes/presents] the [stimulus/event that serves as a reinforcer].	
4	If the client [insert challenging behavior], the supervisee [insert description of extinction].	
5	All other challenging behaviors are ignored.	
6		
7		
8		
9		
10		

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

References

Catania, A. C. (1992). *Learning* (3rd ed.). Prentice Hall.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* (3rd ed.). Pearson.

Favell, J. E., McGimsey, J. F., & Schell, R. M. (1982). Treatment of self-injury by providing alternate sensory activities. *Analysis and Intervention in Developmental Disabilities, 2*(1), 83–104.

Ferster, C. B., & Skinner, B. F. (1957). *Schedules of reinforcement*. Prentice Hall.

Goh, H. L., & Iwata, B. A. (1994). Behavioral persistence and variability during extinction of self-injury maintained by escape. *Journal of Applied Behavior Analysis, 27*(1), 173–174.

Kahng, S., Iwata, B. A., Thompson, R. H., & Hanley, G. P. (2000). A method for identifying satiation versus extinction effects under noncontingent reinforcement schedules. *Journal of Applied Behavior Analysis, 33*(4), 419–431.

Keller, F. S., & Schoenfeld, W. N. (1950). *Principles of psychology: A systematic text in the science of behavior*. Appleton-Century-Crofts.

Lattal, K. A., & St. Peter Pipkin, C. (2009). Resurgence of previously reinforced responding: Research and application. *The Behavior Analyst Today, 10*(2), 254.

Lerman, D. C., & Iwata, B. A. (1995). Prevalence of the extinction burst and its attenuation during treatment. *Journal of Applied Behavior Analysis, 28*(1), 93–94.

Lerman, D. C., & Iwata, B. A. (1996). A methodology for distinguishing between extinction and punishment effects associated with response blocking. *Journal of Applied Behavior Analysis, 29*(2), 231–233.

Lerman, D. C., Iwata, B. A., & Wallace, M. D. (1999). Side effects of extinction: Prevalence of bursting and aggression during the treatment of self-injurious behavior. *Journal of Applied Behavior Analysis, 32*(1), 1–8.

Lindberg, J. S., Iwata, B. A., Roscoe, E. M., Worsdell, A. S., & Hanley, G. P. (2003). Treatment efficacy of noncontingent reinforcement during brief and extended application. *Journal of Applied Behavior Analysis, 36*(1), 1–19.

Nevin, J. A., Tota, M. E., Torquato, R. D., & Shull, R. L. (1990). Alternative reinforcement increases resistance to change: Pavlovian or operant contingencies? *Journal of the Experimental Analysis of Behavior, 53*(3), 359–379.

Poling, A., & Normand, M. (1999). Noncontingent reinforcement: An inappropriate description of time-based schedules that reduce behavior. *Journal of Applied Behavior Analysis, 32*(2), 237.

Rescorla, R. A. (2004). Spontaneous recovery. *Learning & Memory, 11*(5), 501–509.

Rincover, A. (1978). Sensory extinction: A procedure for eliminating self-stimulatory behavior in developmentally disabled children. *Journal of Abnormal Child Psychology, 6*(3), 299–310.

Ringdahl, J. E., Vollmer, T. R., Marcus, B. A., & Roane, H. S. (1997). An analogue evaluation of environmental enrichment: The role of stimulus preference. *Journal of Applied Behavior Analysis, 30*(2), 203–216.

Shore, B. A., Iwata, B. A., DeLeon, I. G., Kahng, S., & Smith, R. G. (1997). An analysis of reinforcer substitutability using object manipulation and self-injury as competing responses. *Journal of Applied Behavior Analysis, 30*(1), 21–41.

Skinner, B. f. (1953). *Science and human behavior*. Free Press.

Smith, R. G. (2011). Developing antecedent interventions for problem behavior. In *Handbook of applied behavior analysis* (pp. 297–316). Guilford Press.

Van Camp, C. M., Lerman, D. C., Kelley, M. E., Contrucci, S. A., & Vorndran, C. M. (2000). Variable-time reinforcement schedules in the treatment of socially maintained problem behavior. *Journal of Applied Behavior Analysis, 33*(4), 545–557.

Vollmer, T. R., & Athens, E. (2011). Developing function-based extinction procedures for problem behavior. In *Handbook of applied behavior analysis* (pp. 317–334). Guilford Press.

Vollmer, T. R., Iwata, B. A., Zarcone, J. R., Smith, R. G., & Mazaleski, J. L. (1993). The role of attention in the treatment of attention-maintained self-injurious behavior: Noncontingent reinforcement and differential reinforcement of other behavior. *Journal of Applied Behavior Analysis, 26*(1), 9–21.

Chapter 24
Differential Reinforcement

Topics Covered Within This Chapter

Topics
Introduction
Differential Reinforcement of Alternative Behavior (DRA)
Differential Reinforcement of Other Behavior (DRO)
Differential Reinforcement of Low Rates of Responding (DRL)

Clinicians are often faced with the task of reducing or eliminating maladaptive behavior. While extinction and punishment are effective at behavior reduction, both are associated with many negative side effects. See Chaps. 23 and 26 for a thorough review of extinction and punishment, along with the negative side effects, respectively. Differential reinforcement offers another approach at behavior reduction which has far fewer, if any, negative corollaries.

Differential reinforcement involves reinforcing some members of a response class, while placing others on extinction or on a leaner schedule of reinforcement. For an in-depth review of reinforcement, see Chap. 12. When used to reduce a challenging behavior, differential reinforcement may involve placing the challenging behavior on extinction. However, contrary to popular belief, that is not the case in all applications of differential reinforcement. Research is rife with examples of

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_24].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_24

differential reinforcement in which challenging behavior is placed on extinction, contacts punishment, or is reinforced on a lean schedule of reinforcement with lower quality reinforcement (Vollmer et al., 2020; Weston et al., 2018). There are a number of specific differential reinforcement approaches for behavior reduction, including, but not limited to, differential reinforcement of alternative behavior (DRA), differential reinforcement of other behavior (DRO), and differential reinforcement of low rates of behavior (DRL).

Differential Reinforcement of Alternative Behavior

DRA weakens a challenging behavior by strengthening an alternative behavior. DRA involves a concurrent schedule of reinforcement in which the alternative behavior is placed on a dense schedule of reinforcement while the challenging behavior is placed on a lean schedule of reinforcement or placed on extinction (Vollmer et al., 2020). As your supervisees begin to develop DRA programs, they must make several procedural decisions: (a) selection of the alternative behavior, (b) selection of the reinforcer, and (c) selection of schedules of reinforcement for both challenging and alternative behaviors.

When planning DRA, there are several guidelines for selecting the alternative behavior, selecting reinforcement for the alternative behavior, and selecting the response to the challenging behavior. First and foremost, the alternative behavior should be in the client's repertoire. Moreover, the behavior should require low response effort, particularly relative to the response effort of the challenging behavior. In other words, it should be easy for the client to emit the selected alternative behavior. In many cases, an alternative behavior that is incompatible to the challenging behavior is an ideal selection. For example, if the topography of challenging behavior is screaming to access preferred leisure activities, then asking politely in an *inside voice* volume is an excellent alternative behavior because this precludes the possibility of the client engaging in both the challenging and alternative behaviors simultaneously. In such cases, the procedure could be identified as a differential reinforcement of incompatible behavior (DRI). Finally, supervisees should select behaviors that are likely to be reinforced in the natural environment. In many applications of DRA, the selected alternative behavior is reinforced with the same consequence maintaining the challenging behavior (Petscher et al., 2009). That is, the alternative behavior *replaces* the challenging behavior to access the same consequence. Therefore, supervisees must consider if the replacement behavior will be reinforced in the natural environment. For example, if challenging behavior is maintained by adult attention, it would be wise to select an alternative behavior that solicits adult attention, such as calling the adult by name or tapping the adult on the shoulder. If an arbitrary response such as foot tapping is selected, the DRA would most likely be unsuccessful in the natural environment when teachers, parents, and other adults fail to attend to foot tapping. Even if the planned consequence to the alternative behavior is not aligned with the consequence maintaining the

challenging behavior, it is important that the alternative behavior effectively solicits reinforcement in the natural environment. Regardless of the matching, or lack of matching, to the function of challenging behavior, if the alternative behavior fails to be reinforced in the natural environment, the DRA intervention will not succeed.

Consequences for the alternative behavior must be preferred. Therefore, supervisees should use preference assessments to ensure highly preferred consequences are used. Further, validation via a reinforcement assessment is also prudent. As previously mentioned, in many cases, the consequences maintaining the challenging behavior are used to reinforce the alternative behavior. Regardless of the selected consequence, reinforcement of the alternative behavior must be consistent, immediate, and of sufficient magnitude to strengthen the alternative behavior (Lerman et al., 2002). Finally, supervisees should be careful to ensure that reinforcement for the alternative behavior is more immediate, higher magnitude, higher quality, and/or on a denser schedule than that for challenging behavior (Athens & Vollmer, 2010).

DRA is often defined by the reinforcement of an alternative behavior while placing the challenging behavior on extinction. However, it is important to note that there are many demonstrations of effective DRA in which challenging behavior was not placed on extinction (Vollmer et al., 2020). In some cases, clinicians may plan to implement extinction, but perfect adherence to that plan simply is not feasible, particularly in a natural environment. Luckily, DRA efficacy can most likely be maintained under such conditions (e.g., Vollmer et al., 1999). Alternatively, some DRA programs may never intend to place challenging behavior on extinction. If this is the case, your supervisee must ensure that reinforcement is differentiated across one or more dimensions of reinforcement to ensure that the alternative behavior is strengthened, and the problem behavior is weakened.

Differential Reinforcement of Other Behavior

DRO weakens a challenging behavior by reinforcing its absence. In other words, the client receives preferred consequences contingent upon challenging behavior not occurring. There are two DRO approaches: interval DRO and momentary DRO. Interval DRO reinforces the absence of behavior over a specified duration while momentary DRO reinforces the absence of behavior at a specific moment. Both interval and momentary DRO schedules can be fixed or variable.

Within an interval DRO, reinforcement is delivered after an interval of time in which the challenging behavior did not occur. Within a fixed-interval DRO (FI-DRO) schedule, this interval is held constant. Within a variable-interval DRO (VI-DRO) schedule, this interval varies around a mean. Regardless of which interval is selected, if challenging behavior remains at acceptable levels, the DRO schedule can be thinned by gradually increasing the interval, or mean interval (e.g., Della Rosa, 2015). For example, an initial 60-second FI-DRO can be extended to 90 seconds, then 120 seconds, and so on, contingent upon challenging behavior remaining at

low levels. See Poling and Ryan (1982) for more guidance for thinning a DRO schedule.

Within a momentary DRO, reinforcement is delivered contingent upon challenging behavior being absent when an interval ends. For example, the clinician sets a timer for 60-second intervals. When the timer indicates the end of the interval and challenging behavior is not occurring, the clinician delivers reinforcement. The length of the interval may be held constant, fixed-momentary DRO (FM-DRO) or vary around a mean, variable-momentary DRO (VM-DRO).

Among the four options for implementing DRO, FI-DRO schedules are by far the most prevalent DRO schedules among the current literature (Weston et al., 2018). However, all four have been well demonstrated as effective.

When applying any of the four DRO schedules, several considerations must be made regarding (a) the length of the interval, (b) selecting the reinforcer, (c) preventing adventitious reinforcement of other maladaptive behaviors, and (d) schedule resetting. First, clinicians must determine the length of the interval. It is critical to select an interval in which the client will contact reinforcement. Therefore, we recommend that the interval length is selected based upon baseline inter-response time. For example, if implementing DRO to reduce skin picking with a baseline 4-minute inter-response time, the clinician should begin a DRO interval at or under 4 minutes to ensure that the client will contact reinforcement (prior to engaging in skin picking). One criticism of this approach is it may lead to a DRO schedule that is too intense to maintain or lacks social validity. However, the schedule can be gradually thinned once challenging behavior is maintained at low levels.

Second, a clinician must choose an effective reinforcer. If the results of a functional analysis are available, matching the reinforcer to the function of the challenging behavior may improve the success of the DRO, but this is not necessary. In fact, the majority of published applications of DRO did not match the DRO reinforcer with the function of challenging behavior (Weston et al., 2018). More importantly, clinicians must select an effective reinforcer by using preference assessments to identify highly preferred stimuli, employing reinforcer assessments to confirm a consequence serves as a reinforcer, and selecting appropriate dimensions of reinforcement to improve reinforcer efficacy.

Third, clinicians should ensure that adventitious reinforcement of other maladaptive behaviors does not occur. For example, a DRO schedule may be used to reduce hand biting. If the client refrains from hand biting for the DRO interval, then reinforcement would be delivered. However, refraining from hand biting does not preclude the client from engaging in other maladaptive behaviors, for example, screaming. Therefore, it is possible that at the end of an FI-DRO interval, the client's behavior technically met the contingency for reinforcement (i.e., refraining from hand biting), but at the end of that interval, the client is screaming. Technically, reinforcement for the absence of hand biting should be delivered at the same moment screaming is occurring, which has obvious limitations. To remedy this, clinician may adjust the DRO contingency so that the target challenging behavior and other challenging or maladaptive behaviors must meet a DRO criterion to contact reinforcement. However, clinicians need to be thoughtful in determining the best

approach. In some cases, the target behavior is so significant (e.g., eye gouging) that the priority is to reduce it, regardless of potential adventitious reinforcement of other, less severe topographies of challenging behavior (e.g., crying).

The final procedural consideration is the use of schedule resetting. Within a resetting DRO, if challenging behavior occurs within the interval, the interval is stopped, reset, and begun immediately. In a nonresetting DRO, if challenging behavior occurs within the interval, the interval continues, despite the fact that it has already been determined that reinforcement cannot be accessed at the end of the interval. The next interval begins as planned, presenting the next opportunity to contact reinforcement. For a full discussion of the advantages and disadvantages of resetting and nonresetting DRO approaches, see Gehrman et al. (2017).

Differential Reinforcement of Low Rates of Behavior

Differential reinforcement of low rates of behavior (DRL) aims to reduce, but not eliminate a behavior (Deitz & Repp, 1973; Ferster & Skinner, 1957). As a result, DRL is ideal for topographies of behavior that are only challenging when they occur at high rates. For example, an elementary student requesting to be excused to use the restroom is acceptable if it occurs every couple of hours but becomes challenging if the student makes the request a few times each hour. Similarly, asking for assistance with a task is desirable, unless the client asks for assistance throughout the entire task, effectively preventing the opportunity to learn to complete the task independently. In order to achieve lower rates of behavior, DRL involves reinforcement after (a) an interval of time in which the rate of behavior remained at or below a predetermined criterion (full-session DRL), or (b) a behavior occurs after a predetermined acceptable inter-response time (space-responding DRL).

Full-session DRL involves determining an acceptable rate of behavior within a session. For example, how many requests to be excused to the restroom are acceptable among elementary students? After the acceptable rate is determined, reinforcement is delivered at the end of the session if the behavior occurred at or below this number. If it was determined that 6 restroom requests were acceptable in a day, then a teacher may implement a DRL in which the student would be reinforced at the end of the day if he requested 0–6 restroom breaks throughout that day. A modification of the full-session DRL is an interval DRL in which the full session is divided into shorter intervals, each with an accompanying criterion. For example, the teacher could divide the day into three equal intervals: (a) 8:00 am–10:30 am, (b) 10:30 am–1:00 pm, and (c) 1:00 pm–3:30 pm. During each interval, if the student requested a restroom break 0–2 restroom breaks per interval, the teacher would deliver reinforcement.

A spaced-responding DRL involves reinforcing a behavior if it occurs after a predetermined duration of time from the last occurrence of that behavior. In using the previous example, a spaced-responding DRL would involve granting a restroom request and delivering additional reinforcers if that request is at least an hour and

15 minutes after the previous restroom request. Unlike the full-session and interval DRL schedules, some responding must occur to contact reinforcement. As a result, spaced-responding DRL may be favorable when the goal is to maintain some level of responding, because if implementing a full-session or interval DRL the complete absence of the target behavior would be reinforced.

With any DRL approach, it is important to select effective reinforcers. As with other differential reinforcement schedules, the use of a preference assessment and reinforcement assessment can improve the likelihood of success of the DRL. Similar to DRO, the reinforcement interval should be based upon baseline evaluation of inter-response time. For example, if baseline data indicated that disruptive bids for attention occurred about 10 times throughout an adult client's 6-hour shift at his job in a restaurant, a full-session DRL should begin with a schedule in which reinforcement is delivered contingent upon completing a 6-hour shift with 10 or fewer disruptive comments. Alternatively, a space-responding DRL schedule should begin by delivering reinforcement for every disruptive bid for attention that was proceeded with about 35 minutes since the last disruptive bid for attention. If such rates of responding are not socially valid in that environment, schedule thinning can be implemented after challenging behavior is stable. See Wright and Vollmer (2002) for an example of schedule thinning within a DRL schedule.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Introduction to Differential Reinforcement
15:00–30:00	Develop DRA
30:00–45:00	Develop DRO
45:00–55:00	Develop DRL
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *DRA Planning Guide*, 3 copies per supervisee
- Appendix B: *DRA Vignettes*, 1 copy per supervisee
- Appendix C: *DRA: Procedural Fidelity Checklist Template*, 1 copy per supervisee
- Appendix D: *DRO Planning Guide*, 3 copies per supervisee
- Appendix E: *DRO Vignettes*, 1 copy per supervisee
- Appendix F: *DRO: Procedural Fidelity Checklist Template*, 1 copy per supervisee
- Appendix G: *DRL Planning Guide*, 3 copies per supervisee
- Appendix H: *DRL Vignettes*, 1 copy per supervisee
- Appendix I: *DRO: Procedural Fidelity Checklist Template*, 1 copy per supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Iannaccone et al. (2020)
- Lerman et al. (2002)
- Otalvaro et al. (2020)

Introduction to Differential Reinforcement

Begin your supervision meeting by asking your supervisees to describe the drawbacks of punishment. Follow this with a discussion of the drawbacks of extinction, when used as a sole intervention. Ask your supervisees to identify behavior reduction techniques that do not rely solely on punishment or extinction. We imagine that they will identify differential reinforcement as fitting this description without your prompting. Once identified, share the definition of differential reinforcement. Ask your supervisees to share examples of how they implemented differential reinforcement in their practice. After thoroughly summarizing differential reinforcement in general, introduce the three approaches to differential reinforcement: DRA, DRO, and DRL.

Provide your supervisees with a definition of DRA. Review the following procedural considerations: (a) selecting an alternative behavior, (b) selecting a reinforcer, and (c) consequences for both the alternative and challenging behavior. Ask your supervisees to identify situations in which DRA would be a suitable intervention. Appropriate response may include, but are not limited to, (a) despite a need for challenging behavior reduction, punishment and extinction are associated with too many disadvantages; (b) a functional analysis resulted in an identified function; and (c) the client lacks adaptive behavior that is efficient for getting needs met.

After reviewing the steps of DRA, distribute three copies of the *DRA Planning Guide*, one copy of the *DRA Vignettes*, and three copies of the *DRA Procedural Fidelity Checklist Template.* Read the first vignette found in the *DRA Vignettes* handout and also within the attached PowerPoint. As a whole group, collectively complete the planning form. Use the information gathered on the planning form to develop a procedural fidelity checklist using the template provided in Appendix C. Note this document is a simple template and additional steps or details are likely necessary. As you develop the DRA procedure, be sure to ask supervisees to justify recommended steps, praise correct responses, and immediately correct errors.

Transition to a discussion of DRO. Define DRO and describe the distinguishing features of all four: FI-DRO, VI-DRO, FM-DRO, and VM-DRO. Next, review the following procedural considerations: (a) selecting interval length, (b) selecting the reinforcer, (c) preventing adventitious reinforcement of other maladaptive behaviors, and (d) schedule resetting. Ask your supervisees to identify situations in which DRO would be a suitable intervention. Appropriate responses may include, but are not limited to: (a) despite a need for challenging behavior reduction, punishment and extinction are associated with too many disadvantages; (b) functional analysis results are unavailable; and (c) challenging behavior is maintained by automatic reinforcement.

After reviewing the steps of DRO, distribute three copies of the *DRO Planning Guide*, one copy of the *DRO Vignettes*, and three copies of the *DRO Procedural Fidelity Checklist Template.* Read the first vignette found in the *DRO Vignettes* handout and within the attached PowerPoint. Complete the planning form with a group as you did with the first DRA vignette. Follow this by collectively developing a procedural fidelity checklist found in Appendix F. As with the DRA procedural fidelity checklist template, note this document is a simple template and additional steps or details are likely necessary.

Turn the discussion to DRL. Define DRL, making a clear distinction between the (a) full-session DRL, (b) interval DRL, and (c) spaced-responding DRL. Ask supervisees what factors should be considered when deciding between the three options. At the very least, be sure your supervisees recognize that full-session and interval DRL involve reinforcement of the complete absence of behavior; therefore, if some level of the target behavior should be maintained, then a spaced-responding DRL is indicated. Review the general steps of each DRL procedure. Finally, review the following procedural considerations: selecting reinforcers and selecting DRL interval.

Finally, distribute three copies of the *DRL Planning Guide*, one copy of the *DRL Vignettes*, and three copies of the *DRL Procedural Fidelity Checklist Template.* Read the first vignette found in the *DRL Vignettes* handout and within the attached PowerPoint. Complete the planning form with a group as you did with the first DRA and DRO vignettes. Follow this by collectively developing a procedural fidelity checklist found in Appendix I. As with the previous procedural fidelity checklist templates, this is a simple template and additional steps or details are likely necessary.

Develop DRA

Now that you have introduced each of the three differential reinforcement procedures and developed one differential protocol using the vignettes and planning guides per procedure, you will give your supervisees an opportunity to develop a procedure more independently. Guide them to break into small groups of 2–3 supervisees. In their small group, they should read the second vignette: Margaret. Next, they should use the planning guide to foster communication about the best DRA protocol for Margaret. When their discussion is complete, they will create a procedural fidelity checklist. It is helpful if they have an electronic copy of Appendix C and a laptop computer or tablet so that they can develop a clean, easy-to-read document; however, a paper version will suffice. After each group has completed their DRA plan for Margaret, re-group and have the small groups share their experience. First, share what information influenced specific decisions (e.g., how they selected alternative behavior, how they determined the response to the challenging behavior). Second, share the procedural checklist. Ideally, an electronic copy can be projected for all to see, but if not, simply have your supervisee read through the steps of their procedural fidelity checklist. After a short presentation, invite others to provide feedback, both praise and corrective.

Develop DRO

Repeat the DRA small group activity with the second DRO vignette: Kinciad. You may wish to divide your supervisees into new small groupings or leave the DRA groups intact. After the small groups use the planning guide to develop a procedural fidelity checklist and have the groups share their work with one another. Similar to the DRA activity, be sure your supervisees share the decision-making process informed by the guide (e.g., how they decided to use interval or momentary DRO, how they determined the interval length). After a short presentation, invite others to provide feedback, both praise and corrective.

Develop DRL

Repeat this activity one more time with the second DRL vignette: Karson. Again, you may wish to keep group divisions or re-divvy into new groups. After completing the group activity, have them share with the whole group with an emphasis on their decision-making process (e.g., how they decided to use full-session or spaced-responding DRL, how they determined an acceptable level of challenging behavior). End by inviting other supervisees to provide feedback.

Knowledge Check

1. Is extinction a required component of DRA? Why or why not?
2. What should be considered when selecting the alternative behavior within a DRA?
3. Describe how to select a consequence delivered in response to the alternative behavior in a DRA.
4. What is a reason for implementing a DRO rather than a DRL?
5. What is a reason for selecting a spaced-responding DRL rather than a full-session DRL?

Homework for Individual Supervision without a Client

1. Review the third vignette for DRA, DRO, and DRL (Appendix B, E, and H).
2. Identify if a client for whom you will implement a differential reinforcement procedure. Determine which differential reinforcement procedure to use with a client.
3. If a DRA is selected, retrieve and review a recent FBA on the target behavior.
4. If a DRO or DRL is selected, collect data on baseline IRT across a minimum of four observation sessions.
5. If available, retrieve and review results of recent preference assessments and reinforcer assessments.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 50-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–20:00	Plan DRA, DRO, and DRL with Vignettes
20:00–40:00	Develop Differential Reinforcement Procedure for a Client
40:00–50:00	Role-Play

Materials Needed

- Appendix A: *DRA Planning Guide*, 2 copies
- Appendix B: *DRA Vignettes*, 1 copy
- Appendix C: *DRA: Procedural Fidelity Checklist Template*, 2 copies
- Appendix D: *DRO Planning Guide*, 2 copies
- Appendix E: *DRO Vignettes*, 1 copy
- Appendix F: *DRO: Procedural Fidelity Checklist Template*, 2 copies
- Appendix G: *DRL Planning Guide*, 2 copies
- Appendix H: *DRL Vignettes*, 1 copy
- Appendix I: *DRO: Procedural Fidelity Checklist Template*, 2 copies

Plan DRA, DRO, and DRL with Vignettes

During the first 20 minutes of your meeting, instruct your supervisee to lead you both through the planning guide and writing the steps of implementation on the procedural fidelity checklist just as you did in the group supervision meeting. In this meeting, your supervisee will complete this activity for the final vignette for each procedure: Brady (DRA), Mina (DRO), and Noble (DRL). As with the group activity, use this time to observe and provide feedback on the considerations your supervisee makes in planning the ideal differential reinforcement procedure. As always, provide praise for correct responses and correct errors.

Develop Differential Reinforcement Procedure for a Client

At the end of your group supervision meeting, you assigned your supervisee to select a client for whom they will implement DRA, DRO, or DRL. Prior to this meeting, they were to select both the client and the procedure. Regardless of the selected procedure, they should have obtained and reviewed the client's recent preference assessment and reinforcer assessment reports. If they selected to implement a DRA, they should have also retrieved and reviewed a recent FBA report. We anticipate that some supervisees will want to implement a DRA for a client without a recent FBA. This is technically possible; however, many DRAs programs involve reinforcing the alternative behavior with the same consequence that was maintaining the challenging behavior. As a result, we strongly encourage you and your supervisees to use a function-based reinforcer if a recent FBA on the target behavior is available. If a recent FBA is unavailable, your supervisee has two options: (a) delay moving forward with developing a DRA program until an FBA can be conducted, or (b) continue developing a DRA program, but be mindful of communicating clearly that the program does not use function-based reinforcement. This distinction between a function-based DRA and a nonfunction-based DRA will be

important for your supervisee to grasp. Finally, if implementing a DRO or DRL, they were to have collected baseline data on inter-response time.

Using the collected data and retrieved resources, ask your supervisee to use the appropriate planning guide to develop a procedural fidelity checklist for the selected differential reinforcement procedure for their client. As with the planning activities, ask your supervisee to *think aloud* through the planning process so you can provide helpful feedback about all considerations that must be made to develop an effective differential reinforcement procedure. At the end of this activity, you and your supervisee should have a clearly defined differential reinforcement procedure for implementing with their client. Ideally, by the end of this meeting, those steps would be saved electronically using the appropriate procedural fidelity checklist template. However, if you do not have access to the technology to alter the electronic document during the planning process, ask your supervisee to do so immediately after this meeting.

Role-Play

The final activity of your individual supervision meeting without a client is a role-play. During the role-play, your supervisee will act as themselves and you will act as the client while simultaneously collecting procedural fidelity data. If this is difficult, we recommend recording yourself in a role-play for 5 minutes and then immediately observing the video to collect procedural fidelity data.

We recommend you complete a 5-minute role-play, then stop to deliver feedback. Repeat this process as many times as you can. During the initial role-play, do your best to play the role as you believe the client would behave on their best day. If your supervisee implements with fidelity under these conditions, increase the difficulty of implementation by authentically representing challenges you anticipate your supervisee may face (e.g., increased disruptive behavior). As always, provide praise for correct implementation and correct errors. Continue the 5-minute role-play followed by feedback until your supervisee demonstrates the ability to implement the procedure with at least 90% of steps implemented correctly.

Homework for Individual Supervision with a Client

1. Develop a data sheet for measuring challenging behavior when implementing the differential reinforcement procedure (DRA, DRO, DRL). Feel free to include additional measures (e.g. alternative behavior), when applicable.
2. At least one week prior to the individual supervision meeting with a client, send the data sheet to the supervisor for approval.
3. Once approved, use the data sheet to collect data on challenging behavior either (a) when no intervention is in place or (b) when the current, non-differential reinforcement intervention is in place.
4. Graph collected baseline data. Within 48 hours of the individual supervision meeting with a client, send the graphed data to your supervisor.
5. At least 48 hours prior to the individual supervision meeting with a client, send electronic version of newly developed differential reinforcement procedural fidelity checklist to supervisor. Note: this may be completed at the end of this meeting, but it is possible that final revisions must be made.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 50-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–10:00	Provide Feedback Regarding Differential Reinforcement Plan and Data Collection
10:00–40:00	Observe Differential Reinforcement Procedure
40:00–50:00	Performance Feedback

Materials Needed

- Supervisee-developed Differential Reinforcement Procedure Fidelity Checklist
- Supervisee-developed Differential Reinforcement Data Sheet
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Instructional Plan and Data Collection

Your supervisee should have provided you with three items: (a) data sheet which you have already approved, (b) baseline data on target behavior collected with the data sheet, and (c) a procedural fidelity checklist for the differential reinforcement procedure they intend to implement. Prior to this meeting, review these documents to confirm that your supervisee has completed them accurately. Note items to praise and correct. For the first 10 minutes of this session, meet with your supervisee to discuss your feedback. We recommend meeting without the client to better allocate attention to the task at hand. If significant changes must be made, the supervision meeting with a client will need to be postponed in order to give your supervisee ample time to prepare. However, we do not anticipate that will be the case in most instances.

Observe Differential Reinforcement

You will observe your supervisee implementing the selected differential reinforcement procedure for up to 30 minutes. You may wish to divide this 30-minute observation to two or more observations or extend the total duration of the observation. In fact, if implementing a DRO or a DRL with an interval of 30 minutes or longer, attempt to observe during the full duration of the interval. In some cases, this may be impractical or impossible (e.g., FI-DRO with a 4-hour interval). In such instances, observe as long of a duration as possible in order to observe the greatest number of steps in the procedural fidelity checklist as possible.

During the observation, measure procedural fidelity and collect data on the client behavior using the forms your supervisee provided you. If it is difficult to measure both supervisee and client behaviors simultaneously, divide your observation period in half, collect client data during the first half and supervisee procedural fidelity data during the second half.

Performance Feedback

During your final 10 minutes, you will provide performance feedback. We recommend holding this discussion when no clients are present, and your supervisee can be fully present in the discussion. Begin by praising correct implementation and

then correct any observed errors. Solicit questions from your supervisee and offer to role-play any steps in which they implemented with poor fidelity. End by comparing the data you and your supervisee collected on client behavior. Provide your supervisee with your data sheet so they can calculate interobserver agreement (IOA). Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following while implementing a differential reinforcement procedure: (a) accurately collect data on challenging behavior and an additional behavior (when applicable; e.g., DRA) with at least 80% agreement and (b) implement a differential reinforcement procedure with least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement a different differential reinforcement procedure than the one selected for the individual meeting with a client.
- ☐ Evaluate your supervisee's ability to implement a differential reinforcement program with a different client.
- ☐ Evaluate your supervisee's ability to implement a differential reinforcement program with the same client, but a different topography of behavior.

Appendix A: DRA Planning Guide

Client: _____

Topography of Challenging Behavior: _____

Function of Challenging Behavior: _____

Response to Challenging Behavior: _____

Alternative Behavior: _____

Is this within the client's repertoire?	Yes	No
Is this less effortful than the challenging behavior?	Yes	No
Would this be reinforced in the natural environment?	Yes	No
Optional: Is this incompatible with the challenging behavior?	Yes	No

Response to Alternative Behavior: _____

Is the consequence preferred?	Yes	No
Encouraged: has preference assessment verified preference?	Yes	No
Is schedule of reinforcement dense?	Yes	No
Is reinforcement high quality?	Yes	No
Is reinforcement delivered immediately?	Yes	No
Encouraged: has reinforcer assessment verified reinforcement?	Yes	No
Encouraged: does reinforcement match function?	Yes	No

Appendix B: DRA Vignettes

Vignette: Cooper

Cooper is a 7-year-old boy diagnosed with Down syndrome and intellectual disability. He receives in-home ABA services. His father's request assistance in managing his challenging behavior, kicking walls and furniture, which predominantly occurs in the evening. Cooper communicates vocally in short sentences. He has delays in motor development, but he is capable of completing all the tasks associated with bedtime routine with minimal support, with the exception of taking a bath, which requires parental adult support. After a thorough FBA, it is determined that Cooper's property destruction is maintained by escape from bedtime routine, mainly cleaning his room, taking a bath, brushing his teeth, and getting into bed. Cooper's fathers work early morning shifts and find Cooper's property destruction, and the delay it creates on finally getting to bed, highly disruptive to their family life. Their hope is Cooper learns to complete bedtime routine with minimal disruptions caused by property destruction. As Cooper's in-home provider, you have completed a preference assessment and determined the following items to be highly preferred: books from the Clifford the Big Red Dog series, a stuffed animal porcupine he calls Spikey, and Spiderman dress up clothes. You have yet to determine if access to these items serve as a reinforcer.

Vignette: Margaret

Margaret is a 15-year-old girl diagnosed with autism. She receives ABA services 30 hours per week at a clinic. Margaret communicates with 1- and 2-word phrases along with a speech generating application on her iPad. Margaret's grandmother has expressed concern regarding her frequent screaming. Margaret produces short, high-pitched, nonword vocalizations throughout the day, but most often in the early evening when Margaret's grandmother is completing chores around the house, such as preparing dinner or folding laundry. After a thorough FBA, it is determined that Margaret's screaming is maintained by attention. As the sole caretaker, Margaret's grandmother's hope is that Margaret will be able to tolerate 15–20 min of alone time, with access to leisure items, so that her grandmother can maintain the household. As Margaret's in-home provider, you have completed a preference assessment and determined that Margaret has very few highly preferred tangible items. However, coloring pencils and a digital camera are moderately preferred. A reinforcer assessment has verified that praise, hugs, and high fives function as reinforcers.

Vignette: Brady

Brady is a 2-year-old boy diagnosed with autism and intellectual disability. He receives in-home early childhood services, which includes a team of behavior analysts who provide services in home. Brady has no vocal communication. His behavior analysts have recently introduced a 4-word communication board. Brady has made some progress, but he has not yet mastered requesting his preferences using the board with an array of four cards. Brady's mom is concerned about Brady's tantrums. She reports that when he is frustrated, he drops to the ground, kicks and hits the floor, and cries. This occurs several times a day. Brady's team conducts an FBA and concludes that tantrums are maintained by access to preferred toys. Brady frequently plays with a see 'n say, a light-up toy, a rain stick toy, and a squishy ball. However, a preference assessment has yet to be conducted.

Appendix C: DRA: Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Challenging Behavior:
Topography: _____ Consequence: _____

Alternative Behavior:
Topography: _____ Schedule of Reinforcement: _____

	Step	Implemented Correctly? + = Yes - = No
1	When the client engages in [challenging behavior] the supervisee [insert consequence].	
2	Optional: describe how alternative behavior should be prompted.	
3	When the client [insert alternative behavior, the supervisee [insert reinforcement]. Be sure to describe the dimensions and schedule of reinforcement.	
4		
5		
6		
7		
8		
9		
10		

_____ / _____ * 100 = _____% of steps completed
Steps Completed Correctly. Total Number of Step

Appendix D: DRO Planning Guide

Client: _____

Topography of Challenging Behavior: _____

Function of Challenging Behavior: _____

Baseline Interresponse Time of Challenging Behavior: _____

Response to Challenging Behavior: _____

Choose one: Interval DRO Momentary DRO
Justification: _____
_____

Choose one: Fixed Variable
Justification: _____
_____

Schedule Resetting: Yes No

Interval Length _____
Justification: _____
_____

Reinforcement: _____

Is the consequence preferred?	Yes	No
Encouraged: has preference assessment verified preference?	Yes	No
Is reinforcement high quality?	Yes	No
Is reinforcement delivered immediately?	Yes	No
Encouraged: has reinforcer assessment verified reinforcement?	Yes	No
Encouraged: does reinforcement match function?	Yes	No

How will adventitious reinforcement of other maladaptive behaviors be prevented:

Appendix E: DRO Vignettes

Vignette: Sebastian

Sebastian is a 9-year-old boy diagnosed with Prader Willi syndrome and intellectual disability. He attends public school where a behavior analyst consults with his classroom teacher and works directly with Sebastian 1 hour per day. Sebastian is making great progress on many of his communication and academic goals. However, Sebastian's teacher is concerned about Sebastian's frequent scratching of his arms. Sebastian's arms are extremely dry and his skin is frequently flaking off. By appearance, one would assume this is uncomfortable. It appears to be a result of constant scratching. Although each individual scratch is not of magnitude to cause damage to the skin, the repetitive nature of Sebastian's scratching has led to bleeding and clearly irritated skin. The school has yet to complete an FBA on scratching; however, the initial teacher and caregiver interview suggest a strong likelihood that scratching is maintained by automatic reinforcement. Sebastian's behavior analyst observed Sebastian's scratching last week. She noticed that scratching tends to occur episodes, meaning that scratching occurs repetitively for a short duration of time. She defined a *scratching episode* as repetitive scratching with at least a 10-s interval since the last scratch and 10-s prior to the next scratch episode. The duration of scratching episodes was 15 s, on average. Below is her data regarding frequency of scratching episodes (*episodes* defined as repetitive scratching with at least a 10-s interval since the last episode and prior to the next episode). Sebastian enjoys playing with a fidget spinner, a Buzz Lightyear action figure, and slime. The behavior analyst conducted a preference assessment which confirmed these are the three highest preferred toys.

Day	Time	Frequency
Monday	1:00–2:00	12
Tuesday	10:00–11:00	15
Wednesday	8:00–9:00	10
Thursday	2:00–3:00	17
Friday	9:30–10:30	14

Vignette: Kincaid

Kincaid is a 21-year-old man diagnosed with Williams syndrome and intellectual disability. Kincaid works at a local grocery store. With the assistance of a behavior analyst, Kincaid has learned many new job skills which has earned him two promotions. However, there has been some concern regarding Kincaid's spitting behavior. For years, Kincaid has spit on his hands and rubbed them together. Needless to say,

his employer is concerned that this is behavior will lead to the spread of illness and contamination of food products. Due to time constraints, Kincaid's behavior analyst is unable to complete an FBA prior to developing an intervention. However, he was able to collect baseline data, which is presented below. Moreover, his behavior analyst recently conducted a preference assessment, which concluded that Kincaid's highest preferred items are watching Olympics competitions on a tablet, playing Solitaire on a tablet, or painting.

Day	Time	Frequency
Monday	1:00–2:00	2
Tuesday	10:00–12:00	4
Wednesday	8:00–9:00	1
Thursday	2:00–5:00	17
Friday	8:30–12:30	21

Vignette: Mina

Mina is a 4-year-old girl diagnosed with autism and intellectual disability. She receives ABA services for 40 hours per week at a private clinic in her community. Mina has made great strides in her communication and play skills. However, Mina's parents are concerned about her thumb sucking behavior. Mina began sucking her thumb as an infant and, despite their best efforts, Mina's parents have not been successful at reducing this behavior. Mina's dentist is concerned about the effect this behavior is having on her dental health and Mina's thumbs are covered in rough callouses from the frequent thumb sucking. The behavior analysts at her clinic completed an FBA, which concluded that thumb sucking is automatically maintained. Moreover, they conducted a preference assessment which identified a red car with buttons to activate lights and sirens as her highest preferred toy. A reinforcer assessment also concluded that the red car functions as a reinforcer. A behavior analyst on Mina's team collected frequency data prior to developing the intervention. She defined thumb sucking as the thumb being placed past the plane of the lips. She collected both frequency and total duration across the observation, which she used to calculate mean duration per episode of thumb sucking. These data are below.

Day	Time	Frequency	Mean duration per thumb sucking episode
Monday	8:00–10:00	10	5 min/episode
Tuesday	10:00–12:00	14	7 min/episode
Wednesday	9:00–11:00	7	10 min/episode
Thursday	2:00–5:00	18	8 min/episode
Friday	8:30–12:30	20	7 min/episode

Appendix F: DRO: Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Challenging Behavior:
Topography: _____ Consequence: _____

Interval Duration (or Mean Duration): _____

Consequence for Meeting Interval Expectation: _____

Choose one: FI-DRO VI-DRO FM-DRO VM-DRO

	Step	Implemented Correctly? + = Yes − = No
1	When the client engages in [challenging behavior] the supervisee [insert consequence].	
2	Optional for resetting: When the client engages in [challenging behavior] the supervisee resets the interval timer.	
3	Interval DRO: If at the end of the interval, the client had not engaged in challenging behavior, the supervisee [insert reinforcement]. Be sure to describe the dimensions and schedule of reinforcement.	
4	Momentary DRO: If at the end of the interval, the client is not engaging in challenging behavior, the supervisee [insert reinforcement]. Be sure to describe the dimensions and schedule of reinforcement.	
5	Variable Interval or Momentary: The DRO interval varies around [insert mean duration].	
6	Fixed Interval or Momentary: The DRO interval is consistent [insert interval duration].	
7		
8		
9		
10		

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix G: DRL Planning Guide

Client: _____

Topography of Challenging Behavior: _____

Function of Challenging Behavior: _____

Baseline Interresponse Time of Challenging Behavior: _____

Response to Challenging Behavior: _____

Total Absence of Challenging Behavior Is Acceptable: Yes No

Choose one: Full-Session DRL Interval DRL Spaced-responding DRL
Justification: _____
_____

Acceptable Level of Challenging Behavior: _____

Interval Length _____
Justification: _____
_____

Reinforcement: _____

Is the consequence preferred?	Yes	No
Encouraged: has preference assessment verified preference?	Yes	No
Is reinforcement high quality?	Yes	No
Is reinforcement delivered immediately?	Yes	No
Encouraged: has reinforcer assessment verified reinforcement?	Yes	No
Encouraged: does reinforcement match function?	Yes	No

Appendix H: DRL Vignettes

Vignette: Lily

Lily is an 8-year-old girl diagnosed with an intellectual disability. She attends public school and spends most of her day in a general education second grade class. With the support of a behavior analyst who provides both consultation support for Lily's teacher and pull-out instruction with Lily 5 days per week, Lily is doing well academically. However, Lily's teacher, behavior analyst, and parents are concerned about Lily's lack of participation in recess. Lily is new to this school campus and has very few friends in class. During recess, she rarely interacts with the other students, despite her teacher observing that other students frequently invite Lily to play with them. Lily's parents report that Lily has always preferred sedentary leisure activities as opposed to gross motor play such as running, climbing, sliding, etc. However, for both her health and social development, they wish for Lily to spend more time playing with friends at recess. In what appears to be an attempt to escape recess play, Lily's teacher reports that Lily frequently requests to get a drink from the water fountain, which is stationed just outside the entry to the school, about 80 yards from the playground where her classmates spend their time during recess. However, an FBA has not been conducted on excessive water fountain requests. Although Lily is able to safely walk to and from the water fountain, Lily's teacher is concerned that with the multiple trips to and from the water fountain, Lily is missing opportunities to engage with her classmates. Lily's teacher and parent would like for Lily to request no more than two trips to the water fountain during recess. The behavior analyst working with Lily has noticed that Lily enjoys watching cartoons on the classroom tablet or computer and making crafts such as beaded bracelets and an assortment of creations with popsicle sticks. However, no preference assessment has been conducted. Lily' behavior analyst measured water fountain requests and trips (all requests were granted). Below are the data:

Day	Time	Frequency
Monday	1:00–1:30	8
Tuesday	1:00–1:30	7
Wednesday	1:00–1:30	9
Thursday	1:00–1:30	6
Friday	1:00–1:30	10

Vignette: Karson

Karson is a 35-year-old man diagnosed with an intellectual disability. Karson is a barista at a local coffee shop. He has worked there for 5 years and customers love Karson's friendly personality. Despite being a skilled barista, Karson's boss is

concerned about the frequency with which Karson tells knock-knock jokes, his specialty with customers. While customers do appear to enjoy the occasional knock-knock joke, Karson's boss has noticed an uptick in jokes and it seems that the frequency of his jokes are both impairing his ability to complete the essential tasks of his job and turning off customers. In other words, his coffee production is slowed. Moreover, customers' nonverbal behavior indicates they are a bit overwhelmed with a constant barrage of knock-knock jokes. Karson receives support from local agency serving adults with disabilities. This support includes both a job coach and a behavior analyst that work collaboratively. Karson's boss enlists their help in reducing the frequency of knock-knock jokes. His boss reports that he does not want Karson to stop interacting with customers completely, in fact, about four jokes per hour would be acceptable. Karson was asked to identify his favorite leisure activities that he could enjoy at work. He reported wanting to be able to take a break to chat with coworkers in the breakroom, drink a coffee in the breakroom while flipping through a magazine, and watching the Price is Right gameshow on the breakroom TV. Karson's behavior analyst collected baseline data on knock-knock jokes. Those data are below.

Day	Time	Frequency
Monday	7:00–10:00	25
Tuesday	7:00–10:00	32
Wednesday	7:00–10:00	35
Thursday	7:00–10:00	26
Friday	7:00–10:00	28

Vignette: Noble

Noble is a 4-year-old boy diagnosed with autism and intellectual disability. Noble receives in-home ABA services for 30 hours per week. Noble has made great progress on communication, play, and early academic skills. He engages in very few challenging behaviors, with the exception of one unusual habit. Noble frequently takes his stuffed animals and places them in specific places around the house. Considering Noble has about 30 stuffed animals, this can be quite a lot to work around and cleanup for his family of six in his home. Although the behavior does not specifically cause any harm, Noble's parents are tired of cleaning up stuffed animal after stuffed animal in the living room, bathrooms, halls, and more. Therefore, they enlist the help of their behavior analyst. Noble's family reports that their biggest concern is when he places stuffed animals outside of his room between 5:00 and 7:00 pm when everyone is rushing to finish homework, daily chores, prepare dinner, and eat dinner. They would be happy if he never brought a stuffed animal out of his room again during this evening rush, but could also tolerate about 3 stuffed animals per night. Noble's behavior analyst has not conducted an FBA on placing stuffed animals around the home, but anecdotal observation suggests a possibility that the behavior is automatically maintained. Noble's behavior analyst has

conducted a preference assessment which concluded puzzles, magnet blocks, and a light and sound producing toy guitar are his most preferred items. He also conducted a reinforcer assessment to confirm that all three items serve as reinforcers. Finally, Nobles's behavior analyst collected data on placing stuffed animals around the home for four days during the busy 5:00–7:00 time. He *defined placing stuffed animals around the home* as any stuffed animal crossing the threshold of Noble's bedroom door.

Day	Time	Frequency
Monday	5:00–7:00	25
Tuesday	5:00–7:00	30
Wednesday	5:00–7:00	28
Thursday	5:00–7:00	24

Appendix I: DRL: Procedural Fidelity Measure Template

Supervisee: _____ Supervisor: _____
Client: _____ Date & Time: _____

Challenging Behavior:
Topography: _____ Consequence: _____

Acceptable Low Rate: _____ Consequence: _____

Choose one: Full-Session DRL Interval DRL Spaced Responding DRL

	Step	Implemented Correctly? + = Yes − = No
1	When the client engages in [challenging behavior] the supervisee [insert consequence].	
2	Full-Session or Interval DRL: If at the end of the interval, the client had engaged in [insert number] or fewer instances of the target behavior, the supervisee [insert reinforcement]. Be sure to describe the dimensions and schedule of reinforcement.	
3	Spaced Responding DRL: If the target behavior occurs at least [insert duration of time] since the last occurrence, the supervisee [insert reinforcement]. Be sure to describe the dimensions and schedule of reinforcement.	
4		
5		
6		
7		
8		
9		
10		

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

References

Athens, E. S., & Vollmer, T. R. (2010). An investigation of differential reinforcement of alternative behavior without extinction. *Journal of Applied Behavior Analysis, 43*(4), 569–589.

Deitz, S. M., & Repp, A. C. (1973). Decreasing classroom misbehavior through the use of DRL schedules of reinforcement. *Journal of Applied Behavior Analysis, 6*, 457–463.

Della Rosa, K. A., Fellman, D., DeBiase, C., DeQuinzio, J. A., & Taylor, B. A. (2015). The effects of using a conditioned stimulus to cue DRO schedules. *Behavioral Interventions, 30*(3), 219–230.

Ferster, C. B., & Skinner, B. F. (1957). *Schedules of reinforcement*. Appleton-Century-Crofts.

Gehrman, C., Wilder, D. A., Forton, A. P., & Albert, K. (2017). Comparing resetting to non-resetting DRO procedures to reduce stereotypy in a child with autism. *Behavioral Interventions, 32*(3), 242–247.

Iannaccone, J. A., Hagopian, L. P., Javed, N., Borrero, J. C., & Zarcone, J. R. (2020). Rules and statements of reinforcer loss in differential reinforcement of other behavior. *Behavior Analysis in Practice, 13*(1), 81–89.

Lerman, D. C., Kelley, M. E., Vorndran, C. M., Kuhn, S. A., & LaRue, R. H., Jr. (2002). Reinforcement magnitude and responding during treatment with differential reinforcement. *Journal of Applied Behavior Analysis, 35*(1), 29–48.

Otalvaro, P. A., Krebs, C. A., Brewer, A. T., Leon, Y., & Steifman, J. S. (2020). Reducing excessive questions in adults at adult-day training centers using differential-reinforcement-of-low rates. *Journal of Applied Behavior Analysis, 53*(1), 545–553.

Petscher, E. S., Rey, C., & Bailey, J. S. (2009). A review of empirical support for differential reinforcement of alternative behavior. *Research in Developmental Disabilities, 30*(3), 409–425.

Poling, A., & Ryan, C. (1982). Therapeutic applications of differential-reinforcement-of-other behavior (DRO) schedules: A review. *Behavior Modification, 6*(1), 3–12.

Vollmer, T. R., Roane, H. S., Ringdahl, J. E., & Marcus, B. A. (1999). Evaluating treatment challenges with differential reinforcement of alternative behavior. *Journal of Applied Behavior Analysis, 32*(1), 9–23.

Vollmer, T. R., Peters, K. P., Kronfli, F. R., Lloveras, L. A., & Ibañez, V. F. (2020). On the definition of differential reinforcement of alternative behavior. *Journal of Applied Behavior Analysis, 53*(3), 1299–1303.

Weston, R., Hodges, A., & Davis, T. N. (2018). Differential reinforcement of other behaviors to treat challenging behaviors among children with autism: A systematic and quality review. *Behavior Modification, 42*(4), 584–609.

Wright, C. S., & Vollmer, T. R. (2002). Evaluation of a treatment package to reduce rapid eating. *Journal of Applied Behavior Analysis, 35*(1), 89–93.

Chapter 25
Functional Communication Training

Topics Covered Within This Chapter

Topics
Introduction
Selecting a Functional Communication Response (FCR) Teaching and Reinforcing the FCR
Response to Challenging Behavior

Functional communication training (FCT) is a robust intervention to reduce challenging behavior. Following a functional behavior assessment (FBA), FCT involves teaching the client a socially appropriate communication response that replaces the challenging behavior (Carr & Durand, 1985; Gerow et al., 2018; Tiger et al., 2008). Effectively, FCT is a differential reinforcement of alternative behavior (DRA) procedure in which the alternative response is a socially appropriate, generally recognizable communication response (see Chap. 24). During FCT, the clinician prompts the selected communication response and reinforces it with the same consequence maintaining challenging behavior. Typically, challenging behavior is placed on extinction, but other consequences, such as punishment, may be used (Gerow et al., 2018; Tiger et al., 2008).

There are four steps to implementing FCT: (a) conduct an FBA, (b) select the functional communication response (FCR), (c) teach and reinforce the FCR, and (d) respond to challenging behavior. The first step is to conduct an FBA. The efficacy of FCT hinges on teaching a mand that serves the same function as the challenging behavior; therefore, an FBA is a critical component.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_25].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_25

Selecting an FCR

The second step of implementing FCT is selecting a mand, referred to as the FCR. While FCT has been demonstrated to be effective across a number of mand topographies (Gerow et al., 2018), there are several considerations to be made when selecting the FCR. First, the FCR should be one that would be recognized and reinforced by the general community. For example, the vocalization "drink, please" is likely to be followed by the delivery of a drink, even by people unfamiliar with the client's FCT program. On the contrary, an arbitrary behavior, such as the manual sign for the letter *d*, would be unlikely to have any meaning to communication partners outside of those with knowledge of the FCT program. In order for the newly acquired FCR to persist in the naturally setting, it must be reinforced. For it to be reinforced, it has to be generally recognized in all the context(s) in which it will be used (Durand, 1999).

Not only should the FCR be recognizable, it should also require low response effort, particularly relative to the challenging behavior (Horner & Day, 1991; Richman et al., 2001). However, FCRs that require increasingly higher response effort may be introduced after initial successful FCT. For example, the use of mand frames, such as the vocalization "I want the [item]," require more response effort than the item name alone, but promote generalization (Hernandez et al., 2007). Therefore, FCRs may be a low response effort initially, but can eventually be shaped to better suit the needs of the client.

Similarly, the FCR should be within the client's general repertoire. For example, if the client has little history of emitting vocal verbal behavior, it would be unwise to select a vocal mand to serve as the FCR. While the specific mand (e.g., "drink, please") may or may not be in the client's repertoire, at the very least the clinician should have reason to believe the selected FCR will be acquired quickly, based on the client's current communication repertoire. For example, if the client has a history of emitting two-word vocal mands, then it is reasonable to believe the client can quickly acquire the skill of saying "drink, please," but it is unreasonable to expect the client to quickly acquire the vocalization "I am thirsty and would like a drink." Selecting a response that already exists within the client's repertoire will increase the rate of acquisition. On the other hand, the use of an existing, rather than a novel response, may result an increase in challenging behavior, so clinicians should be careful to watch for this possibility (Derby et al., 1998; Winborn et al., 2002).

A mand topography assessment is useful in identifying mands that meet many of the aforementioned criteria (Ringdahl et al., 2009). To conduct a mand topography assessment, the clinician would identify various mands topographies that could serve as the FCR, typically across a range of modalities (e.g., vocal, card touch, manual sign, speech generating device). During each trial, the clinician manipulates the establishing operation in a way similar to the functional analysis condition associated with the maintaining consequences (e.g., preferred item in sight, but out of reach for FCT to treat tangibly maintained challenging behavior). The clinician then implements least-to-most prompting, recording which prompt evoked the mand.

Regardless of prompt level, the functional reinforcer is delivered and the trials are repeated several times per mand topography. The mand topography which required the least intrusive prompts is considered to be the one with which the client is most proficient, and it is selected to be taught within FCT.

Teaching and Reinforcing the FCR

The third step in implementing FCT is teaching and reinforcing the mand. Sessions begin with manipulating the establishing operations in a similar fashion as manipulated in the functional analysis condition associated with the maintaining consequence. For example, if challenging behavior is maintained by escape from academic tasks, the clinician instructs the client to complete an academic task. However, rather than delivering the putative reinforcer contingent upon challenging behavior, the clinician prompts the selected FCR. The use of a most-to-least or progressive time delay procedure are ideal because they deliver immediate prompts, reducing the likelihood of challenging behavior occurring prior to the controlling prompt being delivered, as could be the case with least-to-most prompting (Fisher et al., 1993; Tiger et al., 2008).

During initial FCT sessions, the FCR should be reinforced on a dense schedule of reinforcement, typically a fixed-ratio 1. After challenging behavior has been reduced, it is often desirable to thin the schedule of reinforcement as a dense schedule of reinforcement is likely impractical in natural settings. For example, a teacher responsible for ten students cannot practically respond to every bid for attention from a single student. In some cases, the dense schedule of reinforcement is counterproductive to other goals. For example, if a young adolescent who recently acquired a socially appropriate mand to access video games is given access to video games upon each request, it would be at the expense of participating in other activities that would build social or academic skills. To address the limitations associated with the FCR contacting a dense schedule of reinforcement, clinicians should implement schedule thinning after challenging behavior is being emitted at low levels and independent FCRs are being emitted at high levels. For a full review of schedule thinning techniques, see Hagopian et al. (2011).

Responding to Challenging Behavior

If challenging behavior occurs, it is common to place it on extinction. However, the current literature base contains many successful FCT applications in which challenging behavior continues to contact reinforcement (e.g., Davis et al., 2018; Peck et al., 1996) or contact punishment (e.g., Fisher et al., 1993; Hagopian et al., 1998). If implementing FCT in which the challenging behavior continues to contact reinforcement, the clinician should differentiate reinforcement for the FCR and the

challenging behavior so that the FCR contacts a much higher quality of reinforcement relative to the challenging behavior. It may sound counterintuitive to continue reinforcing challenging behavior during FCT; however, there may be cases in which withholding the reinforcer is logistically difficult or impossible. For example, if peer-delivered attention maintains a challenging behavior, it is unlikely that peers will implement extinction, or even have a desire to do so. In some cases, it may be dangerous to withhold reinforcement. For example, if challenging is maintained by escape from work tasks, extinction would likely involve physically guiding the client to complete the task in order to prevent a period of escape from the task. If the target challenging behavior is severe aggression, it would be dangerous for the implementer to implement escape extinction.

There are notable drawbacks associated with the use of punishment (see Chap. 26 for a lengthier discussion of drawbacks). Therefore, the consideration to implement punishment within FCT should not be taken lightly. Evidence suggests that, in some cases, punishment may be necessary to reach socially valid levels of challenging behavior reduction with FCT (e.g., Hagopian et al., 1998). It appears that in most cases, extinction is sufficient in decreasing levels of challenging behavior; therefore, it is best practice to first implement FCT with extinction only. If FCT with extinction proves to be ineffective, then the use of punishment may be considered.

Another consideration is whether or not to prompt the FCR after the client engages in challenging behavior. In some applications of FCT, the clinician prompts for the FCR immediately after the client engages in challenging behavior, but in others, the prompt is delayed by a few seconds. The concern with an immediate prompt is that it could strengthen the chain of establishing operation ➔ challenging behavior ➔ prompt ➔ FCR. Landa et al. (2022) systematically evaluated the impact of an immediate or delayed prompt following challenging behavior, finding that for two participants, an immediate prompt had no adverse effects on challenging behavior. For one participant, a delay between challenging behavior and a prompt for the FCR was necessary for FCR acquisition. For another participant, the delay resulted in increased challenging behavior. More work is needed to determine situations in which an immediate or delayed prompt is indicated; however, your supervisees should be aware of the possible effects of immediate and delayed prompts after challenging and be prepared to evaluate the effect of different approaches if needed to reach optimal FCT outcomes.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–15:00	Introduction to FCT
15:00–40:00	Article Presentations
40:00–55:00	Mand Topography Assessments
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Selecting a Recognizable Mand*, 1 copy per supervisee or presented via PowerPoint
- Appendix B: *Selecting a Mand that Requires Low Response Effort*, 1 copy per supervisee or presented via PowerPoint
- Appendix C: *Teaching and Reinforcing the FCR*, 1 copy per supervisee or presented via PowerPoint
- Appendix D: *Mand Topography Assessment: Instructions and Data Sheet*, 1 copy per supervisee
- Appendix E: *Mand Topography Assessment: Sample Data Sheets*, 1 copy per supervisee
- Each supervisee needs access to a computer with graphing capabilities, preferably Microsoft Excel
- Supervisor needs access to a computer to demonstrate graphing

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Falcomata and Wacker (2013)
- Gerow et al. (2018)
- Ringdahl et al. (2009)

In addition to these readings, assign each supervisee an article for which they will be responsible for summarizing in the group supervision meeting. Encourage all supervisees to read all the remaining articles as well.

There are five articles for supervisees to present. If you have more than five supervisees in your group supervision meeting, pair them to work together on the summary presentation. If you have fewer than five supervisees, you can present the remaining article summaries. Presentations will be 5 minutes each and should

consist of (a) 1-minute summary of the introduction, (b) 1-minute summary of the methods, (c) 1-minute summary of the results, and (d) 2-minute presentation of the discussion, including implications for practice. Encourage supervisees to glean their own implications for practice in addition to those that the article authors may have discussed.

- Landa et al. (2022): Response to challenging behavior
- Richman et al. (2001): Mand response effort
- Ringdahl et al. (2016): Mand preference
- Winborn et al. (2002): Novel versus existing mands
- Matter and Zarcone (2017): Novel versus existing mands

Introduction to FCT

FCT is one of the most prevalent interventions used to reduce challenging behavior; therefore, most of your supervisees will have some familiarity with the procedure. As a result, open the meeting by asking a supervisee to volunteer to describe the defining features of FCT. After confirming that all defining features have been described, ask your supervisees to share their experience with FCT. Provide ample time to allow each supervisee to share. Remind supervisees that the general framework of FCT is identical to DRA. Furthermore, because they just completed field experience activities related to DRA (Chap. 24), this meeting will focus more on considerations and variations specific to FCT rather than the basic FCT framework.

Introduce the four steps of FCT: (a) conduct an FBA, (b) select the FCR, (c) teach and reinforce the FCR, and (d) respond to challenging behavior. In regards to Step 1, ask your supervisees why conducting an FBA is the first step. If they need a little more guidance, follow this by asking them what are the possible outcomes of implementing FCT without FBA results?

Selecting the FCR

Transition the conversation to the discussion of FCR selection by pointing out that FCT has been effective with many mand topographies. Encourage your supervisees to share the FCR selected among FCT programs with which they have experience implementing. Inform your supervisees that FCRs should meet the following criteria: (a) recognized by the general community, (b) require low response effort, and (c) be within the client's general repertoire. Ask your supervisees to explain the first criteria. What does it mean to be recognized by the general community? Next, distribute one copy of *Selecting a Recognized Mand* (Appendix A) to your supervisees. This information is also contained in the PowerPoint slides. Read the first scenario aloud for your supervisees and invite them to volunteer at least two mand topographies that would likely be recognized by the general community and two that would

not. Complete as many scenarios as a group that is necessary to confirm that your supervisees understand the task and then ask them to work in pairs to complete any remaining scenarios. When completed, ask them to briefly share their responses to each scenario as a group.

Next, discuss the consideration of response effort. Again, ask your supervisees to explain this criterion and ask them to give examples and nonexamples of FCR that are low response effort. Distribute *Selecting a Mand That Requires Low Response Effort* (Appendix B), or present via the PowerPoint slides. Similar to the last activity, read the first scenario aloud and guide your supervisees in selecting a mand topography that is low response effort and one that is high response effort. Complete as many scenarios in the large group as necessary and then assign them to work in pairs to complete the activity. Return to the large group and share responses to the scenarios. Before transitioning to the final criterion, briefly discuss the importance of eventually shaping mands that may require a higher response effort, but have improved recognizability. This would be an ideal time to discuss the concept of framed mands and how they may be best used within FCT.

Discuss the final criterion for the mand: to be within the client's general repertoire. Again, ask supervisees to explain this criterion and then provide examples using scenarios from the previous activity they just completed. For example, "In your examples, Rashid communicated with a speech-generating device that has a static display of four icons. We would not teach Rashid a one-word vocalization within FCT because one-word vocalizations are not in his repertoire. On the contrary, we may place a photograph of his mom and dad with the accompanying speech output, 'look here!' as one of the four icons on his device." Invite supervisees to provide a similar explanation for Marcella and Stella.

To close the discussion about selecting a mand to serve as an FCR, introduce the concept of a mand topography assessment. Your supervisees read Ringdahl et al. (2009) to prepare for this meeting; therefore, ask supervisees to describe how the mand topography assessment was conducted in this study. As always, praise correct descriptions, correct inaccuracies, and add any additional information they may have omitted. Later in this meeting, they will complete a mand topography assessment activity to get additional experience on this topic.

Teaching and Reinforcing the FCR

Begin by describing the basic framework of FCT: establishing operation ➔ prompt ➔ FCR ➔ reinforce with the consequence maintaining challenging behavior on a dense schedule of reinforcement. First, ask your supervisee what it means to manipulate the establishing operation and to describe how they would determine how to do this. If they have difficulty with this, it may be helpful to ask them how establishing operations were manipulated within each condition of a functional analysis. Second, explain why most-to-least prompting or progressive time delay is recommended over a least-to-most prompting procedure. Next, explain why reinforcing the FCR on a FR1 schedule is generally recommended for initial FCT. Finally, briefly discuss the benefits of schedule thinning.

Distribute one copy of *Teaching and Reinforcing the FCR* (Appendix C) to each supervisee. This information is also available on the PowerPoint slides. Demonstrate for your supervisees how to complete the table for scenario one, Rashid. You may wish to complete the remaining four scenarios as a group if your supervisees need more support, or you may wish to have them complete the remaining scenarios in pairs and then discuss their decisions as a large group.

Responding to Challenging Behavior

Explain that, despite the efficacy of FCT, challenging behavior is likely to occur during some sessions, particularly initial sessions. Most applications of FCR use extinction for challenging behavior, but in some cases, it may be wise for the challenging behavior to contact reinforcement or punishment. Ask your supervisees to give examples of when reinforcement may be indicated. If necessary, add your own examples. Follow this by soliciting examples of when punishment may be indicated and also add your own examples if necessary. Be sure to recognize the many drawbacks of punishment in your discussion.

Supervisee Article Presentations

Your supervisees should have taken time to prepare for the presentation prior to this meeting. However, you may need to allot a few minutes to make final preparations for their presentations. It is important that each presentation stays within the 5 minutes allotted. Use a watch or timer to facilitate timeliness. We recommend sitting behind all your supervisees during the presentations so that you can signal to the presenter(s) without distracting the audience. A good approach is to use signal cards or paper, such as a yellow card that indicates there are 2 minutes remaining and a red card that indicates that there are 30 seconds remaining. At the end of each presentation, provide praise and correct errors as needed. Be sure that each presentation includes all information you deem relevant to your supervisees' work. If any relevant information was omitted during the presentation, share that information with the group.

Mand Topography Assessments

Distribute one copy of the *Mand Topography Assessment: Instructions and Data Sheet* (Appendix D) to each supervisee. Describe how to use this form and solicit questions. Next, distribute one copy of *Mand Topography Assessment: Sample Data Sheets* (Appendix E). Demonstrate how to graph the first data set. An Excel template is available to use. Ask your supervisees to independently graph the remaining

two data sets. Once they complete their graphs, check their work to ensure the graph is both an accurate representation of the data and contains all the necessary graph components (see Chap. 6 for a complete list). Close this activity by asking your supervisees to select the appropriate mand for C.J., Reece, and Eli, using the data they have available. Do point out that in reality, they will use more than the mand assessment results to determine the best FCR, such as caregiver input and client preference.

Inform your supervisees that they will be identifying a client for whom FCT is indicated. They will conduct a mand topography assessment prior to their individual supervision meeting without a client. Allow them to ask questions and gain any clarification before closing this meeting so that they are prepared to conduct this assessment.

Knowledge Check

1. Is FCT a type of DRA, DRO, DRL, or none of the above?
2. What are the four steps to FCT?
3. What are three qualities to be considered when selecting a mand to serve as the FCR?
4. Why is most-to-least prompting recommended over least-to-most prompting for teaching the FCR?
5. What is one reason to continue reinforcing a challenging behavior during FCT?

Homework for Individual Supervision without a Client

1. Identify a client for whom a behavior reduction program is indicated.
2. Retrieve and review this client's FBA. At least 48 hours prior to your supervision meeting, share the FBA results with your supervisor.
3. Conduct a mand topography assessment with the client and graph the results. At least 48 hours prior to your meeting, share the data sheet and graphed data with your supervisor.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 55-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Review FBA Results, Review Mand Topography Assessment Results & Select a Mand
15:00–40:00	Develop FCT Procedural Fidelity Checklist
40:00–55:00	Role-Play

Materials Needed

- FBA Report for Client (send to supervisor 48 hours prior to meeting).
- Mand Topography Assessment Results (send to supervisor 48 hours prior to meeting)
- Appendix F: *FCT Planning Guide*, 1 copy
- Appendix G: *FCT Procedural Fidelity Checklist Template*, electronic copy
- Appendix H: *FCT Role Play Data Collection*, 2 copies
- Computer in order to edit the *FCT Procedural Fidelity Checklist Template*
- Materials Necessary to Role-Play FCT

Review Mand Topography

During the first 15 minutes of your meeting, review the functional analysis and mand topography assessment results. You should have received these prior to the meeting. Use that time to note what could be praised and should be corrected in regard to the mand topography assessment. The next portion of the field experience cannot be conducted without the FBA results or a properly selected mand topography. If you determine one or both of these items are insufficient, reschedule this meeting until you have the necessary tools to proceed.

First, review the FBA results. Ask your supervisee to identify the function of challenging behavior. Discuss any relevant information that may have been gathered from this report. Next, review the mand assessment results. Collaboratively, use these results to determine an appropriate mand topography to serve as the FCR. In addition to the mand assessment results, discuss if the mand topography would be recognized (and reinforced) by the general community in which the client lives and if the mand topography requires lower response effort than other topographies being considered as well as lower response effort than the challenging behavior topography. Once all considerations have been made, select the mand topography.

Develop FCT Procedural Fidelity Checklist

Now that all data have been collected and reviewed, you will guide your supervisee through developing an FCT protocol for their client. Together, walk through the *FCT Planning Guide* (Appendix F). Encourage your supervisee to complete the guide independently, but offer support, praise accurate use, and correct errors as necessary. Once the planning process is complete, use the *FCT Procedural Checklist Template* (Appendix G) to develop the specific steps of FCT for this client. The template provides suggestions for steps to include (e.g., how to manipulate the establishing operation and prompt the FCR); however, this is a template that needs to be edited to meet the needs of your supervisee and client. Feel free to edit, omit, and add to the steps. Regardless, the final product should at least include the following: (a) how to manipulate the establishing operation, (b) how to prompt the FCR, (c) how to respond to the FCR, and (d) how to respond to the challenging behavior.

Role-Play

We have allotted 15 minutes for FCT role-play. We suggest doing two 5-minute role-plays with about 2.5 minutes after each to discuss feedback. You will role-play as the client and your supervisee will implement FCT. For ease, provide your supervisee with the partial-interval and frequency recording data sheets (Appendix H) to collect data on the challenging behavior and FCR, respectively.

As with other role-play activities, you want to role-play as an authentic client, while keeping in mind that for at least the first role-play that your supervisee will build better foundational skills without *curveballs* (e.g., engaging in nontarget challenging behavior, simultaneously engaging in challenging behavior while emitting the FCR, failing to engage with the functional reinforcer). While these are possible outcomes for which your supervisee does need to be prepared, we suggest withholding these curveballs until your supervisee has demonstrated the ability to implement FCT with fidelity without them.

As you role-play as the client, simultaneously record procedural fidelity on your supervisee's implementation using the newly created checklist. Attempt to collect data as discretely as possible. After each 5-minute session, pause to provide performance feedback. As always, praise accurate implementation and provide a rationale when correcting inaccurate implementation. After both role-plays, give your supervisee sufficient time to ask questions or seek clarification.

Homework for Individual Supervision with a Client

1. If revisions were made after the last meeting, send your supervisor an electronic version of the revised FCT procedural fidelity checklist at least 48 hours prior to the next supervision meeting.
2. Develop a data sheet for measuring challenging behavior and the FCR when implementing FCT.
3. At least 48 hours before the supervision meeting, send the data sheet to your supervisor for approval.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 55-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–10:00	Provide Feedback Regarding FCT Plan and Data Collection
10:00–40:00	Observe FCT Implementation
40:00–55:00	Performance Feedback

Materials Needed

- FCT Procedure Fidelity Checklist, developed by supervisee, multiple copies
- FCT Data Sheet, developed by supervisee, multiple copies
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Instructional Plan and Data Collection

Your supervisee should have provided you with two items: (a) procedural fidelity checklist and (b) a data sheet for collecting data on both challenging behavior and the FCR. Review these documents prior to the individual supervision meeting with a client. Note items to praise and correct. For the first 10 minutes of this session, meet with your supervisee to discuss your feedback. We recommend meeting without a client present to decrease distractions. If significant changes must be made, the supervision meeting with a client will need to be postponed to allow time for revisions to be made.

Observe FCT Implementation

You will observe your supervisee implementing FCT for at least 30 minutes. It is likely that FCT will be implemented in several sessions, much shorter than 30 minutes. Divide this 30-minute observation into as many observations as you see fit. Also feel free to extend the duration of the observation beyond 30 minutes.

During the observation, measure procedural fidelity and collect data on the challenging behavior and FCR. Because you will most likely observe multiple FCT sessions, be prepared with multiple copies of each data sheet. If it is difficult to measure both supervisee and client behaviors simultaneously, measure one during the first session and another during the second and continue switching between the types of data you are collecting across the 30 minutes of observation.

Performance Feedback

During your final 15 minutes you will provide performance feedback. We recommend holding this discussion with no clients present in order to minimize distractions. Begin by praising correct implementation and then correct any observed errors. Solicit clarifying questions and encourage your supervisee to role-play any steps in which they implemented with poor fidelity. End by comparing the data you and your supervisee collected on client behavior. Provide your supervisee with your data sheet so they can calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following when implementing FCT: (a) accurately collect data with at least 80% agreement and (b) implement FCT with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to conduct a mand topography assessment with a different client.
- ☐ Evaluate your supervisee's ability to implement FCT with a different client.
- ☐ Evaluate your supervisee's ability to teach another individual (e.g., parent, teacher, other clinician) how to implement FCT with this client.

Appendix A: Selecting a Recognized Mand

Scenario One: Rashid's FBA concluded that his challenging behavior is maintained by access to attention from his mom and dad. Rashid communicates with a speech-generating device with a static display of four icons.

Recognizable FCR 1: _____

Recognizable FCR 2: _____

Unrecognizable FCR 1: _____

Unrecognizable FCR 2: _____

Scenario Two: Marcella's FBA concluded that her challenging behavior is maintained by access to her My Little Ponies. Marcella communicates with two- and three-word vocalizations.

Recognizable FCR 1: _____

Recognizable FCR 2: _____

Unrecognizable FCR 1: _____

Unrecognizable FCR 2: _____

Scenario Three: Stella's FBA concluded that her challenging behavior is maintained by escaping chores in her group home, including washing dishes and taking out the trash. Stella communicates with one-word vocal approximations and two-word phrases on a speech generating application on her tablet computer.

Recognizable FCR 1: _____

Recognizable FCR 2: _____

Unrecognizable FCR 1: _____

Unrecognizable FCR 2: _____

Scenario Four: Dominic's FBA concluded that his challenging behavior is maintained by access to his preferred snacks, including a yogurt cup. Dominic communicates with a picture exchange system and is currently able to communicate by placing two cards on a sentence strip.

Recognizable FCR 1: _____

Recognizable FCR 2: _____

Unrecognizable FCR 1: _____

Unrecognizable FCR 2: _____

Scenario Five: Abby's FBA concluded that her challenging behavior is maintained by access to attention from a paraprofessional in her classroom, Ms. Robins. Abby communicates with a picture exchange system and is currently able to select a single picture from an array of 10 and hand it to her communication partner.

Recognizable FCR 1: _____

Recognizable FCR 2: _____

Unrecognizable FCR 1: _____

Unrecognizable FCR 2: _____

Appendix B: Selecting a Mand That Requires Low Response Effort

Scenario One: Rashid's FBA concluded that his challenging behavior is maintained by access to attention from his mom and dad. Rashid communicates with a speech-generating device with a static display of four icons.

Low Response Effort: _____

High Response Effort: _____

Scenario Two: Marcella's FBA concluded that her challenging behavior is maintained by access to her My Little Ponies. Marcella communicates with two- and three-word vocalizations.

Low Response Effort: _____

High Response Effort: _____

Scenario Three: Stella's FBA concluded that her challenging behavior is maintained by escaping chores in her group home, including washing dishes and taking out the trash. Stella communicates with one-word vocal approximations and two-word phrases on a speech generating application on her tablet computer.

Low Response Effort: _____

High Response Effort: _____

Scenario Four: Dominic's FBA concluded that his challenging behavior is maintained by access to his preferred snacks, including a yogurt cup. Dominic communicates with a picture exchange system and is currently able to communicate by placing two cards on a sentence strip.

Low Response Effort: _____

High Response Effort: _____

Scenario Five: Abby's FBA concluded that her challenging behavior is maintained by access to attention from a paraprofessional in her classroom, Ms. Robins. Abby communicates with a picture exchange system and is currently able to select a single picture from an array of 10 and hand it to her communication partner.

Low Response Effort: _____

High Response Effort: _____

Appendix C: Teaching and Reinforcing the FCR

Scenario One: Rashid's FBA concluded that his challenging behavior is maintained by access to attention from his mom and dad. Rashid communicates with a speech-generating device with a static display of four icons.

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Scenario Two: Marcella's FBA concluded that her challenging behavior is maintained by access to her My Little Ponies. Marcella communicates with two- and three-word vocalizations.

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Scenario Three: Stella's FBA concluded that her challenging behavior is maintained by escaping chores in her group home, including washing dishes and taking out the trash. Stella communicates with one-word vocal approximations and two-word phrases on a speech generating application on her tablet computer.

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Scenario Four: Dominic's FBA concluded that his challenging behavior is maintained by access to his preferred snacks, including a yogurt cup. Dominic communicates with a picture exchange system and is currently able to communicate by placing two cards on a sentence strip.

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Scenario Five: Abby's FBA concluded that her challenging behavior is maintained by access to attention from a paraprofessional in her classroom, Ms. Robins. Abby communicates with a picture exchange system and is currently able to select a single picture from an array of 10 and hand it to her communication partner.

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Appendix D: Mand Topography Assessment: Instructions and Data Sheet

Supervisee: ______________________ Supervisor: ______________________

Client: ______________________ Assessment Date(s): ______________

Instructions (for mand for tangible): Place the preferred item in sight, but out of reach. Use least-to-most prompting with a 5-s delay to prompt the mand. Contingent upon the mand emitted, prompted or unprompted, provide 30-s access to preferred item. Conduct 10 trials per mand, recording which prompt evoked the mand. Prompt hierarchy:

1. Vocal: Implementer states, "If you want [item], [describe mand]."
2. Model: Implementer states, "If you want [item], do/say this" and then models the mand.
3. Physical Guidance (n/a for vocal mands): Implementer states, "If you want [item], do this" and then physically guides the response.

[Insert Mand Description]			
	Prompt Level		
Trial 1	Vocal	Model	Physical
Trial 2	Vocal	Model	Physical
Trial 3	Vocal	Model	Physical
Trial 4	Vocal	Model	Physical
Trial 5	Vocal	Model	Physical
Trial 6	Vocal	Model	Physical
Trial 7	Vocal	Model	Physical
Trial 8	Vocal	Model	Physical
Trial 9	Vocal	Model	Physical
Trial 10	Vocal	Model	Physical
Totals			

[Insert Mand Description]			
	Prompt Level		
Trial 1	Vocal	Model	Physical
Trial 2	Vocal	Model	Physical
Trial 3	Vocal	Model	Physical
Trial 4	Vocal	Model	Physical
Trial 5	Vocal	Model	Physical
Trial 6	Vocal	Model	Physical
Trial 7	Vocal	Model	Physical
Trial 8	Vocal	Model	Physical
Trial 9	Vocal	Model	Physical
Trial 10	Vocal	Model	Physical
Totals			

[Insert Mand Description]			
	Prompt Level		
Trial 1	Vocal	Model	Physical
Trial 2	Vocal	Model	Physical
Trial 3	Vocal	Model	Physical
Trial 4	Vocal	Model	Physical
Trial 5	Vocal	Model	Physical
Trial 6	Vocal	Model	Physical
Trial 7	Vocal	Model	Physical
Trial 8	Vocal	Model	Physical
Trial 9	Vocal	Model	Physical
Trial 10	Vocal	Model	Physical
Totals			

[Insert Mand Description]			
	Prompt Level		
Trial 1	Vocal	Model	Physical
Trial 2	Vocal	Model	Physical
Trial 3	Vocal	Model	Physical
Trial 4	Vocal	Model	Physical
Trial 5	Vocal	Model	Physical
Trial 6	Vocal	Model	Physical
Trial 7	Vocal	Model	Physical
Trial 8	Vocal	Model	Physical
Trial 9	Vocal	Model	Physical
Trial 10	Vocal	Model	Physical
Totals			

Appendix E: Mand Topography Assessment: Sample Data Sheets

Supervisee: Shannon Supervisor: MacKenzie

Client: C.J. Assessment Date(s): September 1 & 2

Instructions (for mand for tangible): Place the preferred item in sight, but out of reach. Use least-to-most prompting with a 5-s delay to prompt the mand. Contingent upon the mand emitted, prompted or unprompted, provide 30-s access to preferred item. Conduct 10 trials per mand, recording which prompt evoked the mand. Prompt hierarchy:

1. Vocal: Implementer states, "If you want [item], [describe mand]."
2. Model: Implementer states, "If you want [item], do/say this" and then models the mand.
3. Physical Guidance (n/a for vocal mands): Implementer states, "If you want [item], do this" and then physically guides the response.

Speech Generating Device Touching puzzle icon in array of 4 on page			
	Prompt Level		
Trial 1	Vocal	(Model)	Physical
Trial 2	Vocal	(Model)	Physical
Trial 3	(Vocal)	Model	Physical
Trial 4	(Vocal)	Model	Physical
Trial 5	(Vocal)	Model	Physical
Trial 6	Vocal	(Model)	Physical
Trial 7	(Vocal)	Model	Physical
Trial 8	Vocal	(Model)	Physical
Trial 9	(Vocal)	Model	Physical
Trial 10	(Vocal)	Model	Physical
Totals	6	4	0

Manual Sign Manual Sign for puzzle			
	Prompt Level		
Trial 1	Vocal	Model	(Physical)
Trial 2	Vocal	Model	(Physical)
Trial 3	Vocal	Model	(Physical)
Trial 4	Vocal	(Model)	Physical
Trial 5	Vocal	Model	(Physical)
Trial 6	Vocal	(Model)	Physical
Trial 7	Vocal	Model	(Physical)
Trial 8	Vocal	Model	(Physical)
Trial 9	Vocal	Model	(Physical)
Trial 10	Vocal	Model	(Physical)
Totals	0	2	8

Touching Card Touching puzzle card in array of 4 on board			
	Prompt Level		
Trial 1	Vocal	(Model)	Physical
Trial 2	Vocal	(Model)	Physical
Trial 3	(Vocal)	Model	Physical
Trial 4	(Vocal)	Model	Physical
Trial 5	(Vocal)	Model	Physical
Trial 6	(Vocal)	Model	Physical
Trial 7	(Vocal)	Model	Physical
Trial 8	(Vocal)	Model	Physical
Trial 9	(Vocal)	Model	Physical
Trial 10	(Vocal)	Model	Physical
Totals	8	2	0

One-word Vocalization Puzzle		
	Prompt Level	
Trial 1	Vocal	(Model)
Trial 2	Vocal	(Model)
Trial 3	Vocal	(Model)
Trial 4	Vocal	(Model)
Trial 5	Vocal	(Model)
Trial 6	Vocal	(Model)
Trial 7	Vocal	(Model)
Trial 8	Vocal	(Model)
Trial 9	Vocal	(Model)
Trial 10	Vocal	(Model)
Totals	0	10

Supervisee: Jackie Supervisor: Tom

Client: Reece Assessment Date(s): October 13 & 14

Instructions (for mand for tangible): Place the preferred item in sight, but out of reach. Use least-to-most prompting with a 5-s delay to prompt the mand. Contingent upon the mand emitted, prompted or unprompted, provide 30-s access to preferred item. Conduct 10 trials per mand, recording which prompt evoked the mand. Prompt hierarchy:

1. Vocal: Implementer states, "If you want [item], [describe mand]."
2. Model: Implementer states, "If you want [item], do/say this" and then models the mand.
3. Physical Guidance (n/a for vocal mands): Implementer states, "If you want [item], do this" and then physically guides the response.

Speech Generating Device Touching crayon icon from array of two			
	Prompt Level		
Trial 1	Vocal	**Model**	Physical
Trial 2	Vocal	Model	**Physical**
Trial 3	Vocal	**Model**	Physical
Trial 4	**Vocal**	Model	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	Vocal	**Model**	Physical
Trial 7	**Vocal**	Model	Physical
Trial 8	Vocal	**Model**	Physical
Trial 9	Vocal	Model	**Physical**
Trial 10	Vocal	Model	**Physical**
Totals	3	4	3

Manual Sign Manual Sign for crayon			
	Prompt Level		
Trial 1	**Vocal**	Model	Physical
Trial 2	**Vocal**	Model	Physical
Trial 3	Vocal	**Model**	Physical
Trial 4	**Vocal**	Model	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	**Vocal**	Model	Physical
Trial 7	Vocal	**Model**	Physical
Trial 8	**Vocal**	Model	Physical
Trial 9	**Vocal**	Model	Physical
Trial 10	**Vocal**	Model	Physical
Totals	8	2	0

Touching Card Touching crayon card in array of 2on board			
	Prompt Level		
Trial 1	Vocal	**Model**	Physical
Trial 2	Vocal	**Model**	Physical
Trial 3	**Vocal**	Model	Physical
Trial 4	Vocal	**Model**	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	Vocal	Model	**Physical**
Trial 7	Vocal	**Model**	Physical
Trial 8	Vocal	Model	**Physical**
Trial 9	Vocal	Model	**Physical**
Trial 10	Vocal	Model	**Physical**
Totals	2	4	4

One-word Vocalization "Colors"		
	Prompt Level	
Trial 1	**Vocal**	Model
Trial 2	**Vocal**	Model
Trial 3	**Vocal**	Model
Trial 4	Vocal	**Model**
Trial 5	Vocal	**Model**
Trial 6	Vocal	**Model**
Trial 7	**Vocal**	Model
Trial 8	Vocal	**Model**
Trial 9	Vocal	**Model**
Trial 10	Vocal	**Model**
Totals	4	6

Supervisee: Brent Supervisor: Shelley

Client: Eli Assessment Date(s): May 5 & 7

Instructions (for mand for tangible): Place the preferred item in sight, but out of reach. Use least-to-most prompting with a 5-s delay to prompt the mand. Contingent upon the mand emitted, prompted or unprompted, provide 30-s access to preferred item. Conduct 10 trials per mand, recording which prompt evoked the mand. Prompt hierarchy:

1. Vocal: Implementer states, "If you want [item], [describe mand]."
2. Model: Implementer states, "If you want [item], do/say this" and then models the mand.
3. Physical Guidance (n/a for vocal mands): Implementer states, "If you want [item], do this" and then physically guides the response.

Speech Generating Device Touching Potato Head icon from array of ten			
	Prompt Level		
Trial 1	Vocal	**Model**	Physical
Trial 2	**Vocal**	Model	Physical
Trial 3	Vocal	**Model**	Physical
Trial 4	**Vocal**	Model	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	Vocal	**Model**	Physical
Trial 7	**Vocal**	Model	Physical
Trial 8	Vocal	**Model**	Physical
Trial 9	**Vocal**	Model	Physical
Trial 10	Vocal	**Model**	Physical
Totals	5	5	0

Manual Sign Manual Sign for potato head			
	Prompt Level		
Trial 1	**Vocal**	Model	Physical
Trial 2	Vocal	**Model**	Physical
Trial 3	Vocal	**Model**	Physical
Trial 4	**Vocal**	Model	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	**Vocal**	Model	Physical
Trial 7	Vocal	**Model**	Physical
Trial 8	Vocal	**Model**	Physical
Trial 9	Vocal	Model	**Physical**
Trial 10	**Vocal**	Model	Physical
Totals	5	4	1

Touching Card Touching potato head card in array of 20 on board			
	Prompt Level		
Trial 1	Vocal	**Model**	Physical
Trial 2	**Vocal**	Model	Physical
Trial 3	**Vocal**	Model	Physical
Trial 4	Vocal	**Model**	Physical
Trial 5	**Vocal**	Model	Physical
Trial 6	**Vocal**	Model	Physical
Trial 7	**Vocal**	Model	Physical
Trial 8	**Vocal**	Model	Physical
Trial 9	**Vocal**	Model	Physical
Trial 10	**Vocal**	Model	Physical
Totals	8	2	0

One-word Vocalization "I want Mr. Potato Head"		
	Prompt Level	
Trial 1	Vocal	**Model**
Trial 2	Vocal	**Model**
Trial 3	**Vocal**	Model
Trial 4	**Vocal**	Model
Trial 5	**Vocal**	Model
Trial 6	**Vocal**	Model
Trial 7	**Vocal**	Model
Trial 8	**Vocal**	Model
Trial 9	**Vocal**	Model
Trial 10	**Vocal**	Model
Totals	8	2

Appendix F: FCT Planning Guide

Client: _____

Topography of Challenging Behavior: _____

Function of Challenging Behavior: _____

FCR: _____

Describe the establishing operations that evoked challenging behavior in the FA: _____
_____
_____

Describe the establishing operations likely to evoke FCR: _____
_____
_____

Identify the prompt hierarchy for the FCR: _____
_____
_____

Is the controlling prompt included in the hierarchy? Yes No

Circle the response to challenging behavior: Extinction Reinforcement Punishment

If reinforcement or punishment, justify here: _____
_____
_____

Will you prompt the FCR after challenging behavior? Yes No

If yes, will it be immediate or delayed? Immediate Delayed

Justify here: _____
_____
_____

Summarize an FCT trial here:

Establishing Operation	Prompt Technique & Controlling Prompt	Schedule of Reinforcement

Appendix G: FCT: Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Operational Definitions:
Challenging Behavior: _____

FCR: _____

	Step	Implemented Correctly? + = Yes − = No
1	[Insert description of establishing operation.]	
2	[Insert description of prompting procedure]. Be sure to include delay between EO and prompt as well as prompt fading procedures.	
3	When the client [FCR], the supervisee [insert reinforcement]. Be sure to describe the duration, dimensions, and schedule of reinforcement.	
4	If the client [insert challenging behavior], the supervisee [insert response to challenging behavior].	
5	If the client [insert challenging behavior], the supervisee [insert instructions for prompting FCR].	
6		
7		
8		
9		
10		

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix H: FCT Role-Play Data Collection

Client: _____ Date & Time: _____

Supervisee: _____ Supervisor: _____

Date: _____ Time: _____

Partial Interval Recording-Challenging Behavior:

Challenging Behavior Operational Definition: _____

_____

	0:00–0:10	0:11–0:20	0:21–0:30	0:31–0:40	0:41–0:50	0:51–0:60
0:00–1:00						
1:01–2:00						
2:01–3:00						
3:01–4:00						
4:01–5:00						

Frequency Count-FCR

FCR Operational Definition: _____

_____

References

Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*(2), 111–126.

Davis, T. N., Weston, R., Hodges, A., Uptegrove, L., Williams, K., & Schieltz, K. M. (2018). Functional communication training and demand fading using concurrent schedules of reinforcement. *Journal of Behavioral Education, 27*(3), 343–357.

Derby, K., Fisher, W. W., Piazza, C. C., Wilke, A. E., & Johnson, W. (1998). The effects of noncontingent and contingent attention for self-injury, manding, and collateral responses. *Behavior Modification, 22*, 474–484.

Durand, V. (1999). Functional communication training using assistive devices: Recruiting natural communities of reinforcement. *Journal of Applied Behavior Analysis, 32*, 247–267.

Falcomata, T., & Wacker, D. P. (2013). On the use of strategies for programming generalization during functional communication training: A review of the literature. *Journal of Developmental and Physical Disabilities, 25*(1), 5–15.

Fisher, W. W., Piazza, C. C., Cataldo, M. F., Harrell, R., Jefferson, G., & Conner, R. (1993). Functional communication training with and without extinction and punishment. *Journal of Applied Behavior Analysis, 26*, 23–36.

Gerow, S., Davis, T., Radhakrishnan, S., Gregori, E., & Rivera, G. (2018). Functional communication training: The strength of evidence across disabilities. *Exceptional Children, 85*(1), 86–103.

Hagopian, L. P., Fisher, W. W., Sullivan, M. T., Acquisto, J., & LeBlanc, L. A. (1998). Effectiveness of functional communication training with and without extinction and punishment: A summary of 21 inpatient cases. *Journal of Applied Behavior Analysis, 31*, 211–235.

Hagopian, L. P., Boelter, E. W., & Jarmolowicz, D. P. (2011). Reinforcement schedule thinning following functional communication training: Review and recommendations. *Behavior Analysis in Practice, 4*(1), 4–16.

Hernandez, E., Hanley, G. P., Ingvarsson, E. T., & Tiger, J. H. (2007). A preliminary evaluation of the emergence of novel mand forms. *Journal of Applied Behavior Analysis, 40*(1), 137–156.

Horner, R. H., & Day, H. M. (1991). The effects of response efficiency on functionally equivalent competing behaviors. *Journal of Applied Behavior Analysis, 24*(4), 719–732.

Landa, R. K., Hanley, G. P., Gover, H. C., Rajaraman, A., & Ruppel, K. W. (2022). Understanding the effects of prompting immediately after problem behavior occurs during functional communication training. *Journal of Applied Behavior Analysis, 55*(1), 121–137.

Matter, A. L., & Zarcone, J. R. (2017). A comparison of existing and novel communication responses used during functional communication training. *Behavioral Interventions, 32*(3), 217–224.

Peck, S. M., Wacker, D. P., Berg, W. K., Cooper, L. J., Brown, K. D., Richman, D., et al. (1996). Choice-making treatment of young children's severe behavior problems. *Journal of Applied Behavior Analysis, 29*, 263–290.

Richman, D. M., Wacker, D. P., & Winborn, L. (2001). Response efficiency during functional communication training: Effects of effort on response allocation. *Journal of Applied Behavior Analysis, 34*(1), 73–76.

Ringdahl, J. E., Falcomata, T. S., Christensen, T. J., Bass-Ringdahl, S. M., Lentz, A., Dutt, A., & Schuh-Claus, J. (2009). Evaluation of a pretreatment assessment to select mand topographies for functional communication training. *Research in Developmental Disabilities, 30*, 330–341.

Ringdahl, J. E., Berg, W. K., Wacker, D. P., Ryan, S., Ryan, A., Crook, K., & Molony, M. (2016). Further demonstrations of individual preference among mand modalities during functional communication training. *Journal of developmental and physical disabilities, 28*(6), 905–917.

Tiger, J. H., Hanley, G. P., & Bruzek, J. (2008). Functional communication training: A review and practical guide. *Behavior Analysis in Practice, 1*(1), 16–23.

Winborn, L., Wacker, D. P., Richman, D. M., Asmus, J., & Geier, D. (2002). Assessment of mand selection for functional communication training packages. *Journal of Applied Behavior Analysis, 35*, 295–298.

Chapter 26
Punishment

Topics Covered Within This Chapter

Topics
Introduction
Punishment Procedures
Side Effects of Punishment
Guidelines for Use of Punishment
Ethical Considerations

When a consequence immediately follows a response, and the future frequency of this response is suppressed, punishment has occurred. There are numerous basic and applied studies that provide evidence for the effectiveness of punishment. Many widely used interventions contain punishment components. However, punishment is frequently misunderstood and procedures using punishment have been criticized. In fact, applied research evaluating punishment procedures has decreased over the years (Kahng et al., 2002; Lerman & Toole, 2011). Despite common misconceptions and a decline in research, punishment is a natural phenomenon and can be an effective tool. It is critical for clinicians to understand and apply punishment effectively. In the past several decades, the field of applied behavior analysis has observed many advances in function-based interventions to reduce challenging behavior, which has most likely influenced a reduction in the use of punishment-based interventions. However, there are some cases in which punishment may be warranted.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_26].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_26

As with reinforcement, punishment is classified into categories. Positive punishment involves the presentation of an aversive stimulus contingent upon a response that suppresses the future frequency of the response. Negative punishment involves the removal of a preferred stimulus contingent upon a response that suppresses the future frequency of the response.

Punishment Procedures

There are a number of procedures that use both positive and negative punishment. The purpose of this chapter is not to describe an exhaustive list of potential procedures, but to focus on more frequently used procedures. Commonly used positive punishment procedures include (a) verbal reprimands, (b) response blocking, (c) restraint, and (d) response interruption and redirection (RIRD). Commonly used negative punishment procedures include (a) time out from positive reinforcement and (b) response cost. In this chapter, your supervisees will gain experience implementing RIRD and/or response cost. We've selected these procedures because RIRD is positive punishment and response cost is negative punishment. RIRD and response cost procedures are typically considered to be on the less restrictive end of the spectrum of punishment procedures. In our experience, both RIRD and response costs are fairly prevalent, thus, it is likely your supervisees will implement both procedures in the future. However, feel free to modify this topic to include punishment procedures better suited to your supervisees' needs and future career goals.

Response Interruption and Redirection

RIRD is a punishment procedure typically used to reduce repetitive and stereotypic behavior (Martinez & Betz, 2013; Spencer & Alkhanji, 2018). To implement RIRD, the clinician first disrupts the challenging behavior (Ahearn et al., 2007). This is a modification of response blocking. RIRD was first established to reduce vocal stereotypy, which cannot be physically blocked. Because vocal stereotypy cannot be blocked, the procedure uses disruption instead. However, RIRD has since been expanded to reduce motor stereotypy as well (e.g., Ahrens et al., 2011). After disrupting the challenging behavior, the clinician instructs the client to emit appropriate responses. In most applications across the literature, these demands are topographically matched to the challenging behavior; that is, after disrupting vocal stereotypy, the client is instructed to emit three appropriate vocalizations. If disrupting motor stereotypy, the client is instructed to emit three appropriate motor movements. There have been evaluations of topographically dissimilar demands in which RIRD efficacy was maintained. Typically, the client must comply with the three demands to terminate RIRD.

Response Cost

Response cost can be conceptualized as a fine for challenging behavior (Cooper et al., 2020). Response cost involves the loss of a positive reinforcer, typically a generalized conditioned reinforcer, contingent upon challenging behavior. Response cost is frequently implemented in conjunction with a token economy but can be implemented by removing any previously acquired positive reinforcers, not only tokens. Response cost is widely implemented in various settings, such as schools, likely due to its convenience (e.g., Ashbaugh & Peck, 1998; Musser et al., 2001).

There are two approaches to response cost: *existing cache response cost* and *bonus response cost* (Cooper et al., 2020). Most clinicians are familiar with the existing cache response cost that involves the removal of reinforcers from an existing cache of positive reinforcers. For example, a teacher removes 10 minutes of a student's upcoming 30-minute recess time contingent upon that student disrupting class with inappropriate comments. With the bonus response cost approach, the clinician makes a set of reinforcers available noncontingently, specifically for the use of removal contingent upon challenging behavior. For example, a teacher began the morning by informing the class, "I am willing to give you 20 minutes of free time in the computer lab this afternoon. However, every time anyone gets out of their seat without permission, you will lose 1 minute from the clock. By 2:00 pm, if you have any time left on the computer lab clock, you can use those minutes at the computer lab."

The ease and efficacy of response cost makes it particularly appealing to clinicians and natural change agents (e.g., teachers, caregivers). However, there are many guidelines for using response cost effectively. The most important guideline with which to abide is avoiding overuse of punishment. As with any punishment procedure, its implementation can be negatively reinforcing. In other words, removal of a reinforcer is likely to have an immediate, terminating effect on the challenging behavior, which will serve to negatively reinforce the clinician's levying of the response cost fine. However, all challenging behavior reduction plans should lean heavily on reinforcement procedures. With response cost, specifically, if implemented too frequently, one loses the ability to implement it at all. In other words, if a student has earned five tokens in a token economy, but later loses those five tokens via response cost, response cost is rendered impossible because the student now has a zero balance of tokens. Not to mention, the token may lose reinforcing properties if, due to frequent response cost fines, the student rarely, if ever, has tokens available to exchange for a backup reinforcer. Therefore, the cardinal rule of response cost is never to bankrupt the cache of reinforcers.

One method to ensure that the client has a sufficient cache of reinforcers is to determine a starting reinforcer supply calculated using baseline levels of challenging behavior. The reinforcer cache should be higher than the mean number of challenging behaviors that occurs during a baseline session (Cooper et al., 2020). For example, if Avery's fifth grade teacher, Mr. Tait plans to implement response cost to reduce Avery's out of seat behavior during science class, he should first determine

how often Avery is out of her seat during science class. If she is out of her seat a mean of four times per science class, then Mr. Tait must ensure that Avery begins science class with more than four reinforcers available for removal. For example, Mr. Tait could begin the class by telling Avery that she can use the classroom tablet for the last 6 minutes of class, but fine her 1 minute each time she gets out of her seat. Starting at 6 minutes ensures that if Avery is out of her seat four times during class, she would not bankrupt her tablet time, thus allowing response cost to be implemented across the class duration. If Mr. Tait wished to implement existing cache response cost, he could develop a token economy in which Avery receives tokens for appropriate behavior. Mr. Tait would have to be cognizant of the fact that he must distribute at least six tokens to ensure that response cost is unlikely to result in a bankruptcy of tokens.

Side Effects of Punishment

Punishment is associated with some side effects that should be considered. First, punishment can lead to an increase in escape or avoidant behaviors (Azrin & Holz, 1966; Cooper et al., 2020; Mayer et al., 1968; Powell & Azrin, 1968). In fact, Skinner aptly described this phenomenon, "A person who has been punished is not thereby simply less inclined to behave in a given way; at best, he learns how to avoid punishment" (Skinner, 1971, p. 83). For example, if Winston misses his curfew and his parents attempt to punish his behavior by withdrawing his smartphone for a week, Winston may engage in whining, excessive complaints, or similar behaviors, perhaps to escape the time-out-from-phone period sooner than planned. This is particularly true if such topographies, whining and excessive complaints in this example, have a history of reinforcement. Avoidant behavior can take many forms. For example, if Rosie's parents frequently reprimand her clothing choices, Rosie may begin leaving for school before her parents wake up to see her outfit of the day. Similarly, if Mrs. Green, Gus' English teacher, reprimands him for submitting a research paper full of typos, then Gus may avoid future reprimands by simply not turning in his work at all. On some occasions, the escape or avoidant behavior topographies are equally or more challenging than the topography being punished. For example, if Ariel's clinician blocked her attempts to pull her own hair, Ariel may respond by aggressing toward the clinician to resist the response block or increase the intensity of self-injurious behavior attempts.

Second, punishment may lead to an undesired behavioral contrast. Behavioral contrast is the phenomenon in which a change in a reinforcement contingency of one component of a multiple schedule affects the response in another component (Reynolds, 1961). While a behavioral contrast is not necessarily an undesired outcome, in some instances, this phenomenon may produce undesired effects. For example, Melanie frequently oversleeps and is late to work. To compensate, she typically drives 5 miles per hour above the speed limit on her route to work. If a police officer begins to station her patrol car along the first half of Melanie's

morning commute, using radar to catch and fine speeding drivers, then Melanie's speeding through the first half of her commute may be punished. Because Melanie now drives the speed limit during the first half of her commute, where she was ticketed for speeding, she will likely drive 10 miles per hour above the speed limit during the second half of her commute, as opposed to 5 miles per hour above throughout the duration of the commute. This increased speeding intensity during half of her commute may actually pose more risk than less intense speeding through the entire commute.

Punishment may result in the client imitating undesired behavior (Bandura, 1969; Sprague & Walker, 2000). For example, if 4-year-old Octavia is reprimanded by her mother for misbehavior, Octavia may begin to reprimand her peers for failing to play a game of her choosing. The imitation of undesirable behaviors is particularly concerning if highly aversive or harsh punishers are used, which we recommend against in most cases for a myriad of reasons. However, clinicians should be aware of this possible side effect so they can attempt to mitigate this outcome.

The final side effect that clinicians must be prepared to address is the fact that the effects of punishment could negatively reinforce the application of punishment and lead to overuse. We described this above in discussing response cost. Clinicians, natural change agents, and any other individual who implements punishment, must be aware of this possibility and take steps necessary to guard against punishment overuse.

Guidelines for the Use of Punishment

When using punishment, clinicians should follow these guidelines to improve success. First, punishment should be delivered contingent upon each occurrence of the behavior, rather than on an intermittent schedule (Azrin et al., 1963; Lerman et al., 1997). Second, punishment should be delivered immediately following the challenging behavior (Abramowitz & O'Leary, 1990). Third, punishment should be implemented with positive reinforcement procedures. The effectiveness of punishment is improved when other responses contact reinforcement (Thompson et al., 1999). Moreover, ensuring that clients have socially appropriate means to contact reinforcement is an ethical practice. This may require the clinician to prompt, and then reinforce, socially appropriate behaviors to contact reinforcement previously delivered contingent upon the now-punished behavior. Fourth, a functional behavior assessment should be conducted to assist in selecting punishment procedures that are indicated, based upon the function of challenging behavior. For example, if challenging behavior is maintained by attention, then a verbal reprimand is contraindicated, but a time out from reinforcement is indicated. Fifth, pairing a discriminative stimulus with punishment to establish antecedent control can ultimately improve efficacy (e.g., McKenzie et al., 2008; Piazza et al., 1996). Once stimulus control is established, that stimulus can be used to transfer the effects to other contexts without actually implementing the punishment contingency consistently. Fifth, establish

and then use conditioned punishers. For example, once a verbal reprimand is conditioned as a punisher, it can be much easier to implement as a punisher than an unconditioned punisher.

Ethical Considerations

Behavior analysts all agree to three basic ethical tenets when designing and implementing any behavior change program. Those are (a) clients have a right to safe and humane treatment, (b) use least intrusive approaches, and (c) providing effective treatment (Cooper et al., 2020). Despite overwhelming agreement on these principals, there can be disagreement and controversy regarding the ethical use of punishment. The difficulty may come from the determining what is considered a humane treatment or what is considered the least intrusive of approaches because such decisions are individualized and subjective in nature. Behavior analysts must develop the ability to discern between cases in which punishment is a viable and ethical option and when it is not. Such situations in which punishment may be a viable and ethical solution include (a) when function- and reinforcement-based interventions have been unsuccessful, (b) when reinforcers maintaining challenging behavior cannot be controlled, or (c) when a slow decline in challenging behavior risks injury (Fisher et al., 1993; Foxx, 2003; Lerman & Toole, 2011. For example, punishment may be the safest and most humane treatment to immediately reduce a high threat of injury presented by severe self-injury. Moreover, most would agree that the use of an immediate and highly intense verbal reprimand would be indicated to immediately terminate the running behavior of a young child running toward a busy highway with no indication of stopping before being hit by a car. Needless to say, punishment can serve an important function in the treatment of challenging behavior while still abiding by the three principles we all hold in such high esteem. In order to behave ethically, clinicians must become skilled at determining when punishment is indicated and implementing punishment using the aforementioned guidelines.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–10:00	Introduction to Punishment
10:00–35:00	Simulated Training
35:00–55:00	Ethics of Punishment Debate
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Positive or Negative Punishment*, 1 copy per supervisee
- Appendix B: *Matching Punishment Procedures to Function of Challenging Behavior*, 1 copy per pair of supervisees
- Appendix C: *Response Cost: Procedural Fidelity Checklist*, 1 copy per supervisee
- Appendix D: *RIRD Procedural Fidelity Checklist*, 1 copy per supervisee
- Appendix E: *Identifying High-P Instructions Data Sheet*, 1 copy per supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- DiGennaro Reed and Lovett (2008)
- Martinez and Betz (2013)
- Musser et al. (2001)

Introduction to Punishment

Begin your meeting by asking your supervisees to define punishment. Then, ask your supervisees to discuss how the behavior analytic, technical definition of punishment differs from the layperson's understanding of punishment. Encourage them to share their experiences with individuals who had misconceptions of punishment. Next, briefly discuss the differences between positive and negative punishment. Distribute *Positive or Negative Punishment* (Appendix A). Quickly review the punishment procedures listed to ensure that your supervisees are familiar with each procedure. Then, give them a few minutes to independently complete this activity. When they complete the activity, return to the large group and ask them to share their answers, which will allow you to check for accuracy.

Transition the conversation to discuss side effects of punishment. State each potential side effect and provide an example (examples are provided in the PowerPoint slides). Next, ask your supervisees to discuss any potential methods to mitigate each side effect. Discuss the following side effects:

1. Increase in escape or avoidant behaviors
2. Behavioral contrast
3. Client imitates undesired behavior
4. Potential for overuse (e.g., application of punishment is negatively reinforced)

Remind your supervisees that because punishment can lead to undesired consequences, it is important to follow guidelines if selecting and implementing

punishment. Review the following guidelines. For each guideline, ask a supervisee to volunteer to describe how they have followed, or failed to follow, each guideline and the effects of that decision.

1. Deliver punishment on a continuous, rather than intermittent schedule.
2. Deliver punishment immediately following challenging behavior.
3. Implement in conjunction with a positive reinforcement procedure. Strongly consider reinforcing alternative responses to access the functional reinforcer.
4. Use functional behavior assessment results to the guide selection of a punishment procedure.
5. Establish antecedent stimulus control.
6. Establish and use conditioned punishers.

To elaborate on the fourth guideline, distribute *Matching Punishment Procedures to Function of Challenging Behavior* (Appendix B). The table in this activity has been adapted by Lerman and Toole (2011). Instruct your supervisees to work in pairs to complete the table. When complete, have your supervisees share their responses. As they present their responses to the activity, praise correct responses and correct errors.

Simulated Training

The next 25 minutes of the supervision meeting will be dedicated to simulating a training workshop. Divide your supervisees into two groups. Assign one group the topic of response cost and the other group the topic of RIRD. Inform each group that they will prepare a 7-minute workshop. They can select their target audience to be either caregivers (e.g., parents) or clinicians (e.g., teachers, speech language pathologists). Regardless of their selected target audience, assume the audience is largely unaware of the assigned procedure. Your supervisee's goal is to provide a 7-minute workshop to train their selected audience in implementing the selected punishment procedure, rather than providing the audience with technical knowledge regarding punishment or the selected procedure. Therefore, provide each group with the relevant procedural fidelity checklists (see Appendix C and Appendix D). They may use this checklist in any way they see fit.

Provide them with 10 minutes to prepare for their training. After the planning period, reassemble the group and randomly select one group to present their workshop first. During the simulated training, the supervisees who are not delivering the training will role-play as caregivers or professionals participating in the workshop. You, on the other hand, will be listening for correct knowledge of and implementation of each procedure. During this activity, correct errors immediately and praise all desired behavior. Additionally, provide signals to the presenters to indicate the length of their workshop.

Ethics of Punishment Debate

The final 20-minute activity is a debate regarding the use of punishment to decrease challenging behavior. You will divide your supervisees into two groups. We recommend they be divided differently than they were for the prior activity. You will assign one group to take the stance of support for the use of punishment to decrease challenging behavior and the other group to take the stance against the use of punishment. Give them 5 minutes to prepare their points and plan their counterpoints to points they anticipate the opposing group to make. Remind groups that the point of this activity is not to make blanket decisions that punishment is or is not acceptable, but to begin to think of all relevant considerations for and against the implementation of punishment.

When groups are prepared, initiate the debate. Follow this schedule, using a timer to be certain that groups abide by the time limits.

- Support Use of Punishment: Opening Argument, 2 minutes
  - Against Use of Punishment: Rebuttal, 1 minute
- Against Use of Punishment: Opening Argument, 2 minutes
  - Support Use of Punishment: Rebuttal, 1 minute
- Support Use of Punishment: Second Argument, 2 minutes
  - Against Use of Punishment: Rebuttal, 1 minute
- Against Use of Punishment: Second Argument, 2 minutes
  - Support Use of Punishment: Rebuttal, 1 minute
- Support Use of Punishment: Closing Statement, 1.5 minutes
- Against Use of Punishment: Closing Statement, 1.5 minutes

Close this activity by asking supervisees if their opinions on the use of punishment changed, and if so, how. Reiterate again that this activity was to encourage them to think through all considerations to be made when considering punishment, not to encourage them to be blanketly in support of or against punishment in general.

Knowledge Check

1. Give one example of positive punishment and one example of negative punishment.
2. What topography of challenging behavior is most commonly treated with RIRD?
3. When implementing RIRD, what is the general compliance requirement to terminate RIRD?
4. What is the cardinal rule of response cost?
5. Name two potential side effects of punishment.

Homework for Individual Supervision without a Client

1. Identify a client for whom a behavior reduction program is indicated.
2. Retrieve and review this client's FBA. At least 48 hours prior to your meeting, share the FBA report with your supervisor.
3. Collect baseline data across three sessions/observations on challenging behavior. Collect these data during the same time you plan to implement a punishment procedure.
4. Graph the baseline data and send to your supervisor at least 48 hours prior to your meeting.
5. Identify high-probability responses using *Identifying High P Instructions Data Sheet*, provided in Appendix E. The responses should include mostly those that are the same topography as the target challenging behavior. Note: this task is only for supervisees planning to implement RIRD.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 50-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review FBA Results
10:00–20:00	Review Baseline Data and High-P Instruction Data (RIRD only)
20:00–35:00	Develop Procedural Fidelity Checklist
35:00–50:00	Role-Play

Materials Needed

- FBA report for client (send to supervisor 48 hours prior to meeting).
- Baseline data graph (send to supervisor 48 hours prior to meeting).
- Appendix C: *Response Cost: Procedural Fidelity Checklist*, 1 copy per supervisee
- Appendix D: *RIRD Procedural Fidelity Checklist*, 1 copy per supervisee
- Data Sheet for Measuring Challenging Behavior During Role-Play (identical to that used to collect baseline data), 2 copies
- Computer to Edit the Response Cost or RIRD Procedural Fidelity Checklist
- Materials to Role-Play Response Cost or RIRD

Review FBA Results

During the first 10 minutes of your meeting, review the FBA results. You should have received these prior to the meeting. Ask your supervisee to quickly summarize the FBA results. Discuss any relevant information that may have been gathered from this report. Ask your supervisee to determine if response cost or RIRD is indicated, contraindicated, or neither for the selected behavior. Because only two interventions are being considered, if the FBA is conducted on repetitive and stereotypic behavior that is automatically maintained, RIRD is indicated. If not, then the supervisee should implement response cost. Once all considerations have been made, select the punishment procedure to implement. If, after reviewing the FBA results, your supervisee wants to implement RIRD, but did not make this determination prior to this meeting and, therefore, does not have high-p instruction data, end this meeting and resume after they have had the opportunity to conduct the high-p instruction assessment.

Review Baseline Data (Response Cost and RIRD) and High-P Instruction Data (RIRD Only)

Supervisees Implementing Response Cost

Ask your supervisee to share the graphed baseline data and describe the data's level, trend, and variability. Next, ask them to calculate the baseline mean. Remind your supervisee that they will need to continue collecting data to determine if challenging behavior is in fact decreasing in response to the punishment procedure.

Use these data to determine the number of reinforcers the client must begin a session with or accumulate in order to prevent reinforcer bankruptcy. Develop a plan for ensuring this will be the case by creating a reinforcement program that will

build a sufficient existing cache or by implementing bonus response cost, providing noncontingent access to a sufficient cache at the start of the session.

Supervisees Implementing RIRD

Ask your supervisee to share the graphed baseline data and describe the data's level, trend, and variability. Next, ask them to calculate the baseline mean. Remind your supervisee that they will need to continue collecting data to determine if challenging behavior is in fact decreasing in response to the punishment procedure.

Ask your supervisee to share the high-p assessment data and identify the responses that meet the high-p instruction definition. Discuss the topographical match to challenging behavior. Note that topographical matches are recommended, but not necessary. Select the specific demands to use when implementing RIRD.

Develop Procedural Fidelity Checklist

Supervisees Implementing Response Cost

Now that all data have been collected and reviewed, you will guide your supervisee through developing a response cost protocol for their client. Together, walk through the *Response Cost Procedural Fidelity Checklist* (Appendix C). This checklist contains the basic steps to implementing response cost but should be individualized to meet the needs of the specific client. For example, report the exact number of reinforcers in the client's cache at the start of a session. Encourage your supervisee to develop the procedural fidelity checklist independently, but offer support, praise accurate use, and correct errors as necessary. In addition to developing the procedural fidelity checklist, ensure your supervisee has a means by which to track the number of fines levied each session. For ease, we recommend adding this to the existing data sheet they are using to record challenging behavior.

Supervisees Implementing RIRD

Now that all data have been collected and reviewed, you will guide your supervisee through developing an RIRD protocol for their client. Together, walk through the *RIRD Procedural Fidelity Checklist* (Appendix D). This checklist contains the basic steps to implementing RIRD but should be individualized to meet the needs of the specific client. For example, list the specific demands to be made within the RIRD sequence at the bottom of the checklist and edit Step 2 to reference this list. Similarly, edit Step 1 with the specific approach to interrupting the client's challenge behavior. Encourage your supervisee to develop the procedural fidelity checklist independently, but offer support, praise accurate use, and correct errors as necessary.

Role-Play

We have allotted 15 minutes for your supervisee to role-play implementing response cost or RIRD. We suggest doing two 5-minute role-plays with about 2.5 minutes after each to discuss performance feedback. You will role-play as the client and your supervisee will implement response cost or RIRD. Be sure that your supervisee has the appropriate data collection sheets available. The data sheets should be identical to those used to measure baseline levels of challenging behavior. For response cost, this data sheet should also include a place to document the number of response cost fines levied per session.

As with other role-play activities, you want to role-play as an authentic client, while keeping in mind that for at least the first role-play that your supervisee will build better foundational skills without *curveballs* (e.g., engaging in nontarget challenging behavior). After your supervisee begins to demonstrate proficiency in implementing the selected procedure, begin to vary your role-play so that they must manage unexpected curveballs.

As you role-play as the client, simultaneously record procedural fidelity on your supervisee's implementation of the selected punishment procedure. Use the newly created procedural fidelity checklist, as discretely as possible. Use these data to provide performance feedback.

Homework for Individual Supervision with a Client

1. At least 48 hours prior to the individual supervision meeting with a client, send electronic version of revised response cost or RIRD procedural fidelity checklist.
2. If revisions were made, send electronic version of revised data sheet to your supervisor for approval.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 65-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–10:00	Feedback Regarding Procedural Fidelity Checklist and/or Data Sheet, if needed
10:00–55:00	Observe Response Cost or RIRD Implementation
55:00–65:00	Performance Feedback


Materials Needed


- Supervisee-developed Response Cost or RIRD Procedure Fidelity Checklist, multiple copies
- Supervisee-developed Data Sheet, multiple copies
- Clipboard
- Pen/Pencil

Feedback Regarding Procedural Fidelity Checklist and Data Collection

Your supervisee should have provided you with two items: (a) procedural fidelity checklist and (b) a data sheet for collecting data on both challenging behavior and fines levied (response cost only). Review these materials prior to your meeting, noting feedback for your supervisee. Prior to beginning the meeting with the client present, discuss your feedback with your supervisee. If significant changes must be made, the supervision meeting with a client may need to be postponed.

Observe Response Cost or RIRD Implementation

You will observe your supervisee implementing response cost or RIRD for at least 45 minutes. During the observation, measure procedural fidelity and collect data on the challenging behavior. Feel free to divide your observation period into two sections, one to measure procedural fidelity and one to measure challenging behavior if necessary for accurate measurement. It is likely that either intervention will be implemented in shorter or longer sessions. In the case that sessions are shorter than 45 minutes, repeat your observation until you observe at least a total of 45 minutes of implementation. In the case that sessions are longer than 45 minutes, feel free to extend the duration of your observation. Ideally, you should observe a complete implementation session. However, in cases when this is not possible, be sure to note which steps of the procedural fidelity checklist were or were not observed. Also be sure you and your supervisee coordinate the exact start and stop time of your observation so that you can measure IOA accurately.

Performance Feedback

During the final 10 minutes, you will provide performance feedback. Provide feedback when no clients are present, even if you must schedule to provide feedback at a later time. However, do attempt to provide feedback as immediately as possible. Begin by praising correct implementation and then correct any observed errors. Provide an opportunity for your supervisee to ask questions and to role-play any steps in which they implemented with poor fidelity.

Next, compare the data you and your supervisee collected on client challenging behavior. Provide your supervisee with your data sheet so they can calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following while implementing response cost or RIRD: (a) accurately collect data on the client's challenging behavior with at least 80% agreement and (b) implement response cost or RIRD with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement the selected intervention (response cost or RIRD) with a different client.
- ☐ Evaluate your supervisee's ability to implement the punishment procedure not selected (response cost or RIRD) with a client.
- ☐ Evaluate your supervisee's ability to implement any other relevant punishment procedures (e.g., time out from positive reinforcement, response blocking) with a client.

Appendix A: Positive or Negative Punishment

Instructions: Below is a list of punishment techniques. After reviewing each technique, list each technique in either the positive punishment or negative punishment column.

Time Out from Positive Reinforcement	Response Blocking	Verbal Reprimands
Water Mist	Response Cost	Response Interruption and Redirection
Shock	Physical Restraint	Overcorrection

Positive Punishment Procedures	Negative Punishment Procedures

Positive or Negative Punishment

Answer Sheet

DO NOT DISTRIBUTE TO SUPERVISEES

Instructions: Below is a list of punishment techniques. After reviewing each technique, list each technique in either the positive punishment or negative punishment column.

Time Out from Positive Reinforcement	Response Blocking	Verbal Reprimands
Water Mist	Response Cost	Response Interruption and Redirection
Shock	Physical Restraint	Overcorrection

Positive Punishment Procedures	**Negative Punishment Procedures**
Response Blocking	*Time Out from Positive Reinforcement*
Verbal Reprimands	*Response Cost*
Water Mist	
Response Interruption and Redirection	
Shock	
Physical Restraint	
Overcorrection	

Appendix B: Matching Punishment Procedure to Function of Challenging Behavior

Instructions: Complete the empty cells in the table by writing one of the following in each cell: (a) indicated, (b) contraindicated, or (c) not applicable (neither indicated nor contraindicated). The first row is completed as a model.

Punishment Procedure	Attention Maintained	Tangibly Maintained	Escape Maintained	Automatically Maintained
Time Out from Positive Reinforcement	*Indicated*	*Indicated*	*Contraindicated*	*Contraindicated*
Response Cost				
Verbal Reprimand				
Response Blocking				
Contingent Exercise				
RIRD				
Shock				
Physical Restrain				
Overcorrection				
Water Mist				

This activity is modeled from a table found in Lerman and Toole (2011)

Matching Punishment Procedure to Function of Challenging Behavior

Answer Sheet

DO NOT DISTRIBUTE TO SUPERVISEES

Instructions: Complete the empty cells in the table by writing one of the following in each cell: (a) indicated, (b) contraindicated, or (c) neither (neither indicated nor contraindicated). The first row is completed as a model.

Punishment Procedure	Attention Maintained	Tangibly Maintained	Escape Maintained	Automatically Maintained
Time Out from Positive Reinforcement	*Indicated*	*Indicated*	*Contraindicated*	*Contraindicated*
Response Cost	*Neither*	*Indicated*	*Neither*	*Neither*
Verbal Reprimand	*Contraindicated*	*Neither*	*Neither*	*Neither*
Response Blocking	*Contraindicated*	*Indicated*	*Contraindicated*	*Indicated*
RIRD	*Contraindicated*	*Indicated*	*Contraindicated*	*Indicated*
Shock	*Neither*	*Neither*	*Neither*	*Neither*
Physical Restrain	*Contraindicated*	*Indicated*	*Contraindicated*	*Indicated*
Overcorrection	*Contraindicated*	*Neither*	*Indicated*	*Neither*
Water Mist	*Neither*	*Neither*	*Neither*	*Neither*

This activity is modeled from a table found in Lerman and Toole (2011)

Appendix C: Response Cost: Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Challenging Behavior: _____

	Step	Implemented Correctly? + = Yes −= No
1	The response cost rules or contingencies are vocally explained at the start of the session. *Exclude for clients with limited vocal verbal behavior.*	
2	The client has access to reinforcers, either via positive reinforcement or delivered noncontingently. *Note: We recommend this amount be determined by baseline levels of challenging behavior.*	
3	The client's reinforcers are visually represented (e.g., tokens, written amount of time to access preferred activity). This is to facilitate communication of the removal of the reinforcer.	
4	At no point do response cost fines "bankrupt" the client's cache of reinforcers.	
5	Response cost fines are imposed immediately after the occurrence of the challenging behavior.	
6	All other challenging behaviors are ignored.	
7	The supervisee collects data on challenging behavior.	
8	The supervisee collects data on the response cost fines imposed.	

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix D: RIRD: Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Challenging Behavior: _____

	Step	Implemented Correctly? + = Yes −= No
1	When the client engages in challenging behavior, the supervisee immediately interrupts the behavior by calls the client's name. (*Note: you can replace the use of saying the client's name with another response to interrupt the challenging behavior*).	
2	The supervisee instructs the client to emit socially acceptable behaviors that match the topography of the challenging behavior. (*Note: you can instruct behaviors that are not matched based on topography with supervisor approval*).	
3	If the client fails to comply to instructions, the supervisee prompts the response with a controlling prompt.	
4	Contingent upon independent compliance with three consecutive demands, the supervisee praises compliance.	
5	Contingent upon independent compliance with three consecutive demands, the supervisee terminates the RIRD sequence.	
6	All other challenging behaviors are ignored.	
7	The supervisee collects data on the response cost fines imposed.	

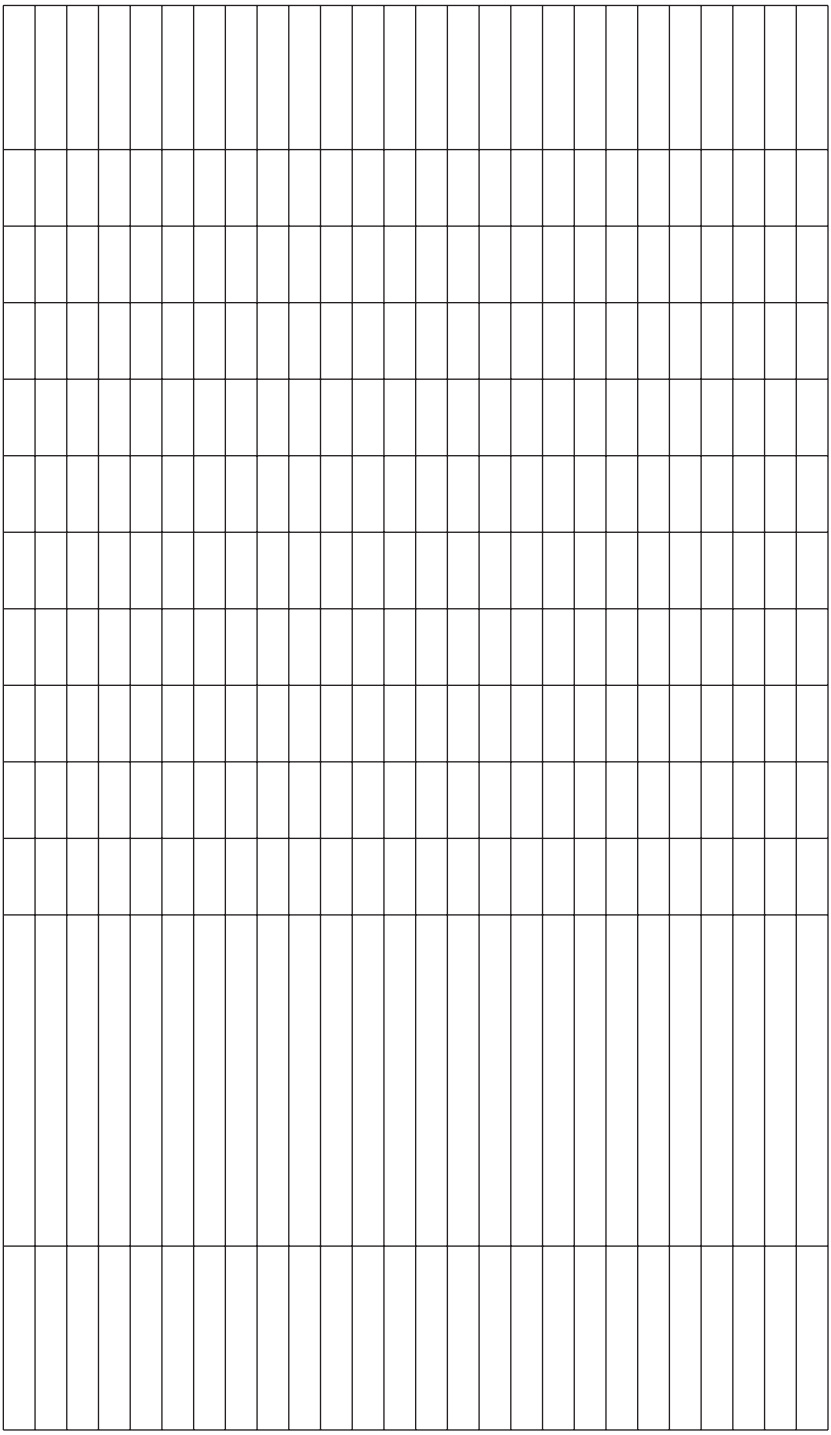
_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Appendix E: Identifying High-P Instructions Data Sheet

Instructions: Select instructions that may be utilized with RIRD. The majority of responses evaluated should be topographically similar to the target challenging behavior, unless your supervisor has recommended otherwise. Randomly provide each instruction 10 times across 1–10 sessions with the client. Do not provide prompts or assistance to comply with the instruction. Make an effort to embed instructions into normal routines rather than delivering instruction in a mass trial format. Do not praise or reinforce compliance. Similarly, do not correct errors or noncompliance.

For each trial, record a "+" if the client complied with the instruction and a "−" if they did not. After delivering each instruction 10 times, calculate the percent of compliance across trials. Instructions complied with at least 80% of the time will be considered high-p instructions and can be utilized with RIRD.

	Instruction	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Percent Compliance



References

Abramowitz, A. J., & O'Leary, S. G. (1990). Effectiveness of delayed punishment in an applied setting. *Behavior Therapy, 21*(2), 231–239.

Ahearn, W. H., Clark, K. M., & MacDonald, R. P. F. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 40*, 263–275. https://doi.org/10.1901/jaba.2007.30-60

Ahrens, E. N., Lerman, D. C., Kodak, T., Worsdell, A. S., & Keegan, C. (2011). Further evaluation of response interruption and redirection as treatment for stereotypy. *Journal of Applied Behavior Analysis, 44*, 95–108. https://doi.org/10.1901/jaba.2011.44-95

Ashbaugh, R., & Peck, S. M. (1998). Treatment of sleep problems in a toddler: A replication of the faded bedtime with response cost protocol. *Journal of Applied Behavior Analysis, 31*(1), 127–129.

Azrin, N. H., & Holz, W. C. (1966). Punishment. In W. K. Honig (Ed.), *Operant behavior: Areas of research and application* (pp. 380–447). Appleton.

Azrin, N. H., Holz, W. C., & Hake, D. F. (1963). Fixed-ratio punishment. *Journal of the Experimental Analysis of Behavior, 6*(2), 141–148.

Bandura, A. (1969). *Principles of behavior modification*. Holt, Rindhart, & Winston.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis* (2nd ed.). Pearson.

DiGennaro Reed, F. D., & Lovett, B. J. (2008). Views on the efficacy and ethics of punishment: Results from a national survey. *International Journal of Behavioral Consultation and Therapy, 4*, 61–67.

Fisher, W., Piazza, C., Cataldo, M., Harrell, R., Jefferson, G., & Conner, R. (1993). Functional communication training with and without extinction and punishment. *Journal of Applied Behavior Analysis, 26*(1), 23–36.

Foxx, R. M. (2003). The treatment of dangerous behavior. *Behavioral Interventions: Theory & Practice in Residential & Community-Based Clinical Programs, 18*(1), 1–21.

Kahng, S., Iwata, B. A., & Levin, A. B. (2002). Behavioral treatment of self-injury, 1964-2000. *American Journal of Mental Retardation, 107*(3), 212–221.

Lerman, D. C., & Toole, L. M. (2011). Developing function-based punishment procedures for problem behavior. In W. W. Fisher, C. C. Piazza, & H. S. Roane (Eds.), *Handbook of applied behavior analysis* (pp. 348–369). The Guilford Press.

Lerman, D. C., Iwata, B. A., Shore, B. A., & DeLeon, I. G. (1997). Effects of intermittent punishment on self-injurious behavior: An evaluation of schedule thinning. *Journal of Applied Behavior Analysis, 30*(2), 187–201.

Martinez, C. K., & Betz, A. M. (2013). Response interruption and redirection: Current research trends and clinical application. *Journal of Applied Behavior Analysis, 46*(2), 549–554.

Mayer, G. R., Sulzer, B., & Cody, J. J. (1968). The use of punishment in modifying student behavior. *The Journal of Special Education, 2*(3), 323–328.

McKenzie, S. D., Smith, R. G., Simmons, J. N., & Soderlund, M. J. (2008). Using a stimulus correlated with reprimands to suppress automatically maintained eye poking. *Journal of Applied Behavior Analysis, 41*(2), 255–259.

Musser, E. H., Bray, M. A., Kehle, T. J., & Jenson, W. R. (2001). Reducing disruptive behaviors in students with serious emotional disturbance. *School Psychology Review, 30*(2), 294–304.

Piazza, C. C., Hanley, G. P., & Fisher, W. W. (1996). Functional analysis and treatment of cigarette pica. *Journal of Applied Behavior Analysis, 29*(4), 437–450.

Powell, J., & Azrin, N. (1968). The effects of shock as a punisher for cigarette smoking. *Journal of Applied Behavior Analysis, 1*(1), 63–71.

Reynolds, G. S. (1961). Behavioral contrast. *Journal of the Experimental Analysis of Behavior, 4*(1), 57–71.

Skinner, B. F. (1971). *Beyond freedom and dignity*. Peguin Books.

Spencer, V. G., & Alkhanji, R. (2018). Response interruption and redirection (RIRD) as a behavioral intervention for vocal stereotypy: A systematic review. *Education and Training in Autism and Developmental Disabilities, 53*(1), 33–43.

Sprague, J., & Walker, H. (2000). Early identification and intervention for youth with antisocial and violent behavior. *Exceptional Children, 66*(3), 367–379.

Thompson, R. H., Iwata, B. A., Conners, J., & Roscoe, E. M. (1999). Effects of reinforcement for alternative behavior during punishment of self-injury. *Journal of Applied Behavior Analysis, 32*(3), 317–328.

Chapter 27
Token Economies

Topics Covered Within This Chapter

Topics
Generalized Conditioned Reinforcement
Token Economy Development
Interconnected Schedules of Reinforcement

Generalized Conditioned Reinforcement

Conditioned reinforcers are stimuli that come to serve as reinforcers after being paired with unconditioned reinforcers. Generalized conditioned reinforcers are a specific type of conditioned reinforcer that have been paired with a variety of unconditioned and conditioned reinforcers. Generalized conditioned reinforcers in the form of tokens are exchanged for a variety of backup reinforcers. Repeated presentation of a specific reinforcer is not always ideal because it can lead to habituation and a reduction in reinforcer value. In addition, delivering a reinforcer during teaching trials may be disruptive because the learner typically cannot consume the reinforcer and engage in the target behavior simultaneously. Therefore, presentation of tokens can aid in increasing the delay between the target behavior and the presentation of the backup reinforcer while maintaining a dense schedule of reinforcement.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_27].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_27

Token Economy Development

There are several steps required for developing an effective token economy (see Table 27.1). First, as with any behavior plan, the target behavior must be operationally defined. Stress to your supervisees the importance of defining behavior in such a way that it is clear when the behavior is and is not occurring. For example, if the supervisee wishes to increase rule-following, they must define specific observable responses that are included within the definition of rule-following (e.g., following teacher instructions within 5 seconds). If the operational definition is unclear, tokens will not be provided consistently, and the behavior of interest is less likely to increase.

Table 27.1 Developing a token economy

Identify target behavior
Establish tokens
Develop a menu of backup reinforcers
Determine contingencies for earning and losing tokens
Determine the prices of backup reinforcers
Determine when and how tokens should be exchanged
Develop a process for monitoring on-going effectiveness

Note: Adapted from Hine et al. (2018)

Second, your supervisees will need to establish stimuli to serve as tokens. Tokens may be stimuli that can be manipulated by the learner (e.g., poker chips) or stimuli that are manipulated by the token deliverer alone (e.g., check marks). Once the form of the token is determined, the token must be paired with backup reinforcers. For individuals with advanced verbal repertoires, a rule alone may be sufficient to establish tokens as conditioned reinforcers (Moher et al., 2008). However, for individuals with developing verbal repertoires, intentional pairing between the token and backup reinforcers will be necessary. One example of this intentional pairing is provided by Moher and colleagues. The authors describe a two-step pairing procedure that incorporated 10-trial blocks of noncontingent token delivery. During step one, the authors provided access to the backup reinforcer within 0.5 seconds of token delivery and during step two, the participant had to physically exchange the token for the backup reinforcer. The authors evaluated the effectiveness of the pairing procedures by conducting a reinforcer assessment to determine whether tokens would maintain responding. They found that contingent presentation of tokens was effective in maintaining behavior after the tokens were sufficiently paired with high-preference items.

Third, your supervisees must develop a menu of backup reinforcers. Including a variety of items, activities, and privileges as backup reinforcers is ideal as it reduces the impact of motivational variables. That is, if the token is paired with only one specific reinforcer, the effectiveness of the token will be impacted by the learner's recent consumption of the specific reinforcer. However, if the token is paired with multiple reinforcers, it is likely that an establishing operation will be in place for one of them. If effective backup reinforcers are not identified, the token economy will be ineffective.

Fourth, your supervisees will need to determine the schedule of reinforcement for token delivery also referred to as the token-production schedule (see Hackenberg, 2009). That is, what is the contingency between the target behavior and delivery of a token. For example, if after every fifth occurrence of the target behavior the implementer delivers a token, the schedule of reinforcement would be a FR 5. It is important to avoid thinning the schedule of reinforcement too quickly. For example, if the pre-token economy schedule of reinforcement was a FR 2, immediately increasing the response requirement to five responses to earn one token would be an abrupt shift in the schedule of reinforcement and would likely result in a decrease in responding. Another important consideration is whether a variable rather than a fixed schedule should be used (Hine et al., 2018). Variable schedules typically produce a response pattern without pre-ratio pauses due to the indiscriminable contingencies. Related to the contingency for earning tokens, your supervisees will need to determine whether a response cost procedure will be incorporated within the token economy. This is a punishment procedure and thus we recommend careful consideration as to whether the response cost is necessary for the token economy to be successful. Please refer to Chap. 26 of this book for a more detailed discussion of punishment.

Fifth, your supervisees should determine the prices of the backup reinforcers also referred to as the token-exchange schedule (Hackenberg, 2009). For example, if the learner must earn 10 tokens to play outside, the token-exchange schedule will be a FR 10. Remind your supervisees to assign higher token requirements to high-preference backup reinforcers.

Sixth, your supervisees should determine when and how tokens can be exchanged (i.e., exchange-production schedule). For example, the learner has to earn 20 tokens before they can exchange the tokens for the reinforcer or the learner can only exchange tokens at certain times during the day. Remind your supervisees to be intentional when deciding when tokens can be exchanged. It can be tempting to restrict token exchange opportunities to periods of the day which are most convenient for the token deliverer, but infrequent token exchange periods can reduce the effectiveness of the token economy. This is particularly important when initially introducing the token economy.

And finally, your supervisees will need to develop procedures for monitoring the effectiveness of the token economy. Specifically, measurement of the target behavior should reveal an increase in the target behavior following the introduction of the token economy. See Chap. 5 for a more detailed discussion of behavioral measurement.

It is possible that even after following each of these steps your supervisees may encounter difficulties related to the effectiveness of the token economy. Hine et al. (2018) provide an overview of common barriers that may negatively impact the extent to which token economies increase the behavior of interest. These authors provide responses to these barriers that are based on basic and applied research. There are several practical recommendations provided in this article that should be employed in the event that difficulties with token economies arise.

Interconnected Schedules of Reinforcement

One of the topics that we want to highlight in this chapter is the importance of recognizing the interconnected schedules of reinforcement (see Table 27.2). The three schedules are as follows: (a) the token-production schedule, (b) the exchange-production schedule, and (c) the token-exchange schedule. When making modifications to the token economy, your supervisees should take care to change one schedule (e.g., token-production schedule) at a time rather than altering all three at once. Your supervisee should be able to clearly identify each of the schedules operating within their designed token economy and systematically evaluate the impact modifying one schedule has on the overall effectiveness of the token economy.

Table 27.2 Interlocking contingencies within a token economy

Token-production schedule	Schedule of reinforcement for token delivery. *A token is added to the board after Lisa completes three math problems.*
Exchange-production schedule	Rules regarding when reinforcers can be exchanged. *Lisa must bank 10 tokens before she can purchase back up reinforcers.*
Token-exchange schedule	Price of reinforcers. *Lisa must spend five tokens in order to play outside but only two tokens to receive a piece of candy.*

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Interlocking Contingencies Worksheet
30:00–45:00	Hypothetical Token Economy Development
45:00–55:00	Selecting a Behavior of Interest
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Interlocking Contingencies Worksheet*, 1 copy for each supervisee
- Appendix B: *Plan for Token Economy Development*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Hackenberg (2009)
- Hine et al. (2018)
- Sleiman et al. (2020)

Review Major Concepts

Begin your group supervision meeting by reviewing the steps for developing a token economy and the interlocking schedules of reinforcement. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

Behavior of Interest

Talk to your supervisees about systematic methods for selecting a behavior of interest. Provide examples of target responses that would be relevant to the population with whom your supervisees work. Ask your supervisees to identify additional examples. Remind your supervisees of the importance of developing a clear operational definition. This may be a good opportunity to review material discussed in Chap. 5 on measurement. Discuss appropriate data collection methods for a variety of target behaviors.

Establish Tokens

Following the selection of the target behavior, your supervisees need to determine what they will use as tokens. Encourage them to thoughtfully consider whether items that their client can manipulate (e.g., poker chips) would be most appropriate or whether stimuli that the token deliverer manipulates (e.g., check marks) would be most appropriate. This tends to be the portion of the token economy development that supervisees find most enjoyable. Once the token form has been determined, the

tokens must be paired with other reinforcers such that they function as conditioned reinforcers. Remind your supervisees that initial pairings should require very low response effort (e.g., simply handing over the token) to ensure efficient conditioning is possible. Stress to your supervisees the importance of developing a systematic approach to conditioning tokens as the entire economy hinges on the tokens exerting reinforcing or discriminative functions (Hackenberg, 2009).

Backup Reinforcers and Prices

Next, you should discuss how to identify back up reinforcers that can be purchased with the tokens and the number of tokens that will be required to obtain the reinforcers. Encourage your supervisees to use preference assessment results to inform the prices (i.e., high-preference items should require more tokens than moderate-preference items). Reinforcers included on the menu are not required to be tangible items, they can be activities, privileges, or social interactions.

Schedule of Reinforcement

Discuss the importance of selecting an appropriate schedule of reinforcement for token delivery. Your supervisees should consider the current schedule of reinforcement for the behavior and avoid rapidly thinning the schedule.

Exchange Rules

Finally, your supervisee must determine the rules regarding how many tokens must be accrued before they can be exchanged. In addition, any rules regarding how the tokens can be exchanged (e.g., only certain times during the day) should be specified as well.

Interlocking Contingencies

Your supervisees have likely implemented a token economy before; however, it is unlikely that they did so while acknowledging the interlocking contingencies which can render a token economy ineffective if not balanced correctly. Dedicate time to highlight the importance of carefully planning any changes in one of the contingencies and how it may impact the other contingencies. Describe each of the schedules in detail and provide examples. Ask your supervisees to come up with additional examples.

Token-Production Schedule This is the schedule dictating when the behavior results in a token. For example, after four correct responses one check mark is provided or after 2 minutes of reading one token is placed on the board.

Exchange-Production Schedule This is the schedule that dictates when tokens can be exchanged to access back up reinforcers. This could be based on a specific number of accumulated tokens or a specific time of day. For example, after accumulating 10 tokens they can be exchanged or tokens can be exchanged on the hour (e.g., 1:00 pm, 2:00 pm, 3:00 pm).

Token-Exchange Schedule This schedule dictates how many tokens are required to purchase a particular reinforcer. For example, access to the trampoline costs 10 tokens or a cookie requires two checkmarks.

Interlocking Contingencies Worksheet

For this activity, provide each of your supervisees with the *Interlocking Contingencies Worksheet* (Appendix A). Ask your supervisees to independently complete the worksheet and identify the three interlocking contingencies for the examples. Once they have completed the worksheet, instruct your supervisees to share their responses with another supervisee and to provide feedback to one another. Answer questions and provide guidance as necessary throughout this activity.

Hypothetical Token Economy Development

During this activity your supervisees should use the *Plan for Token Economy Development* form (see Appendix B) to create a hypothetical token economy. Instruct your supervisees to identify a behavior they would like to address for themselves (e.g., reading more, drinking more water) and then develop a hypothetical token economy for addressing this target behavior. Have your supervisees share their plans with the group and discuss any potential difficulties identified by yourself or the other supervisees.

Selecting a Behavior of Interest

During this activity, your supervisees should select a client behavior which they will target with a token economy. Have them work in pairs or as a large group. Allow the supervisees to provide feedback to one another on the feasibility of increasing the proposed behavior using a token economy. In addition, prompt your supervisees to

consider how they will collect data. Guide your supervisees through this discussion and provide feedback as needed.

Homework

Prior to their supervision meeting without a client, your supervisees will need to submit their selected behavior of interest along with a data collection sheet. You should approve both of these before your supervisee initiates baseline data collection. After collecting three to five baseline sessions, your supervisees should graph these data and bring the graph to the individual supervision meeting without a client. Your supervisee should also complete a rough draft of the *Plan for Token Economy Development.*

Knowledge Check

1. What is the token-production schedule?
2. What is the exchange-production schedule?
3. What is the token-exchange schedule?

Homework for Individual Supervision without a Client

1. Operationally define a behavior of interest and create a data collection system. After obtaining your approval, your supervisee should collect data on the target behavior for three to five sessions. This assignment should be submitted and approved before the scheduled meeting.
2. Graph the collected data (3–5 baseline sessions) to display the current level of the behavior of interest before the introduction of the token economy.
3. Complete a rough draft of the *Plan for Token Economy Development* (Appendix B).

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Graph and Plan Evaluation
15:00–30:00	Client-Directed Activities

Materials Needed

- Graphed baseline data
- Appendix B: *Plan for Token Economy Development*
- Appendix C: *Graph Component Checklist*
- Appendix D: *Token Economy Procedural Fidelity Checklist*

Prior to this meeting, your supervisee should have submitted the operational definition of the behavior of interest and the data collection system. Your supervisee should receive your approval on this assignment before moving forward with data collection.

Graph and Plan Evaluation

Review your supervisee's graph and evaluate the quality of the graph using the *Graph Component Checklist* (see Appendix C). Provide specific feedback to your supervisee on how they can improve their graph. You and your supervisee should determine whether, based on the data, introducing the token economy is appropriate or whether additional baseline sessions should be conducted. Next, review your supervisees *Plan for Token Economy Development* form. Role-play the procedures with your supervisee to ensure the plan is feasible.

Client-Directed Activities

During this meeting, you and your supervisee should develop a *Token Economy Procedural Fidelity Checklist* (Appendix D) based on the *Plan for Token Economy Development*. Following the meeting, your supervisee should finalize the *Token Economy Procedural Fidelity Checklist*. They should have the fidelity checklist and client data sheet prepared for you to collect data to evaluate their fidelity of implementation and IOA for data collection.

Homework for Individual Supervision with a Client

1. Finalize *Token Economy Procedural Fidelity Checklist* (Appendix D).

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Token Economy Implementation
30:00–45:00	Session Procedures
45:00–60:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix D: *Token Economy Procedural Fidelity Checklist*
- *Supervision Observation Form*

Token Economy Implementation

Prior to your meeting with your supervisee, they should have finalized *Token Economy Procedural Fidelity Checklist* and the data sheet for the behavior of interest. They should provide you with a copy of both sheets. Observe your supervisee implement the token economy and collect data simultaneously. Following the session, provide specific feedback based on the data collected on the fidelity checklist.

Session Procedures

As your supervisee conducts the token economy, observe your supervisee target other goals with their client as well. During this portion of the observation, collect data using the *Supervision Observation Form*.

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and the supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist. When providing corrective feedback, include a justification as to why a behavior needs to change. Model components of the token economy that were implemented incorrectly and provide behavior specific praise for components implemented correctly. Finally, end this session with the opportunity for your supervisee to ask questions.

Mastery Criterion: In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role-play and feedback.

Future Growth

- ☐ Observe your supervisee provide feedback to another trainee on their use of a token economy.
- ☐ Review your supervisee's plan for a token economy for a different client.

Appendix A: Interlocking Contingencies Worksheet

1. Kari receives a token after writing five spelling words. Once she earns 10 tokens, she can take a break with requested preferred items.
   (a) Token-Production Schedule
   (b) Exchange-Production Schedule
   (c) Token-Exchange Schedule
2. Chiney earns a token for every free throw she makes. Once she earns 20 tokens, she can exchange her tokens for a reinforcer. High-preference activities such as listening to music require 30 tokens and moderate-preference activities such as taking selfies require 10 tokens.
   (a) Token-Production Schedule
   (b) Exchange-Production Schedule
   (c) Token-Exchange Schedule
3. Damian earns one token after reading continuously for 1 minute. He can exchange tokens during recess and lunch break. Damian can purchase 10 extra minutes of recess or lunch break for 30 tokens.
   (a) Token-Production Schedule
   (b) Exchange-Production Schedule
   (c) Token-Exchange Schedule
4. Corey earns one token after hitting an average of 10 baseballs. He can exchange his tokens once he earns 50 tokens. His high-preference reinforcers require 60 tokens and his moderate-preference items require 20 tokens.
   (a) Token-Production Schedule
   (b) Exchange-Production Schedule
   (c) Token-Exchange Schedule
5. Shannon earns one token for each 15-minute period in which she remains on-task at work. She can exchange her tokens at the beginning and end of the workday. She can exchange 5 tokens for a piece of candy, 15 tokens for a soda, 50 tokens for lunch from a selected fast-food restaurant, and 300 tokens for permission to arrive at work at 10:00 am instead of 8:00 am.
   (a) Token-Production Schedule
   (b) Exchange-Production Schedule
   (c) Token-Exchange Schedule

Interlocking Contingencies Worksheet Answer Guide

1. Kari receives a token after writing five spelling words. Once she earns 10 tokens, she can take a break with requested preferred items.

   (a) Token-Production Schedule

   FR 5

   (b) Exchange-Production Schedule

   10 tokens

   (c) Token-Exchange Schedule

   10 tokens

2. Chiney earns a token for every free throw she makes. Once she earns 20 tokens, she can exchange her tokens for a reinforcer. High-preference activities such as listening to music require 30 tokens and moderate-preference activities such as taking selfies require 10 tokens.

   (a) Token-Production Schedule

   FR 1

   (b) Exchange-Production Schedule

   20 tokens

   (c) Token-Exchange Schedule

   High-preference activities 30 tokens; moderate-preference activities 10 tokens

3. Damian earns one token after reading continuously for 1 minute. He can exchange tokens during recess and lunch break. Damian can purchase 10 extra minutes of recess or lunch break for 30 tokens.

   (a) Token-Production Schedule

   1 min whole interval

   (b) Exchange-Production Schedule

   Recess and lunch break

   (c) Token-Exchange Schedule

   30 tokens

4. Corey earns one token after hitting an average of 10 baseballs. He can exchange his tokens once he earns 50 tokens. His high-preference reinforcers require 60 tokens and his moderate-preference items require 20 tokens.

   (a) Token-Production Schedule

   VR 10

   (b) Exchange-Production Schedule

   50 tokens

   (c) Token-Exchange Schedule

   High-preference reinforcers 60 tokens; moderate-preference reinforcers 20 tokens

5. Shannon earns one token for each 15-minute period in which she remains on-task at work. She can exchange her tokens at the beginning and end of the workday. She can exchange 5 tokens for a piece of candy, 15 tokens for a soda, 50 tokens for lunch from a selected fast-food restaurant, and 300 tokens for permission to arrive at work at 10:00 am instead of 8:00 am.

   (a) Token-Production Schedule

   Whole interval 15 minutes

   (b) Exchange-Production Schedule

   Beginning and end of the workday

   (c) Token-Exchange Schedule

   5 tokens for candy; 15 tokens for soda; 50 tokens for lunch; 300 tokens for late arrival to work

Appendix B: Plan for Token Economy Development

I. Define the target behavior

- ☐ Identify the conditions under which the behavior should occur (e.g., when instructed to clean up)
- ☐ Topographical definition (e.g., picks up toy from the ground and places the toy in the designated container)
- ☐ Required measurement dimensions that must be met (e.g., within 3 of the instruction, or cleans up for 1 minute continuously)

II. Select tokens and procedures for establishing them as conditioned reinforcers

- ☐ Identify the stimulus that will serve as the token
- ☐ Determine how the tokens will be conditioned as reinforcers

III. Develop a menu of back up reinforcers

- ☐ Identify items that have in the past resulted in increased responding
- ☐ Try to include an adequate number of back up reinforcers to reduce the impact of motivational variables. This number will vary based on the client's history of reinforcement and the variety of reinforcers available.

IV. Determine contingencies for earning and losing tokens

- ☐ Identify the schedule of reinforcement for the behavior of interest. This could be the number of responses or the duration of engagement in the response.

V. Determine the prices of back up reinforcers

- ☐ Identify how many tokens are required to purchase different reinforcers
- ☐ High-preference items should "cost" more than moderate-preference items

VI. Determine when and how tokens can be exchanged

- ☐ Identify how many tokens must be earned before they can be exchanged

VII. Develop a system for progress monitoring and a plan for fading

Appendix C: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizontal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix D: Token Economy Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Goal: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Hackenberg, T. D. (2009). Token reinforcement: A review and analysis. *Journal of the Experimental Analysis of Behavior, 91*(2), 257–286. https://doi.org/10.1901/jeab.2009.91-257

Hine, J. F., Ardoin, S. P., & Call, N. A. (2018). Token economies: Using basic experimental research to guide practical applications. *Journal of Contemporary Psychotherapy, 48*, 145–154. https://doi.org/10.1007/s10879-017-9376-5

Moher, C. A., Gould, D. D., Hegg, E., & Mahoney, A. M. (2008). Non-generalized and generalized conditioned reinforcers: Establishment and validation. *Behavioral Interventions, 23*, 13–38. https://doi.org/10.1002/bin.253

Sleiman, A. A., Betz, A. M., Rey, C. N., & Blackman, A. L. (2020). Effects of token manipulation on responding within a token economy implemented with children with autism. *Education and Treatment of Children, 43*, 323–333. https://doi.org/10.1007/s43494-020-00014-2

Chapter 28
Group Contingencies

Topics Covered Within This Chapter

Topics
Introduction
Practical Applications
Implementation Guidelines
Advantages

Introduction

A group contingency is an intervention in which a reward is provided contingent upon the behavior of a single member of a group, the behavior of a small part of a group, or everyone in the group (Little et al., 2015; Heering & Wilder, 2006). There are three types of group contingencies: independent, interdependent, and dependent (Litow & Pumroy, 1975).

An independent group contingency is one in which a contingency is provided to all members of a group and each individual who meets the criterion associated with the contingency receives the reward. An example of an independent group contingency is every relator in the firm who sells ten million worth of real estate in the year receives a paid vacation. Another example is all students who arrive to school on time Monday–Friday will participate in a schoolwide celebration on Friday afternoon.

An interdependent group contingency is one in which all members of the group will receive a reward only if every member in the group meets the criterion of the contingency (Kelshaw-Levering et al., 2000; Lewis et al., 2002). There are two

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_28].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_28

variations to the interdependent group contingency: (a) the whole group meets a criterion or (b) the group's mean data meets a criterion. An example of the first contingency is when every supervisee preparing to sit for the BCBA exam at Sunshine Therapy Center answers at least 70% of questions correctly on a practice exam, the supervisors will treat them all to lunch. An example of the second contingency is when the mean score on the BCBA certification practice exam among supervisees is 70%, the supervisors will treat them all to lunch. With the first example, every supervisee must score a 70% or above. With the second example, some supervisees may score below 70%, but if others score above 70% so that the mean score among the group is at least 70%, then the group has met the criterion and will receive the reward.

Interdependent group contingencies are the most popular group contingency used in school settings (Maggin et al., 2012; Maggin et al., 2017). One particularly prevalent interdependent group contingency is the Good Behavior Game, originally described by Barrish et al. (1969). The Good Behavior Game involves dividing a group, such as a classroom, into two teams. The groups have established behavior expectations such as classroom rules. The Good Behavior Game and its variations have been studied thoroughly across various settings, with various client characteristics, and with a variety of rewards; however, it is most commonly implemented as a classroom management procedure in elementary classrooms (Flower et al., 2014).

In one variation, the clinician, such as the teacher, informs the students that each time they violate one of the expectations (e.g., engage in a disruptive behavior), their team will get a mark. Typically, the infraction is stated when the mark for the infraction is documented. The team with the fewest infractions at the end of the game will earn a reward. Often, a team can also win an award if they have a certain number of marks or fewer (i.e., differential reinforcement of low behavior; see Chap. 24). In another variation, rather than documenting infractions, teams earn points for appropriate, prosocial behavior and the team with the most point earns a reward (Flower et al., 2014; Joslyn et al., 2019). In this case, appropriate behavior, rather than disruptive behavior, is recognized and rewarded. This version of the Good Behavior Game has been referred to as the Caught Being Good Game (Wahl et al., 2016).

A dependent group contingency is one in which the reward for the whole group is dependent on one member or a small group of members meeting a criterion. For example, when all of the supervising clinicians at Sunshine Therapy Center submit their quarterly progress reports, then all employees, not just supervisors, can leave for the day. Another example is Ms. Balaji tells her class that if the *hero student* follows all of the classroom rules from the start of the day until lunch, then the entire class can have 10 extra minutes of recess. Ms. Balaji has randomly selected Larkin to be the hero student and is watching to determine if Larkin meets the criterion. However, she has not revealed the identity of the hero students to the class.

As one can quickly see, the dependent group contingency promotes group-wide cooperation and support (Williamson et al., 1992). In the previous examples, you may expect other employees at Sunshine Therapy Center to provide supervisors with any assistance they need to complete their progress reports so everyone can

leave for the day. In Ms. Balaji's classroom, you may expect to see students encouraging one another to follow the rules as they are unsure who the hero student is, so they want all peers to follow instructions so they can all benefit from the additional recess time. However, many elementary teachers describe dependent group contingencies as unfair (Briesch et al., 2015). Some may fear that the hero student may be bullied if they fail to meet the criterion. To address this concern, the hero student can be selected randomly and this student's identity can be kept hidden from the class. In some applications of dependent group contingencies, the identity of the hero student is never to be revealed. In other cases, the identify is revealed only after the student successfully meets the criterion, which is referred to as a *conditional reveal* (Page et al., 2021).

Practical Applications

Group contingencies are most frequently implemented in school settings, but they can easily be implemented in other settings such as places of employment, community activities, or within sports leagues (Maggin et al., 2012; Maggin et al., 2017; Simonsen et al., 2008; Stage & Quiroz, 1997). You are more likely to see group contingencies implemented with elementary and middle school students rather than high school students. Group contingencies are also more common among general education classrooms rather than special education classrooms (Maggin et al., 2017; Page et al., 2021).

Group contingencies are most frequently used to reduce challenging behavior within the classroom (Maggin et al., 2012; Maggin et al., 2017). Typically, teachers will use group contingencies to reduce mild disruptive behaviors rather than severe challenging behavior. The second most frequent application of group contingencies is for the improvement of academic behaviors. Such behaviors include, time on task, task completion, and task engagement (Maggin et al., 2012; Maggin et al., 2017). These are not the only two areas that you can apply group contingencies. Group contingencies have been successfully used to improve cooperation, sportsmanship, and increase physical activity (Williamson et al., 1992; Speltz et al., 1982; Page et al., 2021; Vidoni & Ward, 2006).

Implementation Guidelines

If your supervisees plan to implement a group contingency, there are several guidelines they should follow. The first guideline is related to the contingency criterion. The criterion should be derived from baseline data. That is, the criterion should be set at about the baseline level of target behavior to increase the likelihood that the group members contact reinforcement during initial applications of the group contingency. In later sessions, the criterion can be systematically modified to a more

stringent criterion. Additionally, the clinician or teacher should clearly communicate the performance criterion to the group members. Although most group contingency research is conducted in general education classrooms, it is likely that communicating the contingency criterion would benefit clients with vocal verbal behavior, but it is less certain that this would be the case for clients without vocal verbal behavior.

The second guideline is to ensure that the group contingency reward is effective. Several steps can be taken to improve the effectiveness of the group contingency reward. First, the use of preference assessments to select rewards can greatly improve the effectiveness of the group contingency. Preference assessments can take many forms; in fact, a vocal report of preferred items or events may be sufficient (Flower et al., 2014; Page et al., 2021). Similarly, having group members respond to a survey regarding preferred items and events can also improve the effectiveness of the group reinforcer contingency. Once rewards have been identified, the clinician should vary the reward being delivered each time the group contingency criterion has been met. In some cases, the clinician may consider randomizing the rewards across applications of the group contingency. This variation of reward will likely prevent an abolishing operation for any particular reward. Finally, rewards should be delivered as immediately as possible after the contingency criterion has been met (Deshais et al., 2018; Maggin et al., 2012).

The efficacy of a group contingency can be enhanced by combining it with additional procedures. Common combinations include clearly defined behavioral expectations, goal setting, praise, performance feedback, and self-monitoring (Maggin et al., 2012; Maggin et al., 2017). As with any intervention, the clinician should monitor data. While it is common sense to monitor group data as it relates to meeting the contingency criterion, it is also recommended to monitor individual data as well.

There are additional guidelines that apply specifically to dependent group contingencies. First, if the group will be rewarded based on the performance of a single member of that group, it is best to select the hero at random (Kelshaw-Levering et al., 2000; Ferneza et al., 2013). Second, it is recommended not to reveal the identity of hero unless the reveal is made only after the individual meets the contingency criterion (i.e., conditional reveal). The conditional reveal serves two purposes. First, this reduces the likelihood of bullying the hero if they fail to meet the group contingency criterion. Second, this is likely to improve the behavior of all group members. If Seth, Pete, Molly, and Amy are members of a group with a dependent group contingency and all group members are made aware that delivery of the reward is based solely on Pete's behavior, then Seth, Molly, and Amy's behavior is less likely to altered.

Advantages

There are many advantages of a group contingency. First it is efficient. One clinician can target behavior change for many individuals with a single intervention (Albers & Greer, 1991). This is particularly helpful if multiple individual contingencies are simply impractical (Hanley & Tiger, 2011). This efficiency may also reduce the clinician-to-client ratio in certain settings. If one clinician can change the behavior of many clients at once, then it is possible that fewer clinicians would be necessary in certain settings. Second, group contingencies can capitalize on peer influence. Contingencies can be developed so that peers are encouraging appropriate behavior among the group. This is particularly helpful in settings in which peers had previously encouraged inappropriate behavior (e.g., most middle school classrooms). Peers serving as change agents can impact the efficacy of the intervention but also reduce the behavior management burden of the clinician or teacher. Moreover, the group contingency may facilitate increased positive social interaction among group members (Kohler et al., 1990). Due to the variety and advantages afforded by group contingencies, your supervisees will benefit from learning how to implement group contingencies with fidelity.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–25:00	Introduction to Group Contingencies
25:00–55:00	Planning Group Contingencies
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Compare and Contrast*, 1 copy per supervisee
- Appendix B: *Guideline Rationale*, 1 copy per supervisee
- Appendix C: *Case Scenarios*, 1 copy per supervisee
- Appendix D: *Group Contingency Planning Guide*, 1 copy per supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Foley et al. (2019)
- Jones et al. (2009)
- Maggin et al. (2017)

Introduction to Group Contingencies

Begin your meeting by asking your supervisees to define *group contingencies*. Next, introduce the three group contingencies: independent, interdependent, and dependent. Provide both the definition and an example of each. As you teach about the interdependent group contingency, include a thorough description of the Good Behavior Game. Distribute *Compare and Contrast* (Appendix A). Read the instructions and then divide your supervisees into pairs to complete the tables. Allot about 8 minutes for them to work together to identify how each set of group contingencies are alike and different. Then return to the full group. To summarize their work, invite supervisees to share their lists. Listen carefully so you can praise correct responses and correct errors.

Briefly discuss some of the research findings regarding the application of group contingencies. Encourage supervisees who have experience with group contingencies in these settings to share their experiences. Encourage them to share experiences either implementing group contingencies or being a member of a group for whom a group contingency was applied.

1. Most frequently implemented in school settings
2. Most frequently implemented with elementary and middle school students
3. Most frequently implemented in general education classrooms
4. Typically implemented to reduce mild challenging behavior or improve academic behavior (e.g., task engagement, task completion)
5. Can be implemented to change other behavior topographies (e.g., cooperation)

Inform your supervisees that there a number of guidelines to consider when implementing group contingencies. Review the following guidelines. Provide enough detail so that supervisees understand the guideline, but do not provide a rationale because they will be asked to provide a rationale in the next activity.

1. Develop the contingency criterion based on baseline data.
2. Develop a clear, objective performance criterion.
3. Communicate the performance criterion to the group members.
4. Select rewards based on preference assessment results. Preference assessment may include verbal report and survey.

5. Vary or randomize rewards.
6. Deliver rewards immediately after criterion has been met.
7. Combine with additional procedures such as goal setting, praise, performance feedback, and self-monitoring.
8. Monitor group and individual data.
9. If implementing a dependent group contingency, randomly select the hero or hero group.
10. If implementing a dependent group contingency, do not reveal the hero or hero group unless and until the criterion was met (i.e., conditional reveal).

To elaborate on the rationale for these guidelines, distribute *Guideline Rationale* (Appendix B). Instruct your supervisees to work in pairs to document the rationale for each guideline. When complete, have your supervisees share their responses. As they present their responses to the activity, praise correct responses and correct errors.

Conclude the introduction by asking your supervisees what they perceive are the advantages of group contingencies. Use the think-pair-share method to facilitate this discussion. First tell your supervisees that you will give the 3 minutes to think of advantages on their own. Encourage them to jot down their ideas on a piece of paper. Then you will ask them divide into pairs and for 3 minutes they will share with a partner the advantages they had identified during their think time. Finally, bring the group together again and ask supervisees to share the advantages they identified with the group. As always, praise correct responses and correct errors immediately. If they fail to identify any advantage, share those unidentified advantages with them before you close.

Planning Group Contingencies

Divide your supervisees into two groups for the planning activity. If you have three or fewer supervisees, allow them to work together, rather than divide into two groups. Each group will be assigned a case scenario (see Appendix C). Instruct them that they have 10 minutes to develop three group contingencies for their assigned case scenario: one independent group contingency, one interdependent group contingency, and one dependent group contingency. Encourage them to use *Planning Group Contingencies* (Appendix D) for each of the three contingencies. After they have developed each group contingency plan, they will present it to the other group. During their presentation, the members of the other group should write down two strengths and one weakness of each of the three group contingency plans and share that with the presenters. Then they will switch roles so that both groups have the opportunity to present their group contingencies and provide feedback to their peers.

Knowledge Check

1. Define an independent group contingency.
2. Define an interdependent group contingency.
3. Define a dependent group contingency.
4. Describe the Good Behavior Game. What type of group contingency is the Good Behavior Game?
5. Name two advantages of group contingencies.

Homework

Inform your supervisees that they will be developing a group contingency to implement with a group of two or more clients. If your supervisee only sees clients individually, they should make their best efforts to schedule sessions so that the client has a peer present for the purpose of a group activity. For example, set up play or social skill activities for two or more clients. In the upcoming supervision meeting without a client, you and your supervisee will plan the group contingency; therefore, they will need two items to plan an appropriate group contingency: (a) knowledge of preferred items or activities and (b) baseline data for target behavior. Baseline data should involve both individual client data and group data as it relates to the performance criterion. Additionally, your supervise should collect data when the client is in the group setting.

In your upcoming supervision meeting, after you plan a group contingency, you and your supervisee will role-play implementing the group contingency. Unfortunately, you cannot role-play more than one client at once; you will need additional individuals to role-play additional group members. Inform your supervisee that they need to recruit at least one peer or coworker who can participate in the role-play. Schedule this individual to attend 20 minutes of the upcoming meeting in order to role-play as a client in the group.

Homework for Individual Supervision without a Client

1. Identify two or more clients for whom you will implement a group contingency.
2. Retrieve and review the clients' recent preference assessment results. If preference assessment results are unavailable, conduct a preference survey with the participant clients. At least 48 hours prior to your meeting, share the preference assessment or survey results with your supervisor.
3. Collect baseline data across three sessions/observations on the behavior(s) that will be targeted with a group contingency. Graph the results. At least 48 hours prior to your next meeting, send the graph to your supervisor.
4. Identify one peer who can participate in the role-play to play the role of the client. Email your supervisor and this individual with instructions on when and where to meet for the role-play activity.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 55-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–10:00	Review Preference Assessment/Survey and Baseline Results
10:00–20:00	Plan Group Contingency
20:00–35:00	Develop Procedural Fidelity Checklist
35:00–55:00	Role-Play

Materials Needed

- Preference Assessment or Survey Results (sent to supervisor 48 hours prior to meeting).
- Baseline Data Graph(s) (sent to supervisor 48 hours prior to meeting).
- Appendix D: *Group Contingency Planning Guide*, 1 copy per supervisee
- Appendix E: *Group Contingency Procedural Fidelity Checklist*, electronic copy for editing
- Data Sheet for Measuring Challenging Behavior During Role-Play (identical to that used to collect baseline data), 2 copies
- Computer to edit the Group Contingency Procedural Fidelity Checklist
- Materials to Role-Play Group Contingency

Review Preference Assessment/Survey and Baseline Results

During the first 5 minutes of your meeting, review the preference assessment or preference survey results. You should have received these prior to the meeting. Ask your supervisee to quickly summarize the results. Discuss any relevant information that may have been gathered from this report. Ask your supervisee how they will use the information gained from this assessment or survey to develop a group contingency.

During the next 5 minutes, discuss the baseline data. Ask your supervisee to share the graphed baseline data and have them describe level, trend, and variability within the data. Next, ask them to calculate the baseline mean. Remind your supervisee that they will need to continue collecting data to determine if the target behavior is in fact changing in response to the group contingency. Confirm that they can continue to use the same data sheet accurately to track progress in response to the group contingency. Conclude by asking your supervisee how they will use the baseline data to develop a group contingency criterion.

Plan Group Contingency

Provide you supervisee with the *Group Contingency Planning Guide* (Appendix D). Instruct your supervisee to complete the document, reading each prompt and response aloud. Encourage your supervisee to complete this planning guide as independently as possible, but offer as much support and collaboration as needed for success. Praise correct responses to the prompt and correct responses that are likely to hinder the success of the group contingency intervention.

Develop Procedural Fidelity Checklist

Now that all data have been collected and reviewed and guidelines have been considered, you will guide your supervisee through developing a group contingency protocol for their clients. Together, complete the *Group Contingency Procedural Fidelity Checklist Template* (Appendix E). This template contains the basic steps to implementing a group contingency, but it will need to be individualized to meet the needs of the clients. For example, report exactly how the supervisee will document progress toward meeting the performance criterion. Encourage your supervisee to develop the procedural fidelity checklist independently, but offer support, praise accurate use, and correct errors as necessary.

Role-Play

We have allotted 15 minutes for your supervisee to role-play implementing the group contingency, followed by 5 minutes to discuss performance feedback. It is quite likely that this is not enough time to represent an actual full implementation of the group contingency. For example, your supervisee may be implementing a group contingency to increase on-task behavior during a 1-hour activity and the reward would be delivered at the end of this hour; therefore, the entire group contingency could not be represented within a 15-minute role-play. To accommodate this, we suggest spending the first 10 minutes role-playing the first 10 minutes of implementation. During this time, you should display some appropriate behaviors and some challenging behaviors related to the group contingency criterion so that you can observe your supervisee responding to both. For the last 5 minutes, transition to a role-play that represents the end of the implementation time (e.g., the end of the 1-hour activity). First, ask your supervisee to pretend that the all or some members of the group met the contingency criterion and role-play what would happen. Then ask the supervisee to pretend that the all or some members of the group failed to meet the contingency criterion and role-play what would happen. Across the entire 15 minutes of role-play, be sure your supervisee is collecting data on confederate client behavior. The data sheets should be identical to those used to measure baseline levels of challenging behavior.

At least one additional individual is needed to participate in this role-play activity, playing the role of a second confederate client. A group contingency cannot be implemented without two or more clients. You will need to instruct the additional confederate client on how to serve in this role. As with other role-play activities, you want to role-play as an authentic client, while keeping in mind that for at least the first role-play that your supervisee will build better foundational skills if your role-play represents a standard application of the group contingency as opposed to representing the various unexpected hurdles that they may face in real life implementation. After your supervisee begins to demonstrate proficiency in implementing the group contingencies, you may wish to repeat the role-play with additional hurdles (e.g., a confederate client elopes).

As you role-play as the client, simultaneously record procedural fidelity on your supervisee's implementation of the group contingency. Use the newly created procedural fidelity checklist as discretely as possible. Use these data to provide performance feedback during the last 5 minutes of this activity. Remember to excuse the additional confederate client, likely a peer or colleague of your supervisee, prior to delivering performance feedback.

Homework for Individual Supervision with a Client

1. At least 48 hours prior to the individual supervision meeting with a client, send an electronic version of the revised group contingency procedural fidelity checklist.
2. If revisions were made, at least 48 hours prior to the individual supervision meeting with a client, send an electronic version of the revised data sheet to your supervisor for approval. Please note that you cannot modify the method of data collection (e.g. frequency count), but rather modify how data are recorded.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Provide Feedback Regarding Procedural Fidelity Checklist and/or Data Sheet, If Needed
10:00–50:00	Observe Group Contingency Implementation
50:00–60:00	Performance Feedback

Materials Needed

- Supervisee-developed Group Contingency Procedure Fidelity Checklist, at least 1 copy (multiple for multiple observations)
- Supervisee-developed Data Sheet, at least 1 copy (multiple for multiple observations)
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Procedural Fidelity Checklist and Data Collection

Your supervisee should have provided you with a procedural fidelity checklist and data sheet at least 48 hours prior to your observation. Review these materials prior to your meeting, noting feedback. Prior to beginning your observation, discuss your feedback with your supervisee. If significant changes must be made, the supervision meeting with a client may need to be postponed.

Observe Group Contingency Implementation

You will observe your supervisee implementing a group contingency for at least 40 minutes. During the observation, measure procedural fidelity and collect data on the target client behavior (individual client behavior data and group data) using the data sheet your supervisee provided you. It is quite possible that a single application of the group contingency will be shorter or longer than 40 minutes. If it is shorter, repeat your observation until you observe at least a total of 40 minutes of implementation. In the case that the single application of a group contingency is longer than 40 minutes, feel free to extend the duration of your observation. Ideally, you should observe a complete implementation. In some cases, this may not be possible or practical. If so, note which steps were not observed on the procedural fidelity checklist. Also be sure you and your supervisee coordinate the exact start and stop time of your client behavior data collection so that you can measure interobserver agreement correctly.

Performance Feedback

During your final 10 minutes provide performance feedback regarding your supervisee's implementation of a group contingency. Provide feedback when no clients are present, even if you must schedule to provide feedback at a later time. Begin by recognizing and praising the steps your supervisee implemented correctly. Next, identify any steps implemented incorrectly. Provide a rationale for correcting errors in implementation and provide an opportunity for your supervisee to role-play implementing these steps correctly. Finally, solicit any questions your supervisee may have.

End your meeting by comparing the data you and your supervisee collected on client target behavior. Ask your supervisee to calculate interobserver agreement (IOA). Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must (a) develop a group contingency protocol that follows at least 80% of the guidelines discussed in this chapter and (b) implement a group contingency with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement a different group contingency. For example, if they implemented a dependent group contingency, evaluate their ability to implement an independent or interdependent group contingency.
- ☐ Evaluate your supervisee's ability to implement any group contingency with a different group of clients.

Appendix A: Compare and Contrast

Instructions: Below are three tables. Each has a column labeled "Same" and "Different." For each table, list what the two identified group contingencies have in common and how they are different.

Independent & Interdependent

Same	Different

Independent & Dependent

Same	Different

Dependent & Interdependent

Same	Different

Appendix B: Guideline Rationale

Instructions: Below are nine guidelines for implementing group contingencies. Provide a different rationale for the inclusion of each guideline. You will share your responses with the group.

1. Develop the contingency criterion based on baseline data.

   Rationale: _____

   _____

2. Develop a clear, objective performance criterion.

   Rationale: _____

   _____

3. Communicate the performance criterion to the group.

   Rationale: _____

   _____

4. Select rewards based on preference assessment results. Preference assessment may include verbal report and survey.

   Rationale: _____

   _____

5. Vary or randomize rewards.

   Rationale: _____

   _____

6. Deliver rewards immediately after criterion has been met.

   Rationale: _____

   _____

7. Combine with additional procedures such as goal setting, praise, performance feedback, and self-monitoring.

   Rationale: _____

   _____

8. Monitor group and individual data.

   Rationale: _____

   _____

9. If implementing a dependent group contingency, randomly select the hero group or hero group member.

   Rationale: _____

   _____

10. If implementing a dependent group contingency, do not reveal the hero group or hero group member unless and until the criterion was met (i.e., conditional reveal)

    Rationale: _____

    _____

Appendix C

Case Scenario: Group One

You are a lead clinician at Hope Therapy Clinic. You supervise a team of professionals including two BCBAs, one speech pathologist, and five individuals currently completing coursework and field experience toward becoming a BCBA. Your team of eight employees have been frequently coming to work late. It started with one or two people showing up about 5 minutes late, but it has worsened. You collected data last week and on average, four employees arrived 15 min late or more each day. You also conducted a preference survey. Many employees reported the following as preferred stimuli or activities:

- Free snacks in the break room
- Free drinks in the break room
- Additional paid time off
- Gift cards to a local coffee shop
- Gift cards to fast food restaurants
- An on-site masseuse for the day
- Free lunch
- Increased budget for work supplies
- Extended lunch break passes
- Movie tickets
- Tickets to the local theater
- Funding and time off for professional development

Case Scenario: Group Two

You are a fifth grade math teacher at Joy Elementary. You have 22 students in your third period class and they are a particularly rowdy bunch. You have become frustrated with their frequent out of seat behavior. You would like to implement an intervention to reduce this behavior. You collected data last week and on average, there were 23 out-of-seat infractions across all students in the third period class. You also conducted a preference survey. Many students reported the following as preferred stimuli or activities:

- Candy
- Snacks
- Longer recess
- Access to the computer lab
- Free time at the library
- Free time to visit with friends
- Free time on a device (e.g., tablet)

- No-homework pass
- Skip a quiz
- Positive note sent home
- Treasure box toys and trinkets
- Make popcorn in class

Appendix D: Group Contingency Planning Guide

Group contingency (circle one): Independent Interdependent Dependent

Operational definition of target behavior: _____

_____

Is the goal to increase or decrease this behavior? (circle one): Increase Decrease

Baseline data collection procedures: _____

_____

Baseline data results: _____

_____

Group contingency criterion (consequence for target behavior based upon baseline data): _____

_____

Method of Preference Assessment (circle one): Verbal Report Survey Direct Assessment

Rewards: _____

_____

Method to vary rewards: _____

_____

Timing of reward delivery: _____

_____

Additional Procedures (circle all that apply):

Goal Setting Praise Performance Feedback Self-monitoring

Method to monitor group data: _____

_____

Method to monitor individual data: _____

_____

If using a dependent group contingency, describe your method for selecting hero group or hero group member: _____

_____

If using a dependent group contingency, will you implement a conditional reveal (circle one).

Yes No

If you circled "No," please explain why: _____

_____

Appendix E: Group Contingency – Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Target Behavior: _____

Performance Criterion: _____

Steps		Implemented Correctly? + = Yes – = No
1	The performance criterion is based upon baseline or ongoing progress data.	
2	At the start of the session, the supervisee vocally states the contingency performance criterion. *Note: may exclude for clients with limited vocal verbal behavior.*	
3	At the start of the session, the supervisee vocally states the rewards that will be delivered if the contingency performance criterion is met. *Note: may exclude for clients with limited vocal verbal behavior.*	
4	When the client/clients [*insert target behavior*], the supervisee [*insert response to target behavior*].	
5	The supervisee clearly communicates the start and stop of the group contingency.	
6	The supervisee regularly praises desired behaviors.	
7	When the client/clients engage in non target challenging behavior, the supervisee [*insert response to non target challenging behavior*].	
8	*[Insert description of how the supervisee documents progress toward meeting the group contingency criterion.]*	
9	Rewards are varied across implementation of the group contingency.	
10	Rewards are delivered [*insert description*] after the group meets the performance criterion. *Note: we recommend reward delivery as immediately after meeting performance criterion when possible.*	
11	The hero small group or hero group member is selected randomly. *Note: this is only applicable for dependent group contingencies.*	
12	The hero small group or hero group member identities is kept confidential until the performance criterion is met (i.e., conditional reveal). *Note: this is only applicable for dependent group contingencies.*	
13	The supervisee collects data on the individual's target behavior. *Note: in some cases this may be deleted if not applicable.*	
14	The supervisee collects data on the group's target behavior. *Note: in some cases this may be deleted if not applicable.*	

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

References

Albers, A. E., & Greer, R. D. (1991). Is the three-term contingency trial a predictor of effective instruction? *Journal of Behavioral Education, 1*, 337–354. https://doi.org/10.1007/bf00947188

Barrish, H., Saunders, M., & Wolf, M. (1969). Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom. *Journal of Applied Behavior Analysis, 2*, 119–124.

Briesch, A. M., Briesch, J. M., & Chafouleas, S. M. (2015). Investigating the usability of classroom management strategies among elementary schoolteachers. *Journal of Positive Behavior Interventions, 17*(1), 5–14. https://doi.org/10.1177/1098300714531827

Deshais, M. A., Fisher, A. B., & Kahng, S. (2018). A comparison of group contingencies on academic compliance. *Journal of Applied Behavior Analysis, 52*(1), 116–131. https://doi.org/10.1002/jaba.505

Ferneza, P., Jabot, M., & Maheady, L. (2013). The effects of group contingencies with randomized components on the homework accuracy of an 11th- and 12th-grade general science class. *Journal of Evidence-Based Practices for Schools, 13*(2), 100–121.

Foley, E. A., Dozier, C. L., & Lessor, A. L. (2019). Comparison of components of the Good Behavior Game in a preschool classroom. *Journal of Applied Behavior Analysis, 52*(1), 84–104.

Flower, A., McKenna, J. W., Bunuan, R. L., Muething, C. S., & Vega, R., Jr. (2014). Effects of the Good Behavior Game on challenging behaviors in school settings. *Review of Educational Research, 84*(4), 546–571.

Hanley, G. P., & Tiger, J. H. (2011). Handbook of applied behavior analysis. In I. W. W. Fisher, C. C. Piazza, & H. S. Roane (Eds.), *Differential reinforcement procedures* (pp. 229–249). Guilford Press.

Heering, P. W., & Wilder, D. A. (2006). The use of dependent group contingencies to increase on-task behavior in two general education classrooms. *Education and Treatment of Children, 29*(3), 459–468.

Jones, M., Boon, R. T., Fore, C., III, & Bender, W. N. (2009). Our mystery hero! A group contingency intervention for reducing verbally disrespectful behaviors. *Learning Disabilities: A Multidisciplinary Journal, 15*(2), 61–69.

Joslyn, P. R., Donaldson, J. M., Austin, J. L., & Vollmer, T. R. (2019). The good behavior game: A brief review. *Journal of Applied Behavior Analysis, 52*(3), 811–815.

Kelshaw-Levering, K., Sterling-Turner, H. E., Henry, J. R., & Skinner, C. H. (2000). Randomized interdependent group contingencies: Group reinforcement with a twist. *Psychology in the Schools, 37*, 523–533.

Kohler, F. W., Strain, P. S., Maretsky, S., & DeCesare, L. (1990). Promoting positive and supportive interactions between preschoolers: An analysis of group-oriented contingencies. *Journal of Early Intervention, 14*(4), 327–341.

Lewis, T. J., Powers, L. J., Kely, M. J., & Newcomer, L. L. (2002). Reducing problem behaviors on the playground: An investigation of the application of schoolwide positive behavior supports. *Psychology in the Schools, 39*(2), 181–190.

Litow, L., & Pumroy, D. K. (1975). A brief review of classroom group-oriented contingencies. *Journal of Applied Behavior Analysis, 8*(3), 341–347. https://doi.org/10.1901/jaba.1975.8-341

Little, S. G., Akin-Little, A., & O'Neill, K. (2015). Group contingency interventions with children—1980-2010: A metaanalysis. *Behavior Modification, 39*(2), 322–341. https://doi.org/10.1037/e615342013-001

Maggin, D. M., Johnson, A. H., Chafouleas, S. M., Ruberto, L. M., & Berggren, M. (2012). A systematic evidence review of school-based group contingency interventions for students with challenging behavior. *Journal of School Psychology, 50*(5), 625–654. https://doi.org/10.1016/j.jsp.2012.06.001

Maggin, D. M., Pustejovsky, J. E., & Johnson, A. H. (2017). A meta-analysis of school-based group contingency interventions for students with challenging behavior: An update. *Remedial and Special Education, 38*(6), 353–370. https://doi.org/10.1177/0741932517716900

Page, S. V., Zimmerman, D. M., & Pinkelman, S. E. (2021). A systematic review of dependent group contingencies (1970–2019). *Journal of Positive Behavior Interventions*. Advance online publication.

Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2008). Evidence-based practices in classroom management: Considerations for research to practice. *Education and Treatment of Children, 31*, 351–380.

Speltz, M. L., Shimamura, J. W., & McReynolds, W. T. (1982). Procedural variations in group contingencies: Effects on children's academic and social behaviors. *Journal of Applied Behavior Analysis, 15*(4), 533–544. https://doi.org/10.1901/jaba.1982.15-533

Stage, S. A., & Quiroz, D. R. (1997). A meta-analysis of interventions to decrease disruptive classroom behavior in public education settings. *School Psychology Review, 26*, 333–368.

Vidoni, C., & Ward, P. (2006). Effects of a dependent group-oriented contingency on middle school physical education students' fair play behaviors. *Journal of Behavioral Education, 15*(2), 80–91. https://doi.org/10.1007/s10864-006-9012-z

Wahl, E., Hawkins, R. O., Haydon, T., Marsicano, R., & Morrison, J. Q. (2016). Comparing versions of the Good Behavior Game: Can a positive spin enhance effectiveness? *Behavior Modification, 40*, 493–517. https://doi.org/10.1177/0145445516644220

Williamson, D. A., Williamson, S. H., Watkins, P. C., & Hughes, H. E. (1992). Increasing cooperation among children using dependent group-oriented reinforcement contingencies. *Behavior Modification, 16*(3), 414–425. https://doi.org/10.1177/01454455920163007

Chapter 29
Contingency Contracting

Topics Covered Within This Chapter

Topics
Developing a Behavioral Contract
Behavior of Interest
Contingencies of the Contract
Negotiating the Contract
Alternative and Conjunctive Schedules of Reinforcement

Behavioral contracts are written agreements that specify the required target responses and consequences for those responses. Contracts are negotiated by both parties (e.g., client and clinician) and specify the behavior required for earning rewards. The consequences included in behavioral contracts are typically very delayed (e.g., at the end of the day or end of the week). Therefore, behavioral contracts should be used with individuals who engage in behavior influenced by rules (i.e., rule-governed behavior; Edgemon et al., 2021). Rule-governed behavior is useful because it allows humans to behave effectively in the absence of immediate consequences (Cooper et al., 2020). Rule-governed behavior is contrasted with contingency-shaped behavior which describes instances in which behavior is altered as a function of the immediate application of reinforcement or punishment. Using the example of baking a cake, if an individual mixes ingredients together and the cake tastes bad, that individual will likely continue to change the ingredients and measurements in the future until eventually they end up with a cake that is delicious. This is an example of contingency-shaped behavior because the response changed as a function of the direct consequences (i.e., the taste of the cake). In contrast, if an individual follows step-by-step instructions provided in a recipe to make the cake

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_29].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_29

this would be an example of rule-governed behavior. That is, the behavior was not shaped by the natural consequences, rather their verbal skills allowed them to behave effectively because of the rules. A more in-depth discussion of rule-governed behavior is beyond the scope of this chapter; however, the importance of ensuring individuals have the appropriate verbal skills before introducing a behavioral contract cannot be overstated.

Developing a Behavioral Contract

Behavioral contracts are often included within multicomponent interventions accompanying strategies such as token economies, goal setting, and/or self-management procedures. Therefore, the procedures for contingency contracting vary a great deal across applications. We will describe the components of behavioral contracts that should be relevant for most applications including the behavior of interest, contingencies of the contract, and contract negotiations.

Behavior of Interest

First, a behavior of interest should be selected. As with any target behavior, the behavior of interest must be operationally defined in a way that allows for consistent measurement. The behavior of interest should be a response or set of responses that the individual can independently complete under the appropriate stimulus conditions (Cooper et al., 2020). That is, the reason the behavior is not reliably occurring should be due to issues with motivation as opposed to skill deficit. In addition to selecting a response already in the individual's repertoire, responses that result in a permanent product are ideal for behavioral contracts (Cooper et al., 2020). Contracts often require responding to occur over a period of time (e.g., a week) and continuous observation of the individual can present logistical issues. Therefore, when possible, encourage your supervisees to select responses that produce permanent products, such as completed assignments, a clean room, or fewer capsules suggesting medication has been taken.

After selecting the behavior of interest, long-term and short-term goals should be identified (Houmanfar et al., 2008). Setting long-term goals should be based upon the performance requirement in the natural environment or the level of performance that is displayed by the majority of other individuals in the environment. Specifically, your supervisee should determine the level of the behavior that would be appropriate by recording the level of behavior emitted by other individuals. Setting manageable short-term goals based on client baseline responding is necessary for a successful behavioral contract. Both long-term and short-term goals should include performance requirements for the target behavior. The following questions are important to consider: (a) when in time should the behavior occur, (b) what conditions should be

present in order for the behavior to occur, (c) how often/long/fast should the behavior occur, and (d) what is the minimum accuracy required. These specific questions may not be relevant in all situations and there may be other questions relevant in some situations; however, these questions provide a good starting point for gathering the important information. Encourage your supervisees to consider all pertinent factors which should be described for development of their own goals.

Contingencies of the Contract

Second, the contingencies regarding what rewards will be delivered and when and how rewards will be delivered should be determined. This will require your supervisee to specify the behavior of all parties. That is, your supervisee should outline specifically when the client does *this* then the reward deliverer will do *this*. Your supervisee should ensure the contract is fair in that the response effort will be adequately rewarded. They should avoid writing contracts in which the benefit across signing parties is not equitable. In addition, the contract should put forth contingencies which will be reliably delivered. Therefore, if one party has no intention of "making good" on their end of the bargain, the contract should be terminated. It is suggested for behavioral contracts to include multiple layers of rewards (Cooper et al., 2020). This may be accomplished in several ways; we describe alternative and conjunctive schedules of reinforcement below which can be introduced to layer rewards.

A final component of determining the contingencies of the contract includes developing procedures for monitoring the client's progress. It is ideal for the tracking document to be accessible to all parties for viewing. Even if your supervisee does not believe it is appropriate for the client to record their own behavior on the form, their client should be able to easily view the document to observe their progress toward earning the reward.

Contract Negotiations

The third and final step is negotiating the contract with the client. Your supervisees should go into the negotiations with a draft of a contract that they expect will change during negotiations. The client's opinion should be heard and valued. If the client does not buy into the terms set in the contract, it is highly unlikely that the contract will result in successful behavior change.

Every negotiation will proceed differently; however, we suggest a few steps that will be important. Your supervisee should present the expected behavior to the client as well as the performance requirements. Ensure the client understands the expectations before transitioning to the rewards. Next, provide the reward options to the client and ask for their feedback. Your supervisee should describe exactly when and how they will deliver the reward to the client. They should emphasize that the

contract dictates their own behavior, not just the client's behavior, and that the terms, once agreed upon, will not be broken. Your supervisee should respond appropriately to counteroffers, meaning they should consider reasonable offers and continue discussing less reasonable ones. Once the negotiation has ended, both parties should voluntarily sign the contract. If the client refuses to sign the contract, further changes should be discussed. Under no circumstances should the client be forced into signing the document.

Document When considering the final document, the language used within the contract must match the verbal skills of the client. Contracts may need to include pictures or graphics for early readers. The required behavior of both signing parties, not just the client, must be specifically stated. Overall, the contract should be clear and straightforward. Following the negotiations, your supervisee will need to incorporate any and all agreed upon edits to the contract. Once the terms of agreement have been finalized, all relevant parties should voluntarily sign the contract.

Alternative and Conjunctive Schedules of Reinforcement

Two compound schedules that are well suited to be incorporated within a behavioral contract used in combination with a token economy, are alternative and conjunctive schedules. Alternative and conjunctive schedules both include at least two components. For an alternative schedule, only one schedule component must be met in order to contact reinforcement whereas for a conjunctive schedule, both components must be met in order to contact reinforcement. Conjunctive schedules are distinct from chain schedules because reinforcement is not contingent upon both components being completed in a specific order (Mace et al., 2011). As an example, if the two schedule components were an FR 5 and an FI 2 minutes, an alternative schedule would specify that whichever contingency is met first (i.e., FR 5 or FI 2 minutes) would result in reinforcement and a conjunctive schedule would specify that both the FR 5 and FI 2-minute contingencies would need to be met prior to reinforcement being delivered. Using these schedules within a contingency contract might include a response requirement and a differential reinforcement of other behavior (DRO) contingency. For example, one component could be an FR 2 for completing chores and the other component could be a DRO 10-minute for engaging in behavior other than challenging behavior. For the alternative schedule, reinforcement would be provided if the client completed two chores or went for 10 minutes without engaging in challenging behavior. In contrast, for the conjunctive schedule, the client would need to complete two chores and avoid engaging in challenging behavior for 10 minutes in order to contact reinforcement. It is possible to transition from an alternative schedule to a conjunctive schedule once the client demonstrates success with the contract.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–40:00	Hypothetical Behavioral Contract Development
40:00–55:00	Selecting a Behavior of Interest
55:00–60:00	Knowledge Check

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Alwahbi and Hua (2021)
- Bowman-Perrott et al. (2015)
- Edgemon et al. (2021)

Review Major Concepts

Begin your group supervision meeting by reviewing the steps for developing a behavioral contract. A brief summary of each step is provided below and PowerPoint slides are available to share with your group.

Behavior of Interest

Introduce the topic of selecting a behavior of interest by providing a variety of examples of target responses that would be relevant to the population with whom your supervisees work. After providing several examples, ask your supervisees to consider additional target responses. If your supervisees do not provide services to clients who would benefit from contingency contracting, have them brainstorm potential responses appropriate for other populations. Remind your supervisees that the behavior of interest should be one that is already in the individual's skill repertoire. When discussing the measurement procedures for the behavior of interest, provide examples of responses that produce permanent products. Advise your supervisees to measure behavior using permanent products when possible. Then, transition to the discussion of developing goals for the behavioral contract. Your supervisees must be intentional in their selection of both long- and short-term goals.

Long-term goals should be determined based on the level of the behavior that will contact reinforcement in the natural environment or based on observations of others in the environment. Short-term goals should be determined by examining the current levels of responding and selecting changes that would result in client's effective responding (i.e., small behavior changes which the individual can successfully meet). All relevant information to the requirements of the behavior of interest should be determined including when the behavior should occur, the context in which the behavior should occur, the frequency/duration/speed of the behavior, and accuracy of responding.

Contingencies of the Contract

Next, you will need to discuss how to select rewards and how to arrange contingencies to best promote client responding. Remind your supervisees to specify the behavior of all parties such that both the client and reward deliverer behave according to the contract. Two important considerations for your supervisees to keep in mind are to ensure the contract is fair and truthful. That is, the behavioral expectations of the client should be fairly rewarded and any contingencies outlined in the contract must be honored. Encourage your supervisees to program in multiple layers of rewards using compound schedules of reinforcement. Two compound schedules we suggest reviewing are alternative and conjunctive schedules.

1. Alternative schedule: reinforcement is delivered following the completion of one schedule component. For example, an alt FI 20 seconds/FR 5 schedule specifies that reinforcement will follow the first response after 20 seconds has elapsed or after 5 responses. Only one component must be met.
2. Conjunctive schedule: reinforcement is delivered following the completion of all schedule components. For example, a conj FI 20 seconds/FR 5 schedule specifies that reinforcement will be available only after the client engages in five responses as well as one response after 20 seconds has elapsed. The two components can be met in either order.

Provide examples of how each of these schedules could be incorporated within a behavioral contract. Review other strategies for layering rewards that may be relevant for your supervisees. The next topic of discussion should be documenting the client's progress toward earning the reward. This might include a token economy or a data sheet for recording progress. In some instances, your supervisee may want to include self-monitoring as a component of the intervention. In this case, the client should record data on their own behavior using the progress monitoring document. Even if the client is not the primary data collector, they should still have some access to the document to easily view their current progress toward earning the reward(s).

Contract Negotiations

This final step of developing a behavioral contract will vary quite a bit across applications. Your familiarity with the population receiving services from your supervisees will allow you to provide additional guidance and recommendations regarding this process. Overall, the negotiations are necessary to ensure buy in from all contract signing parties. Before beginning negotiations, your supervisees should ensure that their client has a solid understanding of the behavioral expectations outlined in the contract. After providing an overview of potential expectations and rewards, your supervisee should request client feedback. Client input should be heard and valued. All discussions related to the contract should be resolved mutually and the terms should be agreed upon by all parties. Stress the importance of all parties voluntarily signing the contract. Just because a contract is signed does not mean further negotiations will not occur. If at any point one of the signees is no longer satisfied with the agree upon terms, the contract can be renegotiated.

Hypothetical Behavioral Contract Development

During this activity your supervisees should use the *Plan for Behavioral Contracts* (see Appendix A) to create a hypothetical self-contract. Instruct your supervisees to identify a behavior they would like to address for themselves (e.g., completing more household chores) and then develop a hypothetical behavioral contract for addressing this target behavior. Have your supervisees share their plans with the group and discuss any potential difficulties identified by yourself or the other supervisees.

Selecting a Behavior of Interest

During this activity your supervisees should select a client behavior which they will target with a behavioral contract. If the population with whom your supervisees work does not have the verbal repertoires required for a behavioral contract, have your supervisees develop a contract with another adult (e.g., family member, partner, friend, coworker). Ask your supervisees to collaborate with one another to select behaviors and potential rewards. Encourage your supervisees to select behaviors that result in a permanent product (e.g., completed worksheet, cleaned dishes). Challenge your supervisees to provide feedback to one another on the feasibility of increasing the proposed behavior using a contingency contract. In addition, prompt your supervisees to consider how they will collect data. Guide your supervisees through this discussion and provide feedback as needed.

Homework

Prior to the meeting without a client, your supervisee should submit the operational definition of the behavior of interest and the data collection system. Your supervisee must receive your approval on this assignment before moving forward with data collection. Once you have approved the behavior of interest and data sheet, your supervisee should collect data for three to five baseline sessions. They should develop a draft of the *Plan for Behavioral Contracts*.

Knowledge Check

1. What type of behavior should be targeted with a behavioral contract?
2. Provide an example of a permanent product and describe why they are ideal for behavioral contracts.
3. Define and provide an example of an alternative schedule of reinforcement.
4. Define and provide an example of a conjunctive schedule of reinforcement.

Homework for Individual Supervision without a Client

1. Operationally define the behavior(s) of interest and create data collection system. After obtaining supervisor approval, collect data on the target behavior for three to five sessions. This assignment should be submitted and approved before the scheduled meeting.
2. Graph the collected data (3–5 baseline sessions) to display the current level of the behavior of interest before the introduction of the contingency contract.
3. Develop a draft of *Plan for Behavioral Contracts* (Appendix A) to review during supervision meeting.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–20:00	Graph and Plan Evaluation
20:00–30:00	Client-Directed Activities

Materials Needed

- Appendix A: *Plan for Behavioral Contracts*
- Appendix B: *Graph Component Checklist*
- Appendix C: *Contingency Contract Procedural Fidelity Checklist*

Graph and Plan Evaluation

Review your supervisee's graph and evaluate the quality of the graph using the *Graph Component Checklist* (see Appendix B). Provide specific feedback to your supervisee on how they can improve their graph. You and your supervisee should determine whether, based on the data, introducing the contingency contract is appropriate or whether additional baseline sessions should be conducted. Next, review your supervisee's *Plan for Behavioral Contracts* document. The behavioral contract will not be finalized until after consulting with the client; however, they should have a flexible working draft before initiating negotiations. When evaluating the quality of their draft contract ensure (a) the behavior of both parties is clearly stated, (b) the contingencies are clearly stated, (c) the performance standards are based on baseline responding, and (d) a method for tracking progress is included. Provide feedback and a rationale for each requested change.

Client-Directed Activities

During this meeting, you and your supervisee should develop a *Contingency Contract Procedural Fidelity Checklist* (Appendix C). The procedural fidelity checklist may require edits following contract negotiations but having an initial draft will allow for quick turnaround for collecting procedural fidelity data. Following the development of the procedural fidelity checklist, provide an opportunity for your supervisee to role-play the negotiation of the contract. Make sure to renegotiate the contract in at least two different ways. By introducing these renegotiations your supervisee will have the opportunity to practice responding to counter-offers made by their client.

Individual Supervision Meeting with a Client #1

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–20:00	Contract Negotiations
20:00–30:00	Performance Feedback

Materials Needed

- Appendix D: *Negotiation Checklist*

Contract Negotiations

Join your supervisee's session to observe the contract negotiation. If possible, observe the conversation from a distance to limit the amount of interference caused by your presence. Collect data using the *Negotiation Checklist* (Appendix D) on the following items: (a) supervisee presents the expected client behavior, (b) supervisee presents their own expected behavior, (c) supervisee specifies the performance levels required for contingent rewards, (d) supervisee presents options for rewards, (e) supervisee presents the method of tracking progress, (f) supervisee seeks client's opinion on suggested rewards and ideas for other potential rewards, (g) supervisee seeks client's opinion on the performance levels required for rewards, (h) supervisee responds appropriately to counteroffers (i.e., accepts reasonable offers and further negotiates for unreasonable offers), and (i) supervisee and client voluntarily sign the contract. If the client refuses to sign the contract, your supervisee should consult with you to identify potential modifications which may result in the contract being more palatable to the client.

Performance Feedback

After you observe the negotiation, provide your supervisee with specific feedback related to their performance. When providing corrective feedback, include a justification as to why a behavior needs to change. Finally, end this session with the opportunity for your supervisee to ask questions. In addition to providing feedback related to your supervisee's negotiation behavior, also discuss any changes that need

to be made to the contract and procedural fidelity checklist based on the discussion with the client.

Homework for Individual Supervision with a Client #2

1. Finalize *Contingency Contract Procedural Fidelity Checklist* (Appendix C).

Individual Supervision Meeting with a Client #2

Below is a plan for activities to incorporate into a 30-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–15:00	Contingency Contract Implementation
15:00–30:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix C: *Contingency Contract Procedural Fidelity Checklist*

Contingency Contract Implementation

Prior to your meeting with your supervisee, they should have finalized the *Contingency Contract Procedural Fidelity Checklist*. They should provide you with a copy of fidelity checklist and data sheet for the client's behavior. Observe your supervisee implement the behavioral contract and collect data simultaneously. Following the session, provide specific feedback on your supervisee's performance using the procedural fidelity checklist. It is possible that multiple observations will need to be conducted to observe multiple implementations of the behavioral contract.

Performance Feedback

After you observe your supervisee, provide them with your data collection sheet and ask your supervisee to calculate IOA. Discuss and resolve any discrepancies between your data and the supervisee's data. Then, provide feedback to your supervisee according to the procedural fidelity checklist. Praise components that were implemented correctly and provide specific feedback related to components implemented incorrectly. Provide the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role-play and feedback. Then, another observation with performance feedback should be conducted.

Future Growth

- ☐ Observe your supervisee provide feedback to another trainee on their use of a behavioral contract.
- ☐ Review your supervisee's plan for a behavioral contract for a different client.

Appendix A: Plan for Behavioral Contract Development

I. Define the behavior of change (e.g., completing homework assignments)

- ☐ Specify minimum performance requirements for the response to count (e.g., completes each assignment with 80% accuracy)
- ☐ Specify when the behavior must occur

II. Identify the target outcomes

- ☐ Identify long-term outcomes
- ☐ Identify short-term outcomes

III. Select rewards that will be provided contingent on meeting performance requirements according to the contract

- ☐ Specify when and how rewards will be delivered
- ☐ Specify who will deliver rewards

IV. Develop a system for progress monitoring

V. Include a location for signatures of all involved parties

Appendix B: Graph Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct	Notes
Horizontal axis marked in equal intervals	Y N	
Horizontal axis label	Y N	
Vertical axis	Y N	
Vertical axis marked in equal intervals	Y N	
Vertical axis range is appropriate to data displayed	Y N	
Condition change lines (if 2+ conditions displayed)	Y N N/A	
Condition labels (if 2+ conditions displayed)	Y N N/A	
Data points with appropriate markers	Y N	
Data path with appropriate line	Y N	
Figure caption that is informative and concise	Y N	
Key (when applicable)	Y N N/A	
Graph is made in Microsoft Excel	Y N	
Graph is in black ink only	Y N	
Graph does not contain gridlines	Y N	
Graph does not contain visible border lines	Y N	

Appendix C: Contingency Contract Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes − = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Appendix D: Negotiation Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Supervisee Behavior	Correct	Notes
Expected client behavior clearly presented	Y N	
Expected supervisee behavior clearly presented	Y N	
Required performance levels presented	Y N	
Reward options presented	Y N	
Method for tracking progress presented	Y N	
Client input on rewards is requested	Y N	
Client input on required performance levels	Y N	
Counteroffers are encouraged and addressed	Y N	
Contract is voluntarily signed by all parties (if edits must be made before signing mark NA for this item)	Y N NA	

References

Alwahbi, A., & Hua, Y. (2021). Using contingency contracting to promote social interactions among students with ASD and their peers. *Behavior Modification, 45*(5), 671–694. https://doi.org/10.1177/0145445520901674

Bowman-Perrott, L., Burke, M. D., de Marin, S., Zhang, N., & Davis, H. (2015). A meta-analysis of single-case research on behavior contracts: Effects on behavioral and academic outcomes among children and youth. *Behavior Modification, 39*(2), 247–269. https://doi.org/10.1177/0145445514551383

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). Applied Behavior Analysis, eBook. Pearson Higher Ed.

Edgemon, A. K., Rapp, J. T., Coon, J. C., Cruz-Khalili, A., Brogan, K. M., & Richling, S. M. (2021). Using behavior contracts to improve behavior of children and adolescents in multiple settings. *Behavioral Interventions, 36*(1), 271–288. https://doi.org/10.1002/bin.1757

Houmanfar, R., Maglieri, K. A., Roman, H. R., & Ward, T. A. (2008). Behavioral contracting. In *Cognitive behavioural therapy: Applying empirically supported techniques in your practice* (pp. 53–59).

Mace, F. C., Pratt, J. L., Zangrillo, A. N., & Steege, M. W. (2011). Schedules of reinforcement. In *Handbook of applied behavior analysis* (pp. 55–75).

Chapter 30
Self-Management

Topics Covered Within This Chapter

Topics
Introduction
Implementation Guidelines
Practical Applications
Advantages

Self-management is when an individual applies behavior change strategies to change their own behavior (Kazdin, 2012; Cooper et al., 2020). Self-management involves two behaviors. First, the controlling response is the self-managing behavior. These are the behaviors that are intended to affect a desired behavior outcome. Second, the controlled response is the target behavior the individual wants to change.

Self-management can involve controlling any component of a behavior change strategy. This includes self-managing antecedents, observing and recording one's own behavior, evaluating one's own behavior, and self-managing consequences. The level of self-management of any of these treatment components occurs on a continuum. On one end of the continuum, self-management may be involved in a tiny portion of a behavior change program (e.g., the individual records his own behavior, but the antecedent and consequences are managed by a clinician). On the

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_30].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_30

other end of the continuum, the behavior change program could be entirely self-managed.

Management of antecedents is the most common approach to self-management. At the antecedent level, an individual may engage in a variety of self-managing behaviors including (a) manipulating motivating operations, (b) prompting desired responses, (c) performing initial steps of a behavior chain, (d) increasing the response effort to engage in undesired behaviors, and (e) benefiting from stimulus control.

Sharon is trying to lose weight for her summer beach vacation so she has created a self-management plan to increase her healthy food intake and decrease unhealthy food intake. She is attending a birthday party Saturday night and knows the host will have a delicious spread. Sharon eats a healthy dinner before she heads to the party. In this example, Sharon manipulated motivating operations. By eating a healthy meal before she left for the party, the full stomach was an abolishing operation for more food at the party, abating any behaviors previously reinforced with junk food, like walking to the kitchen and filling a plate with unhealthy food.

Blakely is a graduate student overwhelmed with the many responsibilities of her graduate program and her part-time job. On top of those responsibilities, she also recently adopted a puppy and has been volunteering at a shelter for victims of domestic abuse. With her many responsibilities, Blakely has had trouble remembering to complete her coursework assignments, like reading the assigned chapters and submitting her homework on time. To improve her completion of course assignments, Blakely purchased a new calendar. She writes each reading and homework assignment into her calendar to help her achieve the goal. In this example, Blakely is using response prompts. By writing down her assignments, she is prompting her own behavior.

Jyreese is an 18-year-old man who just moved into his first apartment. After the first few months, Jyreese realized that he wanted to improve his housekeeping skills. He wanted to increase the frequency with which he washed his clothes, swept and mopped the floor, and washed the dishes. Jyreese determined when he wanted to complete each housekeeping task. On the evenings he wanted to complete a housekeeping task, he engaged in a self-management approach that morning. In the morning before he left for work, he would set out the items needed for the task. For example, on the day he planned to do laundry, he set out his dirty clothes hamper just in front of the washing machine. Similarly, on the day he wanted to sweep and mop the floor, he would set the broom, dust pan, mop, bucket, and a cleaning solution in the kitchen. Jyreese was self-managing his housekeeping behavior by performing the first step in a behavior chain. Each response in a behavior chain serves as a discriminative stimulus for the next step. Therefore, when Jyreese comes home after class, he is immediately confronted with a discriminative stimulus to complete the next step in the chain.

There is another approach for Sharon to meet her goal of increasing her healthy food intake and decreasing unhealthy food intake. To master this goal, Sharon could increase the response effort to engage in undesired behavior of eating unhealthy food by removing all unhealthy food from her house. If Sharon craved a sugary

sweet, rather than grab one from the pantry, she would have to drive to the nearest store to purchase the treat in order to consume it. This increased response effort to engage in the undesired behavior is likely to decrease the unhealthy food intake.

The final antecedent approach for self-management is to benefit from stimulus control. This could be programmed in two ways. First, the individual could limit engagement in the undesired behavior to specific stimulus conditions. With Sharon's goal to decrease unhealthy food intake, Sharon could limit her undesired behavior, unhealthy food intake, to one night per week. She would only eat unhealthy food Saturday for dinner, for example. The other approach to benefit from stimulus control is to specify a specific environment for the desired behavior. Take Blakely who wants to increase her completion of course assignments. Blakely begins to visit her campus library three times per week to read and complete homework assignments. By pairing the campus library with assignment completion, the campus library now has control over Blakely's coursework completion, so when she visits the library, she efficiently completes her work without being distracted by other activities.

In addition to managing antecedent interventions, an individual may self-manage behavior by self-monitoring and evaluating their own behavior. Self-monitoring is the act of observing and recording one's own behavior (Broden et al., 1971; Cooper et al., 2020). This may also be referred to as self-recording. Self-monitoring is likely effective because of the phenomenon of reactivity. Self-monitoring is frequently paired with self-evaluation in which an individual compares their behavior to a goal or standard (Cooper et al., 2020; Kasper-Ferguson & Moxley, 2002; Grossi & Heward, 1998).

Finally, individuals may self-manage consequences to their behavior. The terms "self-reinforcement" and "self-punishment" have been criticized because they do not accurately represent the mechanisms by which behavior is changed (Skinner, 1965; Goldiamond, 1976). While a thorough discussion is beyond the purpose of this chapter, we encourage you and your supervisees to explore excellent, thought-provoking discussions found in Skinner (1965), Goldiamond (1976), and Malott (2005). For the purpose of this chapter, we will simply refer to this practice as self-managing consequences, which typically involves delivery of a reward or aversive consequence sometime after the occurrence of the behavior. For example, Cameron, who is training for a marathon, treats herself to a manicure after she completes five of her planned running workouts. Another example is Millie who is attempting to decreasing her use of swear words. Millie puts one dollar into an envelope for every swear word she says. At the end of the month, she gives the envelope to a charity.

Implementation Guidelines

Guidelines for implementing self-management (Cooper et al., 2020; National Autism Center, 2015) are no different than those for a behavior change program implemented by a clinician. However, these guidelines are valuable enough to

justify a refresher. Any of the guidelines below could be self-managed or implemented by a change agent (e.g., clinician).

1. Operationally define the target behavior.
2. Specify an achievable, socially-valid goal. See Heward (1980) for guidance.
3. Specify a data collection method.
4. Include self-monitoring and self-evaluation into the self-management plan, when feasible.
5. Routinely check accuracy of self-monitoring.
6. Confirm the target behavior(s) are within the individual's repertoire.
7. Choose effective rewards.
8. Solicit a change agent to reinforce self-management behaviors.
9. If the behavior change program consists of some self-managed components and others that are managed by a change agent, systematically fade the involvement of the change agent, when feasible.
10. Share the self-management goals and program with others. This is likely to elicit desired consequences for success (e.g., public recognition) and aversive consequences for failure in self-management (e.g., shame), thus increasing the likelihood of success (Cooper et al., 2020).

Practical Applications

Your supervisees will most likely have many opportunities to both self-manage their own behavior as well as assist clients in developing a self-management program. As a result, it is helpful to gain a better understanding of the self-monitoring literature. While research has confirmed that even preschool children can successfully self-manage behavior (Strain et al., 1994; Reinecke et al., 1999), the majority of research has been conducted with elementary, pre-teen, and adolescent participants (Aljadeff-Abergel et al., 2015). This should not necessarily dissuade your supervisees from implementing self-management procedures with younger clients, but the ratio of self-managed to change-agent-managed components may need to be decreased for younger clients. Self-management procedures have been evaluated across a number of skills. Self-management has been used to increase and/or improve academic skills (Rock, 2005; Shogren et al., 2011), task engagement (Clemons et al., 2016), communication (Koegel et al., 2014), social skills (Strain et al., 1994), play skills (Reinecke et al., 1999), self-help (Bouck et al., 2014), and vocational skills (Rouse et al., 2014). Additionally, self-management interventions have successfully reduced challenging behavior as well as restrictive, repetitive behaviors (Crutchfield et al., 2015; Fritz et al., 2012).

Children and adults with intellectual and developmental disabilities have successfully self-managed behavior change programs to increase desired behaviors and decrease undesired behaviors (Aljadeff-Abergel et al., 2015; National Autism Center, 2015; Steinbrenner et al., 2020). Moreover, a multitude of research has demonstrated the ability of individuals with intellectual and developmental disabilities

to self-manage all aspects of a behavior change program. This includes setting goals, management of antecedents, self-monitoring, self-evaluation, and self-administration of consequences (both rewarding and aversive consequences).

Advantages

Self-management offers many advantages. Self-management is a pivotal skill. If an individual develops self-management skills, those skills can be used to impact positive changes on many other behaviors (Cooper et al., 2020). Similarly, once self-management skills are within one's repertoire, they may be used to promote generalization and maintenance of behaviors.

In some cases, self-management may be the best practice for a number of reasons. For example, self-management may be the only appropriate behavior change program for behaviors that are likely not to be observed by others. For example, an individual who wishes to change their grooming or housekeeping behaviors is likely to need a self-managed behavior program because those behaviors most frequently take place at home, without the presence of others who could serve as a change agent. Similarly, self-management is necessary to change private events, such as self-talk or obsessive thoughts (see Kostewicz et al., 2000 and Kubina et al., 1994 for examples).

Self-management skills may have additional outcomes. For example, self-managing is likely to build self-accountability and self-awareness. Self-management has the inherent benefit providing the individual engaging in the behavior immediate awareness and feedback regarding their own behavior (National Autism Center, 2015). Self-management skills may be particularly helpful for individuals with disabilities. The increased reliance on self-management can have an inverse effect on the reliance on change agents (National Autism Center, 2015). In many cases, the presence of change agents can be stigmatizing; thus, decreased reliance may be a significant advantage. With the strong evidence of the effectiveness of self-management and the many advantages it brings, supervisees should develop skill-sets to both manage their own behavior and assist clients in developing self-management programs.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–25:00	Introduction to Self-Management
25:00–40:00	Plan Self-Management
40:00–55:00	Present Self-Management Program
55:00–60:00	Knowledge Check

 **Materials Needed** 

- Nine Self-management Journal Articles (see group activity below), emailed to supervisees just before the start of the meeting.
- Supervisees Bring a Computer for Reading Articles, when feasible
- Appendix A: *Article Summary Form*, 3 copies per supervisee
  Blank index cards, 2 per supervisee
- Appendix B: *Self-Management Planning Guide*, 1 copy per supervisee
- Appendix C: *Self-Management Feedback Form*, enough for each supervisee to provide feedback to all other supervisees (calculated by subtracting 1 from the total number of supervisees)

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Koegel et al. (2014)
- Rosenbloom et al. (2016)
- Shogren et al. (2011)

Introduction to Self-Management

Open the meeting by asking supervisees to volunteer to share any self-managed behavior change programs they are currently implementing to change their own behavior. Ask volunteers to share the behavior they intend to change, the desired outcome, and the specific strategies they are using to self-manage. As they describe their self-management program, listen carefully for opportunities to model tacting the correct terminology (e.g., "wow, that is a great way to manipulate motivating operations to evoke the desired behavior"). Next, introduce your supervisees to important terminology: *self-management*, *controlling response*, and *controlled response*. Review the different components of a behavior change program that can be self-managed: (a) modifying antecedents, (b) observing and recording data (i.e., self-monitoring), (c) self-evaluation, and (d) modifying consequences. Review how

each of these behavior change components can be self-managed, providing examples of each. Review the self-management guidelines. Present the first guideline and ask your supervisees why this particular guideline is important. As they provide a rationale for each guideline, confirm accurate rationale explanations and correct errors.

Next, share with your supervisees that self-management interventions have been applied to a wide variety of participants, to target a wide variety of behaviors, including increasing desired behavior and decreasing undesired behavior. Divide your supervisees into three groups. Assign each group three articles, according to Table 30.1. They should have received access to all articles via email just prior to this meeting. Distribute *Article Summary Form* (Appendix A). Instruct your supervisee to summarize how self-management was implemented in each study according prompts in the article summary form. Allocate about 10 minutes for the groups to review and summarize their three articles. Then ask each group to briefly share their summaries. As they share their summaries, point out the variety of participants, target behaviors, and self-managed intervention components across these nine studies.

Table 30.1 Article summary assignments

Group One	Group Two	Group Three
Bouck et al. (2014)	Clemons et al. (2016)	Crutchfield et al. (2015)
Fritz et al. (2012)	Grossi and Heward (1998)	Reinecke et al. (1999)
Rock (2005)	Rouse et al. (2014)	Shogren et al. (2011)

End the introduction by sharing with your supervisees that self-managed behavior change programs have many advantages. Distribute two index cards to each supervisee. Ask them to write one advantage of self-management on one of the index cards. After they write one, instruct them to pair with another supervisee and share the advantages they noted. In the discussion as a pair, they should each identify an additional advantage. Now each pair has three advantages, the two they individually identified and the two they identified as a group. Return to the full group. Ask each supervisee to share the two advantages they identified. Write down each advantage so that by the time each supervisee shares their identified advantages, a thorough list is documented. Before you close the introduction, be sure to identify any advantages that your supervisees failed to identify.

Planning Self-Management

The following activity can be completed independently or in pairs. Each supervisee will develop a self-management program to address their own behavior. If you pair supervisees for this activity, they should each write their own self-management program, but they may help one another brainstorm how to do so.

Distribute *Self-Management Planning Guide* (Appendix B). Instruct your supervisees that they should select a one of their own behaviors they wish to target for change. This may be related to their supervised fieldwork (e.g., arrive to work early, complete progress reports ahead of schedule) or not (e.g., increase physical activity, partake in more social activities). Remind them that they will be sharing their behavior goals and intervention plan, so to choose a behavior they feel comfortable discussing with the group.

Inform your supervisees that they will have 15 minutes to determine how they could develop a self-management program using each of the self-management components they just reviewed. Remind your supervisees that the purpose of this activity is to practice identifying how they could implement self-management with each component on this list. It is likely that some supervisees will identify certain components they prefer not to self-manage, but they should identify how to self-manage that component regardless. For example, a supervisee may know that they would have difficulty withholding rewards if they failed to meet a behavior criterion, thus suggesting this intervention component should either be eliminated or managed by a change agent. However, for the purpose of this activity, the supervisee should develop a plan for self-managing rewards for desired behavior for the practice of considering and planning all possible self-managed components.

Present Self-Management Program

After your supervisees develop a self-management program, allot 15 minutes for them to present the program to the group for feedback. This is not to be a formal presentation, but rather each supervisee reviewing each component of the *Planning Self-Management* form. Each supervisee will have an opportunity to present, while the other supervisees record feedback to share with the presenting supervisee on the *Self-Management Feedback Form* (Appendix C).

Before each presentation, distribute *Self-Management Feedback Form* (Appendix C) to each nonpresenting supervisee. Ask your supervisees to use this to record notes about the strengths and limitations of the presented self-management program. After the presentation, invite the supervisees to share their feedback. Begin by asking the supervisees to share at least two strengths of the self-managed antecedent components, followed by one limitation. Repeat this two-to-one ratio of strengths-to-limitations for self-monitoring and self-evaluation components and then consequence components.

Knowledge Check

1. Define self-management.
2. What are a controlling response and a controlled response?
3. Describe three ways in which one could self-manage antecedent intervention components.
4. Define self-monitoring.
5. Name two advantages of self-management.

Homework

Before ending the meeting, explain to your supervisees that they will develop a self-management program with client or a client's caregiver. We anticipate that most supervisees are working directly with clients for whom self-management is well suited (e.g., general education students, children with an intellectual disability receiving services in a clinical setting). If this is the case, we recommend that your supervisees develop a self-management program to teach directly to the client that they serve. On rare occasions, your supervisee may work with clients for whom self-management is not indicated (e.g., very young children, children with extensive support needs). In such situations, we recommend they modify this activity by working collaboratively with a client's change agent to develop a self-management program as it relates to providing care or services to the client. For example, developing a program with the client's teacher aimed at increasing the frequency of praise statements delivered to the client. Another example is working with the client's father to develop a self-management program to improve the accuracy with which he implements an at-home reinforcement program.

As a very last resort, a supervisee could develop a self-management program to improve their own behavior. This option should only be used if it is impossible to complete one of the two recommended activities. If the supervisee develops a self-management program to improve their own behavior, it should be a behavior related to their field experience. Examples of behavior to target include arriving to the field experience on time, improving the accuracy of implementing an intervention, improve frequency of communication with client and/or clients' caregivers. The description of the individual supervision meetings with and without a client is designed for a self-management program with a client or a client's caregiver. It would be the responsibility of the supervisor to adapt these activities for developing a self-management program for the supervisee. It is also unlikely that the development of a self-management program for oneself, as opposed to one's client, would meet the supervised fieldwork requirements as outlined by the BACB (BACB, 2022). It is the responsibility of both the supervisor and supervisee to determine if such activities would constitute field experience and determine alternative acceptable activities to satisfy the supervised fieldwork requirements during this supervisory period.

Homework for Individual Supervision without a Client

1. Recommended Option: Identify one client for whom you will implement self-management.
   Alterative Option: Identify one client's change agent who has communicated a desire to improve behavior related to interactions with the client and would be willing to participate in a self-management program.
2. Recommended Option: Retrieve and review this client's goals.
   Alternative Option: Visit with the client's change agent to determine at least three potential behavior goals for self-management.
3. Begin to brainstorm potential self-management approaches that are a good fit for the client or client's change agent and the identified goals.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 55-minute meeting with an individual supervisee.

Individual supervision meeting without a client agenda

Time	Activity
0:00–10:00	Review Client's/Client's Change Agent's Goals & Select One Goal for Self-Management
10:00–20:00	Plan Self-Management
20:00–35:00	Develop Self-Management Procedural Fidelity Checklist
35:00–55:00	Plan Teaching & Evaluating Self-Management

Materials Needed

- Client's/client's Change Agent's Goal(s)
- Computer to Edit the Self-Management Procedural Fidelity Checklist and Prepare Materials
- Appendix B: *Self-Management Planning Guide*, 1 copy
- Appendix D: Self-*Management Procedural Fidelity Checklist Template*, electronic copy for editing
- Appendix E: *Self-Management Instructions Template*, electronic copy for editing

Review Client's/Client's Change Agent's Goals and Select One Goal for Self-Management

Client Self-Management

During the first 10 minutes of your meeting, review the client's goals. Ask your supervisee to read each goal aloud, summarize the client's progress on that goal, and identify if the goal is well suited to self-management. Furthermore, ask your supervisee to elaborate why they believe the goal is or is not well suited for self-management to confirm that they came to this decision by applying accurate considerations. After they review all of the goals, ask them to select the top three goals for self-management. Discuss the pros and cons of each goal as it relates to being targeted with self-management. Using this information, select a goal to target.

Client's Change Agent Self-Management

During the first 10 minutes of your meeting, review the potential goals for the client's change agent. Ask your supervisee to summarize the conversation they had with the individual. If they identified multiple potential goals for self-management, discuss the pros and cons of each. Using this information, select a goal to target. If not already written in this format, ask your supervisee to write the goal so that it is observable and measurable.

Plan Self-Management

Provide your supervisee with the *Self-Management Planning Guide* (Appendix B). Ask them to complete the document, reading each prompt and response aloud. Encourage your supervisee to complete this planning guide as independently as possible, but offer as much support and collaboration as needed for success. Praise correct responses to the prompts in the guide and correct responses that are likely to hinder the success of the self-management intervention.

After completing the planning guide, collaboratively discuss which of the potential self-management components are best fit for the client or the client's change agent. This should be a collaborative process. Your supervisee may wish to incorporate several self-managed components in order to gain more practice with self-management programs. However, the goal is to meet the client's needs, or that of the client's change agent. Therefore, if the client would be more successful with a single self-managed component, incorporate just one.

Client Self-Management

It is possible that your supervisee's client will self-manage only a fraction of the intervention components necessary to reach the target behavior goal. For example, a young child may be able to self-monitor their own behavior, but would need a change agent, such as your supervisee, to manipulate antecedents and deliver consequences. Once you and your supervisee have identified the interventions to be self-managed, discuss the remaining intervention components that the supervisee will manage.

Client's Change Agent Self-Management

It is likely that this individual will be able to implement enough self-management components to successfully master the target behavior goal. However, it might be necessary for your supervisee to manage one or two of the intervention components (e.g., rewards for meeting behavior criterion, rewards for accurate self-monitoring). Discuss what, if any, intervention components would be managed by the supervisee.

Develop Procedural Fidelity Checklist

Now that all the self-management plans have been well thought out, guide your supervisee through developing a self-management protocol. Together, complete the *Self-Management Procedural Fidelity Checklist Template* (Appendix D). Encourage your supervisee to develop the procedural fidelity checklist independently, but offer support, praise accurate use, and correct errors as necessary.

It is important to note that this template is designed to encompass self-managed and supervisee-managed components of an intervention program. It will also be necessary to create a self-management procedural fidelity checklist containing only the specific steps that the client or client's change agent would perform. After your supervisee has completed a comprehensive procedural fidelity checklist that contains both the steps the supervisee and client will complete, ask your supervisee to create a second procedural fidelity checklist specific to the self-managed components of the intervention program. This second procedural fidelity checklist will be referred to as the *client procedural fidelity checklist*. Your supervisee may use this to evaluate the fidelity with which their client or their client's change agent implements self-management.

Plan Teaching and Evaluating Self-Management

We have allotted 15 minutes for you and your supervisee to determine how they will teach their client/client's change agent the new self-managed program, followed by 5 minutes to discuss collecting data to evaluate the success of the program. Inform your supervisee that they will use behavior skills training (BST) to teach their client, or client's change agent, to implement the self-management program. Briefly review the four steps of BST: (a) instructions, (b) modeling, (c) role-play, and (d) feedback. Ask your supervisee to begin by creating instructions for the client or their client's change agent using *Self-Management Instructions Template* (Appendix E). It is important to note that this template may not be suitable for all clients. For example, some clients may need instructions with line drawings or photographs. Such instructions may take more time to create than allotted in this meeting. This meeting can be extended to accommodate that additional time or you may discuss the desired outcome and ask your supervisee to prepare the instructions at a later time.

Next ask your supervisee to describe how they will model the self-management program for their client. They may consider using a live or video model. Discuss the needs of the client and select an approach to meet their needs. Engage in a similar conversation regarding role-play and feedback. Ask your supervisee to describe how they plan to implement these BST components. Once you and your supervisee have a clear plan of how they will teach the client how to implement the self-management program, transition to discussing the data collection and evaluation process.

Inform your supervisee that they will need to collect data on two behaviors: (a) the target behavior and (b) the fidelity with which the client is implementing the self-management. For the former, if data have been previously collected on this target behavior (e.g., baseline data) it is most likely that the supervisee will continue to use this data collection method. If for any reason the data collection method needs to be changed or if no data have been previously collected on this behavior, confirm that your supervisee will collect baseline data prior to implementing the self-management program so that they can determine if the self-management program is effective.

For the latter, measuring the fidelity of self-management implementation, your supervisee will have already developed a procedural fidelity checklist during the previous activity. Discuss how your supervisee can use this to evaluate fidelity of implementation and how to deliver performance feedback, if necessary. Additionally, if the client will be self-monitoring, ask your supervisee to determine how and when IOA will be measured. Most likely, your supervisee will also collect data on the target behavior in order evaluate the accuracy of self-monitored data. However, in some instances, a secondary data collector other than the supervisee may collect these data. For example, if the self-managed behavior will occur at times when the supervisee is not observing the client, or the client's change agent, then another method for assessing IOA is necessary.

Homework for Individual Supervision with a Client

1. At least 48 hours prior to the individual supervision meeting with a client, send an electronic version of the comprehensive self-management procedural fidelity checklist and the client self-management procedural fidelity checklist.
2. At least 48 hours prior to the individual supervision meeting with a client, send an electronic data sheet to your supervisor. Please note that if you modified the data collection procedure you may need to collect baseline data again with the revised data sheet.

Individual Supervision Meeting with a Client, Part 1

Below is a plan for activities to incorporate into a 50-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Provide Feedback Regarding Procedural Fidelity Checklist and/or Data Sheet, If Needed
10:00–40:00	Observe Self-Management Instruction
40:00–50:00	Performance Feedback

Materials Needed

- Appendix F: *Teaching Self-Management Using BST Feedback Form,* 1 copy
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Instructional Plan and Data Collection

At least 48 hours prior to your observation, your supervisee should have provided you with a procedural fidelity checklist and data sheet. Review these materials prior to your meeting, noting feedback. Prior to beginning your observation, discuss your feedback with your supervisee. If significant changes must be made, the supervision meeting with a client may need to be postponed.

Observe Self-Management Instruction

Prior to the client or the client's change agent implementing a self-management program, your supervisee will need to teach the them how to implement the self-management program. You will observe your supervisee implementing BST to teach the client to implement self-management. We allotted 30 minutes, but we encourage you to observe the entire instruction session, even if it takes longer than 30 minutes. During the observation, record feedback using the *Teaching Self-Management Using BST Feedback Form* (Appendix F).

Performance Feedback

During your final 10 minutes provide performance feedback regarding your supervisee's implementation of BST to teach their client to self-manage. Provide feedback when no clients are present, which may require you to provide performance feedback at a later time. Review each step of BST, summarizing both the strengths and limitations recorded. Provide a rationale for correcting errors in implementation and provide an opportunity for your supervisee to role-play implementing these steps correctly. End by providing your supervisee an opportunity to ask questions.

Individual Supervision Meeting with a Client, Part 2

Below is a plan for activities to incorporate into a 40-minute supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Observe Self-Management Implementation
30:00–40:00	Performance Feedback

Materials Needed

- Supervisee-developed Comprehensive Self-Management Procedural Fidelity Checklist, at least 1 copy
- Supervisee-developed Data Sheet, 1 one copy
- Clipboard
- Pen/Pencil

Observe Self-Management Implementation

If possible, observe the self-management program. If the self-management program includes supervisee- and self-managed components, you will have the opportunity to observe the program because it will only occur in the presence of your supervisee. If the self-management program contains only self-managed components (e.g., the client's parent is self-managing behaviors that only occur in their home), you will not have the opportunity to observe the program because it will not occur in the presence of your supervisee. In the latter case, we recommend your supervisee schedule regular follow-up meetings with the individual to review self-monitoring data, discuss strengths and weaknesses of the program, and modify the program as needed. If this is the case, we encourage you to observe and provide performance feedback during one of these meetings.

If you observe the self-management program being implemented, do so for at least 30 minutes. During the observation, measure procedural fidelity using the comprehensive procedural fidelity checklist that contains both supervisee and self-managed intervention components. Additionally, collect data on the client's behavior using the data sheet your supervisee provided. This may be the data sheet used by the client to self-monitor or the data sheet your supervisee uses if the client is not self-monitoring.

Performance Feedback

Schedule 10 minutes provide performance feedback regarding the implementation of a self-managed intervention program. No clients are present during this feedback discussion. Begin by recognizing and steps your supervisee and their client implemented correctly. It is important to attribute the client's correct implementation as a success of your supervisee as they trained the client to self-manage those components. Next, identify any steps implemented incorrectly. Provide a rationale for correcting errors in implementation and provide an opportunity for your supervisee to role-play implementing these steps correctly. Give your supervisee an opportunity to ask questions.

End by comparing the data you and collected on client target behavior and the data self-monitored by the client or collected by the supervisee. Ask your supervisee to calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Mastery Criteria

In order to progress from this lesson, your supervisee must develop and teach a client (or a client's caregiver) a self-management program in which the client (or client's caregiver) implements the self-managed components with at least 80% fidelity. If this is not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to develop and implement a self-management program for themself.
- ☐ Evaluate your supervisee's ability to develop and teach a self-management program to a different client.

Appendix A: Article Summary Form

Instructions: Summarize the assigned articles by answering the questions below.

Who participated in this study? Include number of participants, ages, and diagnoses.

_____

_____

_____

What behaviors were targeted for increase?

_____

_____

What behaviors were targeted for decrease?

_____

_____

Describe if and how the participant self-managed antecedent components.

_____

_____

_____

Describe if and how the participant self-monitored or self-evaluated.

_____

_____

_____

Describe if and how the participant self-managed consequence components.

_____

_____

_____

Appendix B: Self-Management Planning Guide

Instructions: Develop a plan for self-management of a self-selected behavior by responding to the questions and prompts below.

Target Behavior: _____

Target Behavior Goal: _____

Below, describe how you could self-manage the following components of a behavior management program to achieve the above goal:

Motivating Operations:

_____

_____

Response Prompts

_____

_____

Performing Initial Steps of a Behavior Chain:

_____

_____

Increasing Response Effort to Engage in Undesired Behavior

_____

_____

Stimulus Control:

_____

_____

Self-Monitor:

Self-Evaluate:

Rewards for Desired Behavior:

Aversive Consequences for Undesired Behavior:

Appendix C: Self-Management Feedback Form

Instructions: Review the presented self-management program by noting how the program aligns with each of the guidelines below. At the end of the presentation, note any strengths and weaknesses of the self-managed program.

Antecedent Components:

Strengths

_____

_____

Limitations

_____

_____

Self-Monitoring and Self-Evaluation Components:

Strengths

_____

_____

Limitations

_____

_____

Consequence Components:

Strengths

_____

_____

Limitations

_____

_____

Appendix D: Self-Management – Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Target Behavior: _____

Performance Criterion: _____

	Step	Implemented Correctly? + = Yes − = No
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Appendix E: Self-Management Instructions Template

This self-management program has been designed to reach the following goal: [insert goal]. Follow the steps below to reach this goal.

	Steps
1	*Insert description of step.*
2	*Insert description of step.*
3	*Insert description of step.*
4	*Insert description of step.*
5	*Insert description of step.*
6	*Insert description of step.*
7	*Insert description of step.*
8	*Insert description of step.*
9	*Insert description of step.*
10	*Insert description of step.*
11	*Insert description of step.*
12	*Insert description of step.*
13	*Insert description of step.*
14	*Insert description of step.*

Appendix F: Teaching Self-Management Using BST Feedback Form

Instructions: Observe your supervisee training their client to implement a self-management intervention. For each BST component, summarize the strengths and weaknesses of this training session.

Instructions:

Strengths

_____

_____

Limitations

_____

_____

Modeling:

Strengths

_____

_____

Limitations

_____

_____

Role-Play:

Strengths

_____

_____

Limitations

_____

_____

Feedback:

Strengths

_____

_____

Limitations

_____

_____

References

Aljadeff-Abergel, E., Schenk, Y., Walmsley, C., Peterson, S. M., Frieder, J. E., & Acker, N. (2015). The effectiveness of self-management interventions for children with autism—A literature review. *Research in Autism Spectrum Disorders, 18*, 34–50.

Behavior Analysis Certification Board. (2022). *Board Certified Behavior Analyst® Handbook*. https://www.bacb.com/bcba-handbook/

Bouck, E. C., Savage, M., Meyer, N. K., Taber-Doughty, T., & Hunley, M. (2014). High-tech or low-tech? Comparing self-monitoring systems to increase task independence for students with autism. *Focus on Autism and Other Developmental Disabilities, 29*(3), 156–167.

Broden, M., Hall, R. V., & Mitts, B. (1971). The effect of self-recording on the classroom behavior of two eight-grade students. *Journal of Applied Behavior Analysis, 4*(3), 191–199.

Clemons, L. L., Mason, B. A., Garrison-Kane, L., & Wills, H. P. (2016). Self-monitoring for high school students with disabilities: A cross-categorical investigation of I-Connect. *Journal of Positive Behavior Interventions, 18*(3), 145–155.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior analysis, eBook*. Pearson Higher Ed.

Crutchfield, S. A., Mason, R. A., Chambers, A., Wills, H. P., & Mason, B. A. (2015). Use of a self-monitoring application to reduce stereotypic behavior in adolescents with autism: A preliminary investigation of I-Connect. *Journal of Autism and Developmental Disorders, 45*(5), 1146–1155. https://doi.org/10.1007/s10803-014-2272-x

Fritz, J. N., Iwata, B. A., Rolider, N. U., Camp, E. M., & Neidert, P. L. (2012). Analysis of self-recording in self-management interventions for stereotypy. *Journal of Applied Behavior Analysis, 45*(1), 55–68. https://doi.org/10.1901/jaba.2012.45-55

Goldiamond, I. (1976). Self-reinforcement. *Journal of Applied Behavior Analysis, 9*(4), 509–514.

Grossi, T. A., & Heward, W. L. (1998). Using self-evaluation to improve the work productivity of trainees in a community-based restaurant training program. In *Education and training in mental retardation and developmental disabilities* (pp. 248–263).

Heward, W. L. (1980). A formula for individualizing initial criteria for reinforcement. *Exceptional Teacher, 1*(9), 7–8.

Kasper-Ferguson, S., & Moxley, R. A. (2002). Developing a writing package with student graphing of fluency. *Education and Treatment of Children*, 249–267.

Kazdin, A. E. (2012). *Behavior modification in applied settings*. Waveland Press.

Koegel, L. K., Park, M. N., & Koegel, R. L. (2014). Using self-management to improve the reciprocal social conversation of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 44*(5), 1055–1063. https://doi.org/10.1007/s10803-013-1956-y

Kostewicz, D. E., Kubina, R. M., Jr., & Cooper, J. O. (2000). Managing aggressive thoughts and feelings with daily counts of non-aggressive thoughts and feelings: A self-experiment. *Journal of Behavior Therapy and Experimental Psychiatry, 31*(3–4), 177–187.

Kubina, R. M., Haertel, M. W., & Cooper, J. O. (1994). Reducing negative inner behavior of senior citizens: The one minute counting procedure. *Journal of Precision Teaching and Celeration, 9*(2), 28–35.

Malott, R. W. (2005). Self-management. In M. Hersen & J. Rosqvist (Eds.), *Encyclopedia of behavior modification and cognitive behavior therapy* (Adult clinical applications) (Vol. I, pp. 516–521). Sage.

National Autism Center. (2015). *Findings and conclusions: National standards project, phase 2*. Author.

Reinecke, D. R., Newman, B., & Meinberg, D. L. (1999). Self-management of sharing in three preschoolers with autism. In *Education and training in mental retardation and developmental disabilities* (pp. 312–317).

Rock, M. L. (2005). Use of strategic self-monitoring to enhance academic engagement, productivity, and accuracy of students with and without exceptionalities. *Journal of Positive Behavior Interventions, 7*(1), 3–17.

Rosenbloom, R., Mason, R. A., Wills, H. P., & Mason, B. A. (2016). Technology delivered self-monitoring application to promote successful inclusion of an elementary student with autism. *Assistive Technology, 28*(1), 44090. https://doi.org/10.1080/10400435.2015.1059384

Rouse, C. A., Everhart-Sherwood, J. M., & Alber-Morgan, S. R. (2014). Effects of self-monitoring and recruiting teacher attention on pre-vocational skills. *Education and Training in Autism and Developmental Disabilities, 49*(2), 313–327.

Skinner, B. F. (1965). *Science and human behavior* (No. 92904). Simon and Schuster.

Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-zkan, S., & Savage, M. N. (2020). *Evidence-based practices for children, youth, and young adults with Autism*. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

Shogren, K. A., Lang, R., Machalicek, W., Rispoli, M. J., & O'Reilly, M. (2011). Self- versus teacher management of behavior for elementary school students with Asperger syndrome: Impact on classroom behavior. *Journal of Positive Behavior Interventions, 13*(2), 87–96. https://doi.org/10.1177/1098300710384508

Strain, P. S., Kohler, F. W., Storey, K., & Danko, C. D. (1994). Teaching preschoolers with autism to self-monitor their social interactions: An analysis of results in home and school settings. *Journal of Emotional and Behavioral Disorders, 2*(2), 78–88.

Chapter 31
Generalization and Maintenance

Topics Covered Within This Chapter

Topics
Stimulus Generalization
Response Generalization
Response Maintenance
Programing for Generalization

Generalization is a topic within applied behavior analysis that is often misunderstood. In some instances, it is described as an ability possessed by an individual (e.g., "they generalized the skill") and in other instances it is used as a catch all to describe any situation in which the contingencies are unclear. In 1977, Stokes and Baer published their seminal paper on generalization and defined generalization as the "occurrence of relevant behavior under different, non-training conditions" (pg. 350). They encouraged their readers to abandon the view that generalization is a passive process that simply occurs and adopt a new conceptualization of generalization as an outcome for which specific planning is required. They provided nine methods for programing for generalization, many of which behavior analysts continue to use. When discussing generalization, it is useful to discuss the three specific types including stimulus generalization, response generalization, and response maintenance. We provide a brief description of each and then transition into strategies for promoting generalization.

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_31].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_31

Stimulus Generalization

Stimulus generalization describes situations in which the same response occurs in the presence of a stimulus other than the one to which the response was originally taught. For example, if a client is taught to respond "duck" when shown a rubber ducky and then emits the same response "duck" in the presence of a living duck, this would be an instance of stimulus generalization. There is typically a range of stimuli that should evoke the same response; however, this range is not without bounds (generalization gradient). That is, stimulus generalization to similar stimuli is ideal but for stimuli that do not participate in the stimulus class we expect for discrimination rather than generalization. For example, if a clinician is teaching a client to engage in the response "bird," the clinician would praise this response in the presence of a scrub jay, sparrow, and dove; however, they would not praise this response in the presence of a squirrel. Generalization to different birds is ideal but the individual must discriminate between different animals that are in trees.

In addition to stimulus generalization, behavior analysts are also interested in setting and situation generalization (Cooper et al., 2020). This refers to instances in which the learner engages in the behavior in a setting or situation that is meaningfully distinct from the instructional setting or situation. For example, if David learns to brush his teeth at his mom's house and then, without instruction, he brushes his teeth at his dad's house, this would be an instance of setting generalization. This type of generalization includes engaging in skills (a) in the presence of individuals unrelated to the instructional context, (b) during novel activities, and (c) in the presence of novel stimuli (e.g., pictures on the wall, noises, different furniture).

For stimulus generalization, it is imperative for clinicians to probe for generalization before and after intervention. If generalization is only assessed after intervention, it will be unclear as to whether the intervention was necessary to alter responding under generalization conditions.

Response Generalization

Response generalization refers to situations in which, after being trained to engage in one response, the individual engages in similar responses without being trained to do so. For example, after being taught to say "hello" when entering the classroom, the client says "hi" when entering the classroom even though he was not taught to emit this response. It is impossible for clinicians to directly teach every single response option for every behavior. Therefore, we must ensure our clients demonstrate response generalization.

Response Maintenance

Response maintenance is defined as an individual continuing to engage in the behavior over an extended period of time. For example, after Domenic mastered identifying the color red during structured teaching trials, now the clinician will check to see if Domenic can still identify red 1 month after mastery and 6 months after mastery. If Domenic continues to identify red, we can say the behavior has maintained. There are two considerations when assessing for response maintenance including the intervals for assessment and whether assessment occurs with or without some of the intervention procedures in place. Intervals of assessment vary across the literature ranging from 1 week to multiple years. Your supervisees will need to determine which intervals are most appropriate for their clients. For example, maintenance is assessed after 1 week, then 6 months, and then 1 year. The longer the behavior maintains the more likely it is to occur even after the client no longer participates in the instructional context.

Transitioning to the second consideration, your supervisee will need to determine if maintenance will be assessed using baseline procedures (i.e., no intervention) or if maintenance will be assessed with some intervention components in place. One important question related to this decision is whether the individual is expected to engage in the behavior without intervention procedures or whether it is expected that the behavior will only maintain with specific components of the intervention. For example, if your supervisee taught a client to follow an activity schedule to complete his afternoon routine, would they expect for the behavior to occur in the absence of the activity schedule or is it reasonable to assume that the activity schedule will remain in place while other intervention components such as prompts and external sources of reinforcement are faded. In contrast, a skill such as identifying an object may be more appropriate to assess under baseline conditions as this response should occur in the absence of vocal prompting and tangible reinforcers.

Programing for Generalization

There are several strategies for promoting generalization. We present a few in this chapter that can be addressed during supervision. These include teaching enough stimulus and response examples, teaching loosely, teaching the target behavior to levels of performance required in the natural environment, teaching the learner to recruit reinforcement, and reinforcing response variability.

Teach Enough Stimulus Examples

This strategy refers to teaching the individual to respond to several different stimuli. For example, if your supervisee is teaching their client to use a fork to eat, they should teach them to eat with a salad fork, dinner fork, silver fork, and plastic fork. This will increase the likelihood that the client will be able to eat with a dessert fork, gold fork and a plastic spork. In addition, having multiple individuals (e.g., clinicians) conduct teaching trials in multiple locations is important for promoting generalization. For example, if three different clinicians have taught categories in three different locations across the clinic, this will increase the likelihood that the client will correctly sort categories when asked to do so by their teacher at school.

Teach Enough Response Examples

This strategy, also known as multiple-exemplar training, includes teaching several responses that fulfill similar functions. For example, if you are teaching a client to respond to greetings you might teach them to say, "hi, how are you" and "hello, how's life." After teaching multiple responses, the client might independently respond, "hey, what's up" without being taught to do so. Teaching multiple examples of responses makes it more likely that the client will engage in varied rather than repetitive responses.

Teach Loosely

This strategy includes strategically altering noncritical features of the environment. That is, any feature of the stimulus context that is unnecessary to evoke the response should be varied. For example, if your supervisee is teaching letter identification, they should make sure to use letter cards with a variety of fonts, conduct trials with the stimuli presented on the table or the floor, conduct trials at different times during the day and have multiple clinicians use different tones of voice when presenting trials. This will increase the likelihood that the client will continue to correctly identify letters when asked to do so in a variety of locations by a variety of individuals.

Teach Behavior to Meet Requirements of the Natural Environment

This strategy entails ensuring that the frequency/duration/accuracy/latency/fluency of the response aligns with the requirement outside of the instructional setting. If, in the classroom, the client needs to respond correctly to 25 math problems in 5 minutes, the clinician should set the goal within the clinic to meet this standard. It is unlikely that the behavior will maintain if it never contacts reinforcement because the level of engagement is not comparable with the contingencies in the natural environment. Therefore, clinicians should observe others engaging in the behavior in the natural environment or request information about requirements for the natural environment prior to introducing instruction. This will allow for the goal to be written with an appropriate mastery criterion.

Teach the Learner to Recruit Reinforcement

This strategy specifically plans for situations in which the reinforcement schedule is too lean to maintain the behavior. In these instances, the client will have a response that will result in reinforcement to help bridge the gap of a lean schedule of reinforcement. Teaching the client to recruit reinforcement could include requesting for a teacher to check their answers on a worksheet or asking a coworker whether they are completing the task correctly. For example, Krantz and McClannahan (1998) taught three children ages 4–5 to use the phrases "look" and "watch me" using scripts embedded in an activity schedule.

Reinforce Response Variability

This strategy refers to directly reinforcing engagement in responses that are varied rather than repetitive. One way to achieve this is to use a lag schedule of reinforcement. A lag schedule of reinforcement specifies that in order for a response to contact reinforcement it must be topographically different from the prior *n* responses. If a lag 3 schedule is in place the response must be different than the previous three responses, for a lag 2 schedule the response must be different than the previous two responses, and for a lag 1 the response must be different than the previous response. Brodhead et al. (2015) used a lag schedule to promote variability in the use of mand frames (e.g., "can I have," "I want"). They first taught four or five different mand frames and then introduced a lag schedule to increase the number of mand frames used during each session. If the participant said "I want ___" on trial 1 they would receive the requested snack, if they said "I want ___" on trial 2 they would contact extinction. Before introducing the lag schedule, your supervisee must ensure the

client can engage in multiple response options. Extinction induced variability is most effective when the client can select from more than one response option within their repertoire.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Stimulus or Response Generalization
30:00–40:00	Promoting Generalization
40:00–55:00	Generalization Plan Development
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Promoting Generalization*, 1 copy for each supervisee
- Appendix B: *Generalization Plan Development*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Song et al. (2021)
- Stokes and Baer (1977)
- Stokes and Osnes (1989)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with generalization and maintenance. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

Types of Generalization

Stimulus Generalization Review the definitions of stimulus generalization and setting/situation generalization with your supervisees.

1. Stimulus generalization: when an antecedent stimulus has a history of evoking a response that has been reinforced in its presence, the same type of behavior tends to be evoked by stimuli that are similar to that stimulus (Cooper et al., 2020).
2. Setting/situation generalization: the extent to which a learner emits a behavior in a setting or stimulus situation that is different than the instructional setting (Cooper et al., 2020).

Provide multiple examples of each that are relevant to the population with whom your supervisees work. Ask your supervisees to come up with additional examples. Remind your supervisees of the importance of probing for generalization before they introduce instruction as well as after.

Response Generalization Define response generalization for your supervisees and ask them to provide additional examples. Ensure that your supervisees are not confusing stimulus and response generalization.

1. Response Generalization: the extent to which a learner emits untrained responses that are functionally equivalent to the trained behavior (Cooper et al., 2020).

Response Maintenance First remind your supervisees of the definition of response maintenance.

1. Response maintenance: the extent to which a learner continues to perform the target behavior after a portion or all of the intervention responsible for the behavior's initial appearance has been terminated (Cooper et al., 2020).

Then describe the two considerations for assessing response maintenance. Provide several examples of each and ask your supervisees to provide additional examples that they have encountered in research or practice.

1. Interval for assessment
2. Whether assessment occurs with or without intervention procedures

Promoting Generalization

Review the different strategies with your supervisees and provide several examples that are applicable to the population with whom your supervisees work.

1. Teach enough stimulus examples
2. Teach enough response examples
3. Teach loosely

4. Teach behavior to meet requirements of the natural environment
5. Teach the learner to recruit reinforcement
6. Reinforce response variability

Stimulus or Response Generalization

For this activity, read each vignette and ask your supervisees whether it is an example of stimulus generalization or response generalization. Develop vignettes of your own if these examples are not applicable to the population with whom your supervisees work. Then, ask your supervisees to come up with two examples of stimulus generalization and two examples of response generalization. Ensure your supervisees clearly understand the difference between stimulus and response generalization.

1. Olivia was taught to respond "tree" in the presence of an oak tree and pine tree. Without additional teaching, she now responds "tree" in the presence of a palm tree.
2. Maya was taught to respond, "I'm doing well" and "I am fine" when asked the question "how are you?" Without additional teaching, she now responds, "I'm alright" when asked the question "how are you?"
3. Liam was taught to write the letter *b* in print and in cursive. Without additional teaching, he now writes the letter *b* using a mixture of print and cursive.

4. Kiran was taught to respond "shirt" when presented with a long sleeve button up shirt and a tank top. Without additional teaching, she now responds "shirt" in the presence of a short sleeve polo shirt.
5. Davante was taught to spread butter on toast and bagels. Without additional teaching, he now spreads butter on rolls.

Promoting Generalization

For this activity, ask your supervisees to develop examples that would be relevant for their clients using each of the strategies listed in the *Promoting Generalization* document (see Appendix A). Your supervisees can work independently or in small groups. Have your supervisees share their examples and encourage them to give positive and corrective feedback to one another. Provide guidance and feedback as necessary.

1. Teach enough stimulus examples
2. Teach enough response examples
3. Teach loosely
4. Teach behavior to meet requirements of the natural environment
5. Teach the learner to recruit reinforcement
6. Reinforce response variability

Generalization Plan Development

For this activity use the *Generalization Plan Development* sheet (Appendix B) or create your own document. Your supervisees may not finish the entire plan during this meeting; however, they should try to complete as much as possible as they will need to bring the plan to supervision meeting without a client. Provide guidance and feedback throughout the completion of this activity.

Knowledge Check

1. Explain stimulus generalization.
2. Explain setting/situation generalization.
3. Explain response generalization.
4. What must be considered when probing for response maintenance?
5. Provide 3 examples of strategies for promoting generalization.

Homework for Individual Supervision without a Client

1. Finish the *Generalization Plan Development* sheet (Appendix B).
2. Write an operational definition for a new goal.
3. Prepare the *Generalization Procedural Fidelity Checklist* (Appendix C) for the proposed new goal.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Lag Schedules Practice
15:00–30:00	Client-Directed Activities

Materials Needed

- Appendix B: *Generalization Plan Development*
- Appendix C: *Generalization Procedural Fidelity Checklist*
- Appendix D: *Lag Schedule Practice*
- Appendix E: *Goal Component Checklist*

Lag Schedule Practice

Spend the first portion of your meeting practicing using a lag schedule of reinforcement. Before the meeting, select a behavior that you (as the confederate child) can easily engage in and that has 3–4 response variations. Also, select a reinforcer that will be provided contingent upon your meeting the lag schedule. Determine the lag schedule that your supervisee should implement (we suggest a lag 2 or 3 schedule). Make sure to engage in responses that will and will not meet the lag schedule to evaluate your supervisee's implementation of the schedule. Encourage your supervisee to transcribe each response you engage in to accurately implement the lag schedule. After the practice session ends, provide feedback to your supervisee, and continue practicing until they implement the schedule with 100% fidelity.

Provide the *Lag Schedule Practice* (Appendix D) to your supervisee. Ask your supervisee to read the following vignette and determine which responses should be reinforced according to the lag schedule.

> Joseph has an acquired traumatic brain injury and is relearning some of his speech including requesting access to toys. The clinician has taught Joseph to use four phrases for requesting including, "I want [toy name]," "can I play with [toy name]," "may I play with [toy name]," and "I'd like to play with [toy name]." The clinician has introduced a lag 2 schedule of reinforcement. Specify which responses should be reinforced using the following transcription:
>
> 1. "I want [toy name]"
> 2. "May I play with [toy name]"
> 3. "Can I play with [toy name]"
> 4. "I want [toy name]"

5. "I want [toy name]"
6. "I'd like to play with [toy name]"
7. "Can I play with [toy name]"
8. "I'd like to play with [toy name]"
9. "Can I play with [toy name]"
10. "May I play with [toy name]"

Client-Directed Activities

Transition the discussion to your supervisee's plan for promoting generalization. Prior to this meeting, your supervisee should have completed the *Generalization Plan Development* (Appendix B) sheet and completed the *Generalization Procedural Fidelity Checklist* (Appendix C) that corresponds with the developed goal. This plan should include a specific goal that is appropriate for your supervisee's client and specific procedures detailing how they will promote generalization of the target skill. Use the *Goal Component Checklist* (Appendix E) to evaluate the quality of the goal developed by your supervisee. Then, review the strategies to promote generalization and determine whether the strategies are (a) appropriate for the selected goal and (b) feasible for the population with whom your supervisee works. Review the *Generalization Procedural Fidelity Checklist* and ensure it accurately corresponds to the *Generalization Plan* and includes components specifically related to the listed strategies to promote generalization (e.g., includes a component for the lag schedule of reinforcement). Require your supervisee to implement the protocol with at least 80% fidelity during role-play. Following the meeting, your supervisee should finalize the fidelity checklist and develop a data sheet for collecting data on the client's responding. Your supervisee should collect three to five baseline sessions and graph the data. They should send you the graph and receive your approval to introduce intervention.

Homework for Individual Supervision without a Client

1. Prepare data sheets for new goal.
2. Finalize the *Generalization Procedural Fidelity Checklist* (Appendix C) for the new goal.
3. Conduct baseline sessions before supervisor observation.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–15:00	Administration of Generalization Plan
15:00–30:00	Session Procedures
30:00–60:00	Performance Feedback

Materials Needed

- Data sheets for client responding, 2 copies
- Appendix C: *Generalization Procedural Fidelity Checklist*
- *Supervision Observation Form*

Administration of Generalization Plan

Before conducting your observation, review the graphed baseline data to ensure that introducing the intervention is appropriate. Prior to your meeting with your supervisee, they should have finalized the *Generalization Procedural Fidelity Checklist* and their data sheet for the new goal. Observe the administration of the generalization plan protocol and collect data simultaneously. Ensure that your supervisee conducts multiple teaching trials (e.g., at least 10) for the new goal.

Session Procedures

Following your supervisee's administration of the protocol for a sufficient number of teaching trials, continue to observe your supervisee target other goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee, give them your data sheet and ask them to calculate IOA. Discuss and resolve any discrepancies between your data and the supervisee's data. Then, provide feedback to your supervisee according to the *Generalization Procedural Fidelity Checklist*. When providing corrective feedback, provide a rationale as to why their behavior should change. Offer to model and/or role-play and provide feedback to address behaviors in need of improvement. Finally, end this session with the opportunity for your supervisee to ask questions.

Mastery Criterion

In order to progress from this lesson, your supervisee must (a) accurately collect data with at least 80% agreement and (b) implement the protocol for the new goal with at least 80% fidelity. If either of these are not met, a second individual meeting without a client should be scheduled. This meeting should include intensive role-play and feedback.

Future Growth

- ☐ Observe your supervisee plan for generalization for another client.
- ☐ Observe your supervisee provide feedback to another trainee on their use of lag schedules of reinforcement.

Appendix A: Promoting Generalization

1. Teach enough stimulus examples

2. Teach enough response examples

3. Teach loosely

4. Teach behavior to meet requirements of the natural environment

5. Teach the learner to recruit reinforcement

6. Reinforce response variability

Appendix B: Generalization Plan Development

Goal:	
Target stimuli	
Instruction	
Materials	
Setting	
Operational definition	
Level of independence	
Mastery criterion	

1. Describe generalization probes.

2. Specify when generalization probes will be conducted.

3. Specify when response maintenance will be assessed.

4. Specify which stimulus examples will be taught.

5. Specify which response examples will be taught.

6. Specify which features of the stimulus context that will be varied.

7. Specify the response requirements of the natural environment. Describe how the behavior will be trained to this level.

8. Describe how will the learner be taught to recruit reinforcement for engagement in the behavior.

9. Describe how response variability will be reinforced.

Appendix C: Generalization Procedural Fidelity Checklist

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Client Learning Objective: _____

Step	Implemented Correctly? + = Yes - = No

_____ / _____ * 100 = _____ % of steps completed correctly

Steps Completed Correctly. Total Number of Steps

Appendix D: Lag Schedule Practice

Joseph has an acquired traumatic brain injury and is relearning some of his speech including requesting access to toys. The clinician has taught Joseph to use four phrases for requesting including, "I want [toy name]," "can I play with [toy name]," "may I play with [toy name]," and "I'd like to play with [toy name]." The clinician has introduced a lag 2 schedule of reinforcement. Specify which responses should be reinforced using the following transcription:

1. "I want [toy name]"
2. "May I play with [toy name]"
3. "Can I play with [toy name]"
4. "I want [toy name]"
5. "I want [toy name]"
6. "I'd like to play with [toy name]"
7. "Can I play with [toy name]"
8. "I'd like to play with [toy name]"
9. "Can I play with [toy name]"
10. "May I play with [toy name]".

Appendix E: Goal Component Checklist

Supervisee: _____ Date: _____

Rater (circle one): Supervisee Self-Evaluation Supervisor Feedback

Component or Feature	Correct			Notes
The target stimuli are identified	Y	N	N/A	
The instruction is specified	Y	N	N/A	
The materials are identified	Y	N	N/A	
The setting is specified	Y	N	N/A	
The operational definition is provided	Y	N	N/A	
The level of independence is specified	Y	N	N/A	
The mastery criteria are specified	Y	N	N/A	

References

Brodhead, M. T., Higbee, Gerencser, K. R., & Akers, J. S. (2015). The use of a discrimination training procedure to teach mand variability to children with autism. *Journal of Applied Behavior Analysis, 49*(1), 34–48. https://doi.org/10.1002/jaba.280

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied Behavior Analysis*, eBook. Pearson Higher Ed.

Krantz, P. J., & McClannahan, L. E. (1998). Social interaction skills for children with autism: A script-fading procedure for beginning readers. *Journal of applied behavior analysis, 31*(2), 191–202.

Song, C. J., Vladescu, J. C., Reeve, K. F., Miguel, C. F., & Breeman, S. L. (2021). The influence of correlations between noncritical features and reinforcement on stimulus generalization. *Journal of Applied Behavior Analysis, 54*(1), 346–366. https://doi.org/10.1002/jaba.760

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization 1. *Journal of Applied Behavior Analysis, 10*(2), 349–367. https://doi.org/10.1901/jaba.1977.10-349

Stokes, T. F., & Osnes, P. G. (1989). An operant pursuit of generalization. *Behavior Therapy, 20*(3), 337–355.

Chapter 32
Selecting and Implementing Interventions

Topics Covered Within This Chapter

Topics
Introduction
Selecting Interventions
Intervention Implementation & Evaluation

Applied behavior analysis is deeply rooted in science; it is a technology for making socially important improvements on human behavior. This technology is developed on a century of basic and applied research (Baer et al., 1968; Cooper et al., 2020; Skinner, 1953). As a result, the community of behavior analysts generally value scientifically supported interventions, commonly referred to as *evidence-based practices* among some disciplines (Gallagher, 2004; Torres et al., 2014). Unlike some disciplines in which the importance or value of rigorous, experimental analysis of interventions may vary from practitioner to practitioner, we anticipate that the vast majority, and hopefully all, of your supervisees, will have been taught and have great appreciation for the science that informs our practice. In fact, behavior analysts are expected to select and implement interventions that are conceptually aligned with behavior principles and have sufficient scientific evidence (Behavior Analyst Certification Board [BACB], 2020, Code 2.0). This chapter and related activities are predicated on the assumption that your supervisees desire to do just that. Therefore, rather than focusing this chapter on the importance of selecting interventions that are conceptually consistent with behavior analysis and have

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_32].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_32

sufficient scientific evidence, this chapter is dedicated to developing the following skills (a) selecting among two or more effective, behavior analytic interventions and/or two or more procedural variations among an effective, behavior analytic intervention, (b) measuring and maintaining high procedural fidelity among selected interventions, and (c) monitoring the success of the selected intervention.

Selecting Interventions

Once a clinician has identified a client's goals via a strengths and deficits assessment (see Chap. 11), they must then select the intervention(s) that will lead to the mastery of these goals. The first step is to consider the relevant factors about the client and their outcome goals. These are likely to include the client's, age, diagnosis, and their specific goals because research for specific interventions may be isolated to certain outcomes, clients of specific ages, and clients with specific diagnoses (National Autism Center [NAC], 2015; Steinbrenner et al., 2020). Additionally, the client's strengths and barriers to learning should be considered. If the clinician is familiar with the client, then those strengths and barriers to learning may very well be identified previously. If the client is new to the clinician, this will be a longer process of interviewing the client and/or caregivers and previous service providers (see Chapter 11 for a thorough review of strength/deficit assessments).

If the desired outcome is a reduction in challenging behavior, then a functional analysis is necessary to identify the function maintaining challenging behavior in order for a function-based intervention to be developed (Beavers et al., 2013; Iwata et al., 1994). Other formal assessments may be helpful for this process as well, such as the Barriers Assessment included in the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008). In some cases, indication of barriers may alter the client's goals altogether. For example, if the barrier assessment identifies weak motor imitation, then it is likely that it is in the best interest of the client to develop a skill acquisition program to improve the vital skill of motor imitation prior to addressing other skill deficits. In other cases, these barriers may guide the intervention selection or may guide specific procedures within the selected intervention. For example, if a client has deficits in attending to people, peer-based instruction may not be the best suited intervention. Likely, a better suited intervention involves a prompt hierarchy, but the clinician opts for physical, rather than echoic prompts, based on the deficits associated with attending to others.

Once relevant factors are identified, the second step is to search for scientifically supported interventions. Your supervisees may opt to search databases for relevant articles or refer to scholarly books. Systematic literature reviews are excellent sources for synthesized information. Many additional resources specifically designed for summarizing scientific evidence, including What Works Clearinghouse and National Secondary Transition Technical Assistance Center, are excellent resource for this step as well. Other favorites include National Autism Center's National Standards Report and the National Professional Development Center on

Autism Spectrum Disorders. It is worthwhile to note that the latter two are specific to autism, but in most cases, a clinician can reliably assume that the results will generalize to clients with other intellectual and developmental disabilities.

Searching the literature or other resources to identify scientifically validated interventions should result in the identification of several intervention options. Selecting an intervention is not a one-size-fits-all approach (Leko et al., 2019). There will not be one superior intervention for all potential outcomes. In fact, two clients with the same goal may respond differently to the same intervention (e.g., Carroll et al., 2018; McComas et al., 2009). Therefore, the third step is determining which interventions are the best contextual fit. Clinicians should consider several factors when determining intervention fit. The most important factors are client and caregiver preferences. When feasible, the client should be involved in selecting an intervention or intervention components. Caregivers should also have input. Caregivers can provide insight into the family and cultural values, the daily routines, who interacts with the client and other valuable information. When caregivers are an integral part of intervention selection, it is more likely that they will implement the intervention, thus sustaining the intervention's effects and promoting generalization of outcomes (Albin et al., 1996; Spencer et al., 2012). Moreover, client and caregiver involvement increase the likelihood of selecting an intervention that aligns with their values and culture (Fong et al., 2016; Leko et al., 2019; McCollow & Hoffman, 2020). If the caregiver or another clinician will be implementing the intervention, the complexity of the intervention must also be considered to promote the likelihood that others will implement the intervention and do so with fidelity.

During this process, the clinician should also conduct a cost–benefit analysis to determine if the cost of any intervention justifies the benefit (Cooper et al., 2020). The cost of an intervention not only includes the financial cost but also the cost of any other resources that are necessary to implement the intervention, such as the time. For example, when comparing video modeling to a traditional prompt fading technique, one must consider the time, money and additional resources to develop the video model. In some cases, those are worth the potential benefit (e.g., the client gains more autonomy or has a history of efficient acquisition with video models) that are worth that cost. In other situations, the benefit of video modeling may not justify the cost of time and other resources to develop and play video models.

Additionally, the clinician should also conduct a risk–benefit analysis, particularly if the desired outcome is decreased challenging behavior. During the risk–benefit analysis, the clinician should work collaboratively with the client and/or caregiver to identify the potential risks and benefits associated with each potential intervention so that the client and/or caregiver can determine if the benefits of any treatment outweigh the risks (Bailey & Burch, 2016).

Once all necessary input has been gathered and important factors have been considered, the clinician must select an intervention. When selecting an intervention, behavior analysts must prioritize interventions using positive reinforcement and select restrictive or punishment-based interventions only after less restrictive interventions have failed to result in the desired outcomes (BACB, 2020). Even with considering all of the aforementioned factors and following these guidelines, it is

quite possible that two or more interventions prove to be equally valid selections and the client and stakeholders demonstrate no preference among them. If this is the case, the clinician may opt to implement both interventions for a point of comparison (e.g., Vollmer et al., 1993). Similarly, the clinician may opt to directly assess the client's preference for intervention (e.g., Brower-Breitwieser et al., 2008; Hanley et al., 1997).

Intervention Implementation & Evaluation

Once an intervention is selected, two things must occur. First, the clinician must provide a written description of the behavior program to the client and/or the client's stakeholders (BACB, 2020). Second, the clinician must develop a protocol for the specific interventions included within the behavior program. Clinicians should reference the research on each intervention to determine the specific procedures, but they should expect to find a variety of procedural variations for every intervention.

By this point in the selection and implementation process, if the goal was to reduce challenging behavior, a functional analysis most likely would have been conducted. If not, the clinician must now conduct a functional analysis in order to develop individualized, function based interventions, such as functional communication training (Gerow et al., 2018). If the client has a skill acquisition goal, the clinician should conduct assessment-based instruction to determine how to best individualize the intervention protocol among the procedural variations found in the literature. Kodak and Halbur (2021) provide an excellent guide to designing and implementing assessment-based instruction. We recommend your supervisees read this prior to the group supervision so they are prepared to design and implement assessment-based instruction.

After thorough assessment, the clinician selects an intervention and specifies the protocol. This protocol should be used to frequently monitor the fidelity of implementation. We recommend that clinicians self-monitor their fidelity of implementation and also rely on other clinicians to evaluate procedural fidelity. The effectiveness of an intervention is closely correlated with the fidelity with which was it implemented (Holcombe et al., 1994; Noell et al., 2005; Vollmer et al., 1999). If an intervention is not resulting in the desired outcomes, but also is not implemented with fidelity, it is impossible to determine if the lack of desired outcomes is a result of the intervention or the lack of fidelity. If fidelity begins to decrease, clinicians must seek to determine the cause. For example, perhaps waning fidelity suggests a poor contextual fit. Perhaps it suggests a lack of training. The Performance Diagnostic Checklist-Human Services (PDC-HS; Carr et al., 2013) may be helpful in answering such questions.

In addition to measuring fidelity of implementation, clinicians should measure client outcomes. Clinicians should graph and visually analyze data on a regular basis to continually monitor the effect of intervention on the desired outcome and make changes as needed (BACB, 2020). Moreover, the clinician is responsible for sharing the ongoing monitoring with the client and/or their caregivers. If desired

outcomes do not occur within expected timelines, clinicians should seek to adapt the intervention as necessary.

Needless to say, the process of selecting and implementing interventions is complex and ongoing. The process requires practice, professional expertise, and sufficient content knowledge. Clinicians may need the support of experienced behavior analysts well beyond this short period in which it is the focus of the supervised field experience. We encourage you to offer this support well beyond the completion of field experience and eventual credentialing of your supervisees, when needed and feasible.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Introduction
20:00–55:00	Case Study
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Selecting and Implementing Interventions Guide*, 1 copy per supervisee
- Appendix B: *Resources for Identifying Scientifically Supported Interventions*, 1 copy per supervisee
- Appendix C: *Case Study*, 1 copy per supervisee
- Kodak and Halbur (2021), supervisees should bring printed or electronic copy for reference
- Carr et al. (2013), supervisees should bring printed or electronic copy for reference
- Laptop computers or tablets for accessing online resources during case study activity

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Campanaro et al. (2020)

- Kodak and Halbur (2021)
- Vollmer et al. (1999)

Introduction

Open the meeting by asking your supervisees if they have had the opportunity to select interventions for a client. If any say yes, ask them to explain the process they used to select a treatment. We anticipate that many of your supervisees would not have not this experience at this juncture in their professional preparation. If this is the case, ask them what they think clinicians may do to select an intervention.

Distribute *Selecting and Implementing Interventions Guide* (Appendix A). Use this and the accompanying PowerPoint slides to review the six steps of selecting and implementing interventions. As you describe step one, distribute a copy of the VB-MAPP Barriers Assessment (Sundberg, 2008) if you have one available to you. Divide your supervisees into groups of two or three. Ask them to discuss in their group the following topics (a) how have you gathered relevant information about your clients, (b) what are some barriers to learning that your clients have experienced, and (c) how have you modified an intervention to address those barriers. Give them about 5 minutes to talk in their group, then return to reviewing the guide.

As you move to the second step, searching for scientifically supported interventions, ask your supervisees to identify how they find such information. This is a great time to remind them of the many resources available to them. If you are aware of resources specific to their field experience placements, share those. Additionally, distribute *Resources for Identifying Scientifically Supported Interventions* (Appendix B), or present on the PowerPoint slides, and summarize the resources provided. If your supervisees are unfamiliar with any of the resources, open those on your computer to present websites as you discuss.

Review steps three and four. Spend a little extra time explaining a cost–benefit analysis and risk–benefit analysis, particularly if they are not familiar with these analyses. Moreover, reference the *Ethics Code for Behavior Analysts* (BACB, 2020) when applicable. Transition to the fifth step. Ask your supervisees to summarize the Kodak and Halbur (2021) article. Review the steps of the assessment-based instruction process they describe. Once you are confident your supervisees understand how to implement this procedure, discuss the benefits of its implementation.

Close the introduction by discussing the sixth step. Ask your supervisees how they currently monitor procedural fidelity. If they are comfortable sharing, encourage them to discuss methods to ensuring that their own procedural fidelity maintains at high levels and how they have responded to dips in procedural fidelity. Distribute Carr et al. (2013) and quickly review the PDC-HS and discuss the potential benefits to this assessment. Finally, discuss tips for analyzing data and reporting to stakeholders.

Case Study

You will demonstrate how to select and implement interventions using the *Selecting and Implementing Interventions Guide* (Appendix A). Distribute a copy of *Case Study: Zahra* (Appendix C) to each supervisee. Read the first page. Complete the prompts in the case study in a collaborative process. You will lead the process for the group, but ask for their input and insight. For example, when you identify scientifically supported interventions, you may ask some supervisees to search for journal articles, another group of supervisees to reference the National Autism Center's National Standards Report and another to reference the National Professional Development Center on Autism Spectrum Disorder's website and report. Needless to say, this case study does not provide as much information as would be available when working with an actual client. If you need to make up information that is missing (e.g., that the caregiver reported a preference for one of two identified interventions, Zahra's behavior is reinforced by access to bubbles) feel free to do so.

Knowledge Check

1. What assessments are helpful when selecting an intervention and why?
2. Name three resources for locating scientifically supported interventions.
3. Describe a cost-benefit analysis.
4. Identify at least two responsibilities outlined in the Ethics Standards that should be factored in when selecting an intervention.
5. Briefly describe assessment-based instruction.

Homework

Inform your supervisees that they will be completing the process of selecting and implementing an intervention according to the guide to address one goal for a client. Point out that most clients will have established behavior programs, but (a) they will, nonetheless, complete this process as part of their learning experiences, (b) they should attempt to disregard the currently implemented intervention as to begin this process with an open mind, and (c) be understanding and flexible that even if the final intervention selection differs from that in the current behavior program, no changes will be made to any client's behavior program unless or until the client's full team of professionals agree to do so.

Homework for Individual Supervision without a Client

1. Retrieve and review goals for one client.
2. Review this client's records, particularly any interviews or assessments within the client's record.
3. If a record review identifies that additional interviews and/or assessments are necessary to proceed, contact your supervisor at least 72 hours prior to the individual supervision meeting without a client.

Individual Supervision Meeting Without a Client, Part 1

Below is a plan for activities to incorporate into a 55-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–25:00	Complete the *Selecting and Implementing Intervention Guide*, Steps 1–5
25:00–40:00	Develop Assessment-Based Instruction
40:00–55:00	Role-Play Assessment-Based Instruction

Materials Needed

- Appendix A: *Selecting and Implementing Interventions Guide*, 2 copies
- Appendix B: *Resources for Identifying Scientifically Supported Interventions*, access to electronic copy
- Appendix D: *Assessment-Based Instruction Procedural Fidelity Checklist Template,* access to electronic copy
- Kodak and Halbur (2021), supervisees should bring printed or electronic copy for reference
- Computer
- Materials to role-play assessment-based instruction

Complete Selecting and Implementing Intervention Guide, Steps 1–5

You will assist your supervisee in discussing and completing the steps (when feasible) of the *Selecting and Implementing Interventions Guide*, steps 1–5 (Appendix A) for their own client. Your supervisee should have brought access to as much helpful information as possible and be prepared to begin this process. Begin by selecting one of the client's goals. Unless a functional analysis has been conducted,

we recommend selecting a skill acquisition goal so that this process does not have to be paused pending a functional analysis.

Begin using the guide to facilitate your discussion and decision-making. Along the process, ask your supervisee to document the process and outcomes. This document should include information that was considered in this process. For example, document the barriers to learning that were discussed and how this impacted goal selection. Or document all of the interventions you noted to be scientifically supported, as well as the single intervention that you selected. There is not enough time allotted in this activity to write the behavior program. Be sure to clarify with your supervisee that this step is eliminated only due to the time constraints.

Develop Assessment-Based Instruction

At this point in the planning process, you and your supervisee would have selected an intervention and determined some procedural variations that exist for that intervention (e.g., prompt and prompt fading approaches, reinforcement contingencies or schedule, error correction procedures). Plan assessment-based instruction to evaluate two or three procedural variations. Use the Kodak and Halbur (2021) article to guide you through this process. Develop procedural fidelity checklists for baseline and at least two treatment conditions using *Assessment-Based Instruction Procedural Fidelity Checklists* (Appendix D). At the end of this meeting, your supervisee should have the following: (a) three procedural fidelity checklists, (b) data sheets, and (c) graphing template on Excel.

Role-Play Assessment-Based Instruction

Allocate the last 15 minutes role-playing the assessment-based instruction conditions. If you planned a control and two intervention conditions, role-play each, allocating 5 minutes per condition. If you planned three intervention conditions, use this time to role-play those. In the role-play, you will play the role of client; play this part as authentically as possible. While role-playing as the client, also collect data on the fidelity of implementation using the checklist you just developed. Provide quick performance feedback, reviewing the steps implemented correctly and incorrectly at the end of each role-play.

Homework for Individual Supervision without a Client

1. At least 48 hours prior to the meeting, send an electronic version of the assessment-based instruction three procedural fidelity checklists to your supervisor.
2. At least 48 hours prior to the meeting, send a revised data sheet to your supervisor.

Individual Supervision Meetings with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–5:00	Provide Feedback on Materials (optional)
5:00–50:00	Observe Assessment-Based Instruction
50:00–60:00	Performance Feedback

Materials Needed

- Supervisee-developed Assessment-based Instruction Procedural Fidelity Checklists
- Supervisee-developed Assessment-based Instruction Data Sheet
- Clipboard
- Pen/Pencil

Provide Feedback Regarding Procedural Fidelity Checklists and Data Collection

Your supervisee may have revised the procedural fidelity checklists and data sheet after your last meeting. If so, they should have sent you both documents 48 hours prior to this meeting. Upon receipt, review those documents. If you have feedback, meet with your supervisee for a few minutes before they implement the assessment-based instruction to discuss your feedback. Meet without the client present so that all attention can be directed to this discussion. If significant changes must be made, the supervision meeting with a client should be postponed in order to give your supervisee ample time to prepare.

Observe Assessment-Based Instruction

You will observe your supervisee implementing assessment-based instruction for up to 45 minutes. Feel free to alter this time as needed. At a minimum, you should observe each condition at least once.

During the observation, measure procedural fidelity and collect data on the client behavior using the procedural fidelity checklists and data sheet your supervisee provided you prior to this meeting. If it is difficult to measure both supervisee and client behaviors simultaneously, divide your observation period in half. Collect client data during the first half and supervisee procedural fidelity data during the second half.

Performance Feedback

During your final 10 minutes, you will provide performance feedback to your supervisee. You may need to schedule this at a later time so that you can deliver feedback without interruption. Begin by delivering performance feedback regarding the fidelity of implementation. As always, praise steps completed accurately, correct errors, and provide rationales regarding why correction is needed. Invite your supervisee to ask questions and participate in additional role-play, particularly for conditions with many errors. Next, compare data collected on client behavior. Have your supervisee calculate IOA. Discuss discrepancies and any possible steps to improving data collection if concerns are identified.

Individual Supervision Meeting Without a Client, Part 2 (Optional)

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–30:00	Discuss Assessment-Based Instruction Results

Materials Needed

- Assessment-based instruction results, graphed

Discuss Assessment-Based Instructions Results

After your supervisee has conducted sufficient sessions to observe a stable pattern of responding among the assessment-based instruction, it would be helpful to meet to review those data. We have marked this as an optional meeting because by the time your supervisee has reached this portion of the field experience, they will have had numerous experiences visually analyzing data. They may be at a point where they are able to independently analyze the data and make instructional decisions based on that analysis. However, if you and/or your supervisee feel it best to close this portion of the field experience by jointly analyzing and discussing the data, we recommend you meet again after sufficient data have been collected.

Prior to this meeting, your supervisee should send you the graphed data. When you meet, ask your supervisee to "think aloud" as they analyze the graph. Then, ask them to describe how they will use these data to inform intervention. We anticipate that for most cases, a clear best practice will be evident via visual analysis. If that is not the case, and two or more conditions produce similar results, you can discuss stakeholder preferences, ease of implementation, and other factors that could affect decision-making.

Mastery Criteria

In order to progress from this lesson, your supervisee must do the following when implementing assessment-based instruction (a) accurately collect data on client behavior with at least 80% agreement and (b) conduct the assessment-based instruction with at least 80% fidelity. If either of these are not met, a second individual meeting without a client with intensive role-play and feedback should be scheduled.

Future Growth

- ☐ Evaluate your supervisee's ability to implement select and implement interventions for a full behavior program.
- ☐ Evaluate your supervisee's ability to implement assessment-based instruction for additional interventions and/or clients.

Appendix A: Selecting and Implementing Interventions Guide

Instructions: Follow the guide to select and implement interventions. Use the space provided to record relevant information about this process.

Begin Here: Client has intervention outcome goals (based on skills/deficits assessment)!

Step One: Gather and consider relevant information about the client and their behavior.

Further guidance:

- *Gather information from records review; interviews with client, caregiver, and/or other service providers.*
- *Formal assessments may be helpful (e.g., functional analysis, Barriers Assessment within the Verbal Behavior Milestones Assessment and Placement Program).*
- *Interventions may be scientifically validated for specific ages, diagnoses, or outcome goals.*

Notes: _____

_____

Step Two: Search for scientifically supported interventions.

Further guidance:

- *Journal articles and books are helpful resources.*
- *Systematic literature reviews are particularly useful.*
- *Other resources include: What Works Clearinghouse, National Professional Development Center on ASD, and National Autism Center's National Standards Report.*

Notes: _____

_____

Step Three: Determine contextual fit of each identified intervention.

Further guidance:

- *Consider client and caregiver preference for intervention.*
- *Consider family and cultural values and daily routines.*
- *Determine who will implement the intervention.*
- *Conduct a cos–benefit analysis of potential interventions.*
- *Conduct a risk–benefit analysis, particularly if reducing challenging behavior.*

Notes: _____

_____

Step Four: Select an intervention.

Further guidance:

- *Prioritize use of positive reinforcement.*
- *Only select restrictive or punishment-based intervention if less restrictive interventions fail.*
- *You may still have two or more suitable interventions. If so, rely on client or caregiver preference and/or implement and compare interventions.*

Notes: _____

_____

Step Five: Describe the intervention.

Further guidance:

- *Provide a written behavior program to client and/or caregiver.*
- *Develop specific intervention protocol to measure procedural fidelity.*
- *If function-based behavior reduction intervention is selected, conduct a functional analysis (or review results of previously conducted functional analysis).*
- *Implement assessment-based instruction to determine best procedural components for the client following the guidance from Kodak et al. (2021).*

Notes: _____

_____

Step Six: Implement the intervention.

Further guidance:

- *Develop procedural fidelity checklist. Measure procedural fidelity regularly.*
- *Consider the use of the Performance Diagnostic Checklist-Human Services to determine cause of treatment fidelity failures.*
- *Measure, graph, and visually analyze client outcomes regularly.*
- *Report the client's progress to client and/or caregiver regularly.*

Notes: _____

_____

Appendix B: Resources for Identifying Scientifically Supported Interventions

Resource	How to Access	Additional Information
Education Resources Information Center (ERIC)	Available through BACB Gateway portal and many libraries.	Searchable research database.
Scholarly Journals	Available through BACB Gateway portal and many libraries. Clinicians should consider purchasing journal subscriptions.	The *Journal of Applied Behavior Analysis*, *Journal of the Experimental Analysis of Behavior*, and *Behavioral Interventions* are available through the BACB Gateway portal. Systematic literature reviews may be particularly helpful in the process of selecting interventions.
National Autism Center (NAC)	www.nationalautismcenter.org	Download the National Standards Report. Provides information regarding interventions for individuals with autism, 3–21 years.
National Professional Development Center (NPDC) on Autism Spectrum Disorder	www.autismpdc.fpg.unc.edu	Provides information regarding interventions for individuals with autism, 3–21 years. AFIRM modules provide free professional development on evidence-based practices identified in the report.
National Secondary Transition Technical Assistance Center (NSTTAC)	www.nsttac.org	Provides information regarding best practices for transition into adulthood, including daily living skills and vocational skills.
National Center on Intensive Intervention (NCII)	www.intensiveintervention.org	Provides information for intensive interventions for literacy, math, and challenging behavior.
What Works Clearinghouse	www.ies.ed.gov	Provides information for interventions for elementary to high school students. Can select among many topics including children and youth with disabilities and challenging or problem behavior.

Appendix C: Case Study: Zahra

Name: Zahra

Age: 10 years

Diagnosis: autism spectrum disorder, intellectual disability

Family Information: Zahra lives at home with her dad and stepmom. She has an 8-year-old stepbrother named Khaled.

Summary of Services: Zahra has been receiving services at a behavior analytic clinic, Sunshine Therapy, for 25 hours per week for the past month. She receives at-home behavior analytic services another 10 hours per week in which the clinician supports Zahra's dad and stepmom in implementing interventions in their daily routine. Prior to receiving services, she attended public school and received no behavior analytic interventions at that time. Her dad and stepmom have no prior training in implementing behavior analytic interventions.

Relevant Information Gathered from Assessments: Zahra's clinician conducted caregiver interviews, the Vineland Adaptive Behavior Scales (VABS) and Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP). Both assessments indicated her most significant deficits are in the areas of social skills and play skills. She particularly struggles with peer play, taking turns, and maintaining conversations with peers. The VB-MAPP Barriers Assessment identified the following barriers to learning, as they all scored in the *occasional* to *persistent* range: (a) negative behaviors, (b) prompt dependent, (c) reinforcer dependent, and (d) impaired articulation. She engages in some mild challenging behavior, such as stomping and falling to the floor. Functional analyses have concluded these topographies are maintained by positive reinforcement, specifically peer attention and access to preferred tangibles and activities. Zahra's dad is particularly concerned about her ability to play with peers. He reports that her stepbrother, Khaled, is two years younger than Zahra but is much more advanced in peer play skills. Zahra's dad and stepmom want her to be able to play with Khaled. They hope that they could play board games, play with the same toys (e.g., Legos, cars, blocks) without fighting, and would take turns with outdoor toys, such as the tire swing and the trampoline.

Goal:
Instructions: Develop one social skill or play skill to target. Write this goal so that it is observable and measurable.

_____
_____

Scientifically Supported Interventions:
Instructions: List all scientifically supported interventions identified to address the selected goal.

_____
_____
_____
_____
_____

Contextual Fit
Instructions: For each selected intervention, describe considerations regarding contextual fit, including a cost–benefit analysis and risk–benefit analysis if the goal is to reduce challenging behavior.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Select One Intervention: _____

_____

Procedural Variations

Instructions: Describe potential procedural variations that should be evaluated.

_____

_____

_____

Assessment-Based Instruction

Describe the variables to be evaluated: _____

_____

Identify target behavior (dependent variable) and how it will be measured: _____

_____

_____

Describe experimental design: _____

_____

Describe skill: _____

_____

Describe how targets will be identified: _____

_____

_____

Describe you will equate noncritical procedures across conditions: _____

_____

_____

Summarize the results: _____

_____

_____

Intervention Protocol

Instructions: Create an intervention protocol below:

Step Number	Step Description

Data Collection:

Describe how you will measure procedural fidelity: _____
_____
_____

Describe how often you will measure procedural fidelity: _____
_____

Describe you will collect data. Create a data collection sheet in the space below: ___
_____
_____

Describe how and when you will report progress to client and/or caregiver: _____
_____
_____

Appendix D: Assessment-Based Instruction Procedural Fidelity Checklist Template

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Baseline	
Step	Implemented Correctly? + = Yes −= No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Treatment Condition One	
Step	Implemented Correctly? + = Yes −= No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

Supervisee: _____ Supervisor: _____

Client: _____ Date & Time: _____

Treatment Condition Two	
Step	Implemented Correctly? + = Yes −= No

_____ / _____ * 100 = _____ % of steps completed correctly
Steps Completed Correctly. Total Number of Steps

References

Albin, R. W., Lucyshyn, J. M., Horner, R. H., & Flannery, K. B. (1996). Contextual fit for behavioral support plans. In L. Koegil, R. Koegil, & G. Dunlap (Eds.), *Positive behavioral support: Including people with difficult behaviors in the community* (pp. 81–97). Brookes.

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*(1), 91.

Bailey, J. S., & Burch, M. R. (2016). *Ethics for behavior analysts*. Routledge, Taylor & Francis Group.

Beavers, G. A., Iwata, B. A., & Lerman, D. C. (2013). Thirty years of research on the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 46*(1), 1–21.

Behavior Analyst Certification Board. (2020). *Ethics code for behavior analysts*. https://www.bacb.com/wp-content/bacb-compliance-code-future

Brower-Breitwieser, C. M., Miltenberger, R. G., Gross, A., Fuqua, R. W., & Breitwieser, J. (2008). The use of concurrent operants preference assessment to evaluate choice of interventions for children diagnosed with autism. *International Journal of Behavioral Consultation and Therapy, 4*(3), 270.

Campanaro, A. M., Vladescu, J. C., Kodak, T., DeBar, R. M., & Nippes, K. C. (2020). Comparing skill acquisition under varying onsets of differential reinforcement: A preliminary analysis. *Journal of Applied Behavior Analysis, 53*(2), 690–706.

Carr, J. E., Wilder, D. A., Majdalany, L., Mathisen, D., & Strain, L. A. (2013). An assessment-based solution to a human-service employee performance problem. *Behavior Analysis in Practice, 6*(1), 16–32.

Carroll, R. A., Owsiany, J., & Cheatham, J. M. (2018). Using an abbreviated assessment to identify effective error-correction procedures for individual learners during discrete-trial instruction. *Journal of Applied Behavior Analysis, 51*, 482–501. https://doi.org/10.1002/jaba.460

Cooper, J. O., Heron, T. E., & Heward, W. L. (2020). *Applied behavior*. Pearson.

Fong, E. H., Catagnus, R. M., Brodhead, M. T., Quigley, S., & Field, S. (2016). Developing the cultural awareness skills of behavior analysts. *Behavior Analysis in Practice, 9*(1), 84–94.

Gallagher, D. J. (2004). Educational research, philosophical orthodoxy, and unfulfilled promises: The quandary of traditional research in U.S. special education. In G. Thomas & R. Pring (Eds.), *Evidence-based practices in education* (pp. 119–132). Open University Press.

Gerow, S., Davis, T., Radhakrishnan, S., Gregori, E., & Rivera, G. (2018). Functional communication training: The strength of evidence across disabilities. *Exceptional Children, 85*(1), 86–103.

Hanley, G. P., Piazza, C. C., Fisher, W. W., Contrucci, S. A., & Maglieri, K. A. (1997). Evaluation of client preference for function-based treatment packages. *Journal of Applied Behavior Analysis, 30*, 459–473.

Holcombe, A., Wolery, M., & Snyder, E. (1994). Effects of two levels of procedural fidelity with constant time delay on children's learning. *Journal of Behavioral Education, 4*, 49–73.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*(2), 197–209.

Kodak, T., & Halbur, M. (2021). A tutorial for the design and use of assessment-based instruction in practice. *Behavior Analysis in Practice, 14*(1), 166–180.

Leko, M. M., Roberts, C., Peyton, D., & Pua, D. (2019). Selecting evidence-based practices: What works for me. *Intervention in School and Clinic, 54*(5), 286–294.

McCollow, M. M., & Hoffman, H. H. (2020). Evidence-based decision-making: A team effort toward achieving goals. *Young Exceptional Children, 23*(1), 15–23.

McComas, J. J., Wagner, D., Chaffin, M. C., Holton, E., McDonnell, M., & Monn, E. (2009). Prescriptive analysis: Further individualization of hypothesis testing in brief experimental analysis of reading fluency. *Journal of Behavioral Education, 18*, 56–70. https://doi.org/10.1007/s10864-009-9080-y

National Autism Center. (2015). *Findings and conclusions: National standards project, phase 2*. Author.

Noell, G. H., Witt, J. C., Slider, N. J., Connell, J. E., Gatti, S. L., Williams, K. L., et al. (2005). Treatment implementation following behavioral consultation in schools: A comparison of three follow-up strategies. *School Psychology Review, 34*, 87–106.

Skinner, B. F. (1953). *Science and human behavior*. Free Press.

Spencer, T. D., Detrich, R., & Slocum, T. A. (2012). Evidence-based practice: A framework for making effective decisions. *Education and Treatment of Children, 35*(2), 127–151.

Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2020). *Evidence-based practices for children, youth, and young adults with Autism*. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

Sundberg, M. L. (2008). *VB-MAPP: Verbal Behavior Milestones Assessment and Placement Program: A language and social skills assessment program for children with autism or other developmental disabilities: Guide*. AVB Press.

Torres, C., Farley, C. A., & Cook, B. G. (2014). A special educator's guide to successfully implementing evidence-based practices. *Teaching Exceptional Children, 47*(2), 85–93.

Vollmer, T. R., Iwata, B. A., Zarcone, J. R., Smith, R. G., & Mazaleski, J. L. (1993). The role of attention in the treatment of attention-maintained self-injurious behavior: Noncontingent reinforcement and differential reinforcement of other behavior. *Journal of Applied Behavior Analysis, 26*(1), 9–21. https://doi.org/10.1901/jaba.1993.26-9

Vollmer, T. R., Roane, H. S., Ringdahl, J. E., & Marcus, B. A. (1999). Evaluating treatment challenges with differential reinforcement of alternative behavior. *Journal of Applied Behavior Analysis, 32*, 9–23.

Chapter 33
Ethics

Topics Covered Within This Chapter

Topics
Choice-Making and Decision-Making
Promoting Self-Advocacy
Compassionate Service Delivery

This chapter will specifically cover the core principle of *treating others with compassion, dignity, and respect* as opposed to the entire code. Supervisees will receive 45 hours of instruction dedicated to the Ethics Code for Behavior Analysts; thus, we did not believe a review of the code would be the best use of this chapter. Ethics should be woven into all of your supervision meetings, especially section "4.0." as you should be providing supervision according to the guidelines provided in this section. Therefore, we devote this chapter to promoting self-determination for clients and acknowledging personal choice within service delivery. We will specifically cover three topics including presenting opportunities for choice-/decision-making, promoting self-advocacy, and compassionate service delivery.

Choice-Making and Decision-Making

Clinicians should prioritize client preference during all aspects of intervention. This includes incorporating preferred items and activities into teaching trials, providing options between tasks (e.g., coloring or cutting), options between task materials

Supplementary Information The online version contains supplementary material available at [https://doi.org/10.1007/978-3-031-09932-8_33].

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8_33

(e.g., color pencils or markers), and assessing for preference between interventions and prompting procedures. Overall, behavior analysts tend to include frequent assessment of preference (see Chap. 8) of items/edibles/activities into their instruction. It is less common to include an evaluation of client preference for different interventions. Providing choice opportunities to clients for different interventions is one way to include the client as a valued member of the intervention team. One important caveat to bring to the attention of your supervisees is that preference for interventions should only be assessed for effective interventions. The way in which preference is evaluated will differ based on the verbal skills of the individuals with whom your supervisees work. One way to assess for intervention preference is using a concurrent chains arrangement (Hanley et al., 2005). This arrangement is particularly useful for individuals with limited verbal repertoires.

For example, Briggs et al. (2018) used a concurrent chains arrangement to assess for preference between a multiple schedule and chain schedule at different response requirements. They found that the participant selected the chain schedule at lower response requirements to maximize reinforcement (i.e., access to tangible items); however, as the response requirement increased, she shifted her selection to the multiple schedules. This was an interesting finding as the participant engaged in escape-maintained challenging behavior, yet she freely selected the chain schedule which included work tasks when the response requirement was low.

A concurrent chains arrangement includes the presentation of at least two options using distinct stimuli such as colored switches (Hanley et al., 2005), therapists in colored t-shirts (Briggs et al., 2018), or laminated symbols (Hanratty & Hanley, 2021). The learner must be exposed to the contingencies associated with each of the initial links (e.g., colored switches) using guided-choice trials. Then, during free-choice trials, the learner should be presented with the options and allowed to independently select one. Once a selection has been made, the learner should be exposed to the corresponding contingencies. The cumulative choices are graphed to determine which intervention option was selected most often.

Another important topic to discuss under the umbrella of choice and decision-making is the choice to participate in intervention. This can be conceptualized as obtaining assent from the client prior to implementing intervention procedures. Although assent procedures are typically described in the context of research, it is equally important to determine client assent within practice. Depending on the verbal skills of your supervisees' clients, it may be necessary to use a concurrent chains arrangement to obtain assent, or it may be sufficient to simply ask the client if they will return to the intervention context. For example, Rajaraman et al. (2022) presented three continuously available choices to clients who engaged in challenging behavior that was treated with FCT. The available choices were to (a) participate in the therapeutic context, (b) go to the "hangout" context in which they maintained noncontingent access to preferred items, or (c) to leave the clinic with their caregivers. The researchers found that the participants allocated most of their time to participation in the therapeutic context. This arrangement may not be the most appropriate for all service delivery based on the severity of challenging behavior, client skill deficits, and funding requirements for the agency. Our goal in including this example within the chapter is to highlight the importance of not *forcing* clients

to participate in intervention. Rather, we as behavior analysts should arrange the contingencies in such a way that clients choose to participate in intervention. For example, we have implemented token systems where token delivery resulted in access to high-quality reinforcers. Clients were able to choose to work to earn tokens or to do nothing. The way in which assent is incorporated into services will vary across clinical settings.

Promoting Self-Advocacy

Self-advocacy is often defined as self-identifying a need and effectively communicating this need in order to increase the likelihood that the need will be addressed. Within the field of behavior analysis, we might conceptualize self-advocacy as behaviors that allow the individual to exert counter-control. Skinner describes counter-control as behavior to counteract control that another individual attempts to impose. For example, if someone tells you to give them all your money you can tell them "No." Skinner acknowledges that individuals with disabilities, children, and the elderly may be mistreated because they are unable to engage in behavior to check the behavior of the controller (Skinner, 1974). Therefore, one of our primary goals should be to ensure our clients have skills to counter the control of those with whom they interact. Counter-control may manifest in the form of manding for the removal of stimuli or discontinuation of activities, obtaining information needed to avoid control, or engaging in future planning rather than accepting goals that are set by others.

In this chapter, we identify specific responses that are encompassed within the scope of self-advocacy. The examples we provide are by no means exhaustive; however, we attempted to select skills that could be relevant for many clients. The skills selected by your supervisees will largely be determined by the verbal skills of their client. If their client has developed an extensive verbal repertoire, teaching self-advocacy might focus on goal setting and planning for their future. In contrast, if their client's verbal repertoire is still developing, self-advocacy might focus on more immediate needs such as requests to escape from aversive stimuli or requests for information.

Goal Setting

Goal setting within behavior analysis typically involves using assessment data in collaboration with caregivers to identify behaviors to address during behavioral intervention. Including clients within these discussions is one way to promote self-advocacy. However, within this section, we want to encourage a bigger picture strategy for teaching clients to set goals. The first step is to encourage the client to identify their values. Value identification according to Acceptance and Commitment

Therapy includes pinpointing what is most important or meaningful to an individual (Hayes et al., 2012). Values are not obtainable states, rather they are situations that an individual can continue to work toward. Some examples of values might include being a good sibling, or living a healthy life, or being adventurous. The next step is to encourage the client to identify specific behaviors that align with their values. For example, if they value being a good sibling, specific behaviors might include setting aside time to call a brother or sister once a week or planning a monthly dinner with a sibling. These behaviors that align with values can be referred to as goals. When clients set goals that align with their values, they are more likely to meet the goals as the consequence is highly motivating.

These two steps for goal setting may sound fairly simple; however, your supervisees will need to practice facilitating these conversations to ensure they can evoke the desired responses from their client. That is, abruptly asking, "what is important to you?" will often not result in the desired response. The conversation must be guided in such a way that the client will accurately identify what is important to them, rather than what is important to their family members or things they just like but are not motivated by. During this discussion, your supervisees and their clients should identify short-term and long-term goals.

Manding for Negative Reinforcement and Information

Teaching individuals to request for activities to be terminated or for nonpreferred stimuli to be removed is important for establishing self-advocacy. Clients should have the skills to request for desired items and activities, but also to request for the removal of stimuli they do not want to contact. The literature base on using functional communication training (see Chap. 25) to address escape-maintained challenging behavior is robust. However, there is also a research base for teaching mands for negative reinforcement when challenging behavior is not the primary dependent variable. For example, Chezan et al. (2019) taught three children to refuse nonpreferred food items by exchanging a card, vocally saying "no, thank you," and signing *no*. These researchers tested for generalization and discrimination of the refusal response. They found that the participants used their taught mands in the presence of nonpreferred foods that were not used during training (i.e., generalization) and the participants did not use the refusal response in the presence of preferred foods (i.e., discrimination).

In addition to establishing a manding repertoire for negative reinforcement, establishing a repertoire of manding for information can also promote self-advocacy. Information is valuable as it allows an individual to navigate their environment more effectively. This includes avoiding aversive situations (e.g., "watch out for snakes") and gaining access to positive situations (e.g., "free parking this way"). Independence can be better achieved if an individual can mand for information rather than relying on others to directly provide access to preferred stimuli or activities. Consider the following example, a child wants to play basketball, after asking

her dad if she can play basketball he responds, "after I am done with this load of laundry, I will get the ball for you." In this scenario, the child is reliant on her father to provide access to the desired activity. If instead she asks, "dad, where is the basketball?", when he answers her, she now has the necessary information to obtain the desired activity for herself without waiting on her father. Teaching mands for information is similar to teaching other mands in that an establishing operation must be in place prior to beginning a trial. The primary difference between manding for items and manding for information is the concequence for manding for information is the information rather than direct access to an item or activity. Researchers have taught individuals to mand for information using several questions including *where, what, when,* and *why.* For example, Valentino et al. (2019) arranged situations in which the experimenter engaged in a behavior that was outside of the norm (e.g., turning off the lights in the room) to occasion questions about why they engaged in that behavior (e.g., "why did you do that").

Providing Compassionate Service Delivery

Finally, we shift to the topic of compassionate service delivery. Within this section, we provide three strategies for delivering compassionate services that include facilitating meaningful collaboration with family members, using verbal behavior that is appropriate for the audience, and maintaining consistency with contingencies. Meaningful collaboration goes beyond brief end-of-the session discussions with caregivers. This type of collaboration requires that the clinician initiates interactions with family members to identify the client's strengths and deficits, actively listens and attends to concerns posed by family members, and invites ongoing feedback related to client progress from family members. Stress to your supervisees the importance of including all family members within these interactions. This might include multiple parents, grandparents, and siblings. Siblings are often excluded from meaningful collaboration. Clinicians might request that they not be present for meetings or intervention sessions. We propose that this is a miscalculation and results in the exclusion of a key stakeholder. A complete discussion of the importance of including siblings is beyond the scope of this chapter; however, clinicians should remember that the sibling relationship lasts longer than the parent–child relationship, thus the sibling will likely play an important role in the life of the client for many years. Gathering information from different family members may be achieved using different approaches. Face-to-face discussions are ideal but may not be feasible for all family members, thus your supervisees should attempt a variety of strategies before determining that collaboration with a specific family member is not possible. Strategies might include scheduled phone calls, emails, written notes, or surveys/polls distributed using email or an electronic program like Qualtrics^{XM}.

As scientists, it is important for behavior analysts to use precise language when speaking to other behavior analysts. Issues arise when scientific language is used when communicating in practice. For clients and their families, behavior analytic

language is unfamiliar and often off-putting. The use of terms such as punishment and contingencies do not hold the same meaning for nonbehavior analysts. Therefore, one aspect of providing compassionate care is using language that evokes effective action from the audience. Verbal behavior is only useful if the listener can respond appropriately. Highlight this point to your supervisees. They should have a strong enough understanding of behavior analysis that they can easily transition between behavior analytic language and nontechnical language, similar to the way in which a fluent speaker can transition between English and Spanish.

The final strategy we discuss is maintaining consistency when interacting with clients. Following through with communicated contingencies serves a way to build trust between the clinician and client. For example, if the contingency was stated that when the client completed five math problems they could play outside for 15 minutes, then after five math problems have been completed the 15 minutes should be granted. Increasing the requirement without prior notice (e.g., "you needed to write the answers in the lines" or "you did not answer them fast enough") would be a violation of the contingency and unfair. This type of failure to maintain consistency will damage the relationship and the client will be less likely to follow instructions in the future. Many of the clients who behavior analysts serve have verbal deficits, thus giving accurate descriptions of the contingencies and ensuring the contingencies are carried out as described is of the upmost importance.

Group Supervision Meeting

Below is a plan for activities to incorporate into a 1-hour meeting with a small group of supervisees.

Group Supervision Meeting Agenda

Time	Activity
0:00–20:00	Review Major Concepts
20:00–30:00	Self-Advocacy Skills
30:00–40:00	Obtaining Assent
40:00–55:00	Concurrent Chains Plan Development
55:00–60:00	Knowledge Check

Materials Needed

- Appendix A: *Concurrent Chains Plan*, 1 copy for each supervisee

Reading Assignments

At least 1 week prior to the group supervision meeting, assign your supervisees to read about the subject. Below is a list of recommended assigned readings.

- Morris et al. (2021)
- Rajaraman et al. (2022)
- Rohrer et al. (2021)

Review Major Concepts

Begin your group supervision meeting by reviewing the major concepts associated with ethical service delivery including presenting opportunities for choice-/decision-making, promoting self-advocacy, and providing compassionate services. A brief summary of each is provided below and PowerPoint slides are available to share with your group.

Choice-/Decision-Making

Remind your supervisees about the importance of incorporating client preference into as many aspects of service delivery as possible. This may be an opportunity to review the different types of preference assessments (e.g., paired-stimulus, multiple stimulus without replacement). Ask your supervisees to provide examples of preferred stimuli they include within their intervention sessions. Transition to a review of the other ways in which choice can be incorporated into service delivery. These include, but are not limited to, choices regarding the order in which goals are addressed (e.g., first matching, then writing), the materials used within intervention procedures (e.g., a whiteboard or paper), and the intervention procedures to which they will be exposed (e.g., preference for prompting procedures).

Next, discuss how concurrent chains arrangements can be used to assess for preference for interventions. Describe the procedures used within a concurrent chain arrangement.

1. Pair intervention procedures with salient stimuli to serve as the initial link of the chain. Salient stimuli might include different clinicians in colored t-shirts, colored construction paper, microswitches with different pictures attached, or written signs. Your supervisees can be creative and identify other stimuli which would be more appropriate for their clients.
2. After the choice response (e.g., touching the microswitch, moving toward one of the clinicians) is made, the implementer exposes the learner to the corresponding procedures.
3. Trial types:

(a) Guided choice: During these trials, the choice will be presented but the learner will be guided to select a predetermined option. Once the learner makes a selection, the implementer will introduce the corresponding contingencies. When describing these trials to your supervisees, ensure they understand that the purpose of these trials is to expose the learner to the different contingencies before a choice is made.
(b) Free choice: During these trials, the choice will be presented, and the learner will have the opportunity to make an independent selection between the options. Once the learner makes a selection, the implementer will introduce the corresponding contingencies. When describing these trials to your supervisees, ensure they understand that the purpose of these trials is to assess for preference between intervention components or contingencies.

4. The implementer will graph the selections from the free choice trials using a cumulative record graph.

   (a) Cumulative record graph: The cumulative number of selections is graphed. For example, if during session 1 the learner selects treatment A three times and treatment B one time, the implementer would graph 3 for treatment A and 1 for treatment B. Then, if during session 2 the learner selects treatment A five times and treatment B two times, the implementer would graph 8 for treatment A and 3 for treatment B (See Brodhead et al., 2016, Figure 2 for example).

5. After a sufficient number of trials, the implementer will analyze the data and determine the learner's preference based on their cumulative responding.

Continue this discussion to review other procedures that may be most appropriate for your supervisees.

Self-Advocacy

There are numerous skills that contribute to self-advocacy, so if the specific skills we describe are not applicable to the clients with whom your supervisees work, please discuss more appropriate skills during this meeting.

- Goal setting

First, review the definition of values. Provide several examples of values and ask your supervisees to provide additional examples. Ensure that the examples are not attainable (if so, these would be goals). As a group, select one value and identify specific behaviors that align with that value. Operationally define these behaviors and set both short-term and long-term goals.

- Manding for negative reinforcement

First, review the importance of selecting an appropriate communication topography that best matches the skills of the learner. This might include a vocal response, a card exchange, or sign language. If a vocal response is selected, your supervisees

will need to determine the ideal length of the mand. For example, will the response be one word ("stop") or two to three words ("stop please" or "no thank you"). Then, transition to the discussion of introducing an establishing operation to occasion a response. One important consideration for teaching mands for negative reinforcement is that in order to occasion the mand the learner must be exposed to aversive stimuli. For example, if the implementer is teaching the learner to request for a loud noise to be turned off, the learner must first be exposed to the loud noise. Your supervisee must be mindful when considering exposing their clients to aversive stimuli. The benefit of teaching the client to request for escape from nonpreferred activities and stimuli must outweigh the risks of exposing clients to these nonpreferred activities and stimuli. Use this time to facilitate a meaningful conversation about this risk–benefit analysis.

- Manding for information

First, review specific topographies of mands for information including where, when, and why. Ask your supervisees to provide several examples of mands for information. Then, discuss how to contrive motivation to evoke the different mands for information. Stress to your supervisees the importance of bringing mands for information under the appropriate antecedent control (i.e., mands are under the control of an establishing operation). Provide additional examples of mands for information that would be relevant to the population with whom your supervisees work.

Compassionate Service Delivery

Next, transition to the discussion of compassionate service delivery. We suggest three topics which fall under the umbrella of compassionate service delivery; however, include other topics that are relevant to the population with whom your supervisees work.

1. Meaningful collaboration with family members
   (a) Who: Provide multiple examples of family members that would be relevant to your supervisee's clients. Examples will likely include parents, grandparents, and siblings. Ask your supervisees to think of the family members who should likely be involved in discussions related to their clients.
   (b) How: Provide examples of strategies to encourage collaboration in the event that face-to-face meetings are not possible. Such examples might include email, scheduled phone/video calls, or use of quick poll questions that can be included in an email. Ask your supervisees to devise other potential strategies that might be applicable for family members of their clients.
2. Using appropriate verbal behavior in practice
   (a) This suggestion is fairly straight forward. Your supervisees should have the knowledge to explain behavior analytic intervention without using technical language. Provide several examples of technical language and ask your

supervisees to translate the phrase into nontechnical language. We provide a few examples; however, ensure the examples are appropriate for the population with whom your supervisees work.

(b) Examples:

(i) We are using an FR 1 reinforcement schedule.
(ii) We conducted an FA and determined the challenging is maintained by escape from demands.
(iii) We observed an increase in target responding once we differentially reinforced independent responding.
(iv) The child can independently mand for ten different items when an establishing operation is introduced.

3. Maintaining consistency

(a) Ensure your supervisees understand the importance of being consistent when implementing contingencies. Consistent application of contingencies is important for establishing trust within the clinician–client relationship and will likely result in positive future interactions. Ask your supervisees to provide examples and nonexamples of consistency with contingencies.

Self-Advocacy Skills

For this activity, ask your supervisees to create a self-advocacy goal for one of their clients. The goal should include all the relevant information including (a) target stimuli, (b) instructions to occasion responding, (c) required materials, (d) setting/situation, (e) operational definition, (f) level of independence, and (g) mastery criteria. Have your supervisees share their potential goal with the group and allow supervisees to provide feedback to one another. Provide guidance and feedback as needed.

Obtaining Assent

For this activity, have your supervisees work together in small groups to discuss strategies for obtaining assent from their client. Encourage your supervisees to be creative and to develop examples that would be appropriate for the clients with whom they work. Ask your supervisees to share at least five examples with the larger group. Provide guidance and feedback as needed.

Concurrent Chains Plan Development

For this activity, have your supervisees complete the *Concurrent Chains Plan* (see Appendix A). We provide an example of a completed plan on page 2 of Appendix A. If the example does not translate to the clients with whom your supervisees work, feel free to develop your own example. Your supervisees should complete the plan with their clients in mind; however, the procedures will be role-played during individual supervision without a client, thus the plan should be appropriate for the role-play as well. Have your supervisees share their plans with the group and encourage the supervisees to provide feedback to one another. Provide ongoing guidance and feedback as your supervisees complete the activity. Your supervisees may not finish the entire plan during this meeting; however, they should try to complete as much as possible as they will need to bring the plan to the supervision without a client meeting.

Knowledge Check

1. Name 5 choice opportunities that can be incorporated into treatment.
2. Describe the steps for using a concurrent chains arrangement.
3. Provide 3 examples of self-advocacy skills.
4. Identify 3 strategies for collaborating with client family members.

Homework for Individual Supervision without a Client

1. Finish the *Concurrent Chains Plan* (Appendix A). Bring relevant materials to the meeting.

Individual Supervision Meeting Without a Client

Below is a plan for activities to incorporate into a 30-minute meeting with an individual supervisee.

Individual Supervision Meeting Without a Client Agenda

Time	Activity
0:00–15:00	Concurrent Chains Arrangement
15:00–30:00	Client-Directed Activities

Materials Needed

- Appendix A: *Concurrent Chains Plan*
- *Compassionate Collaboration Tool*

Concurrent Chains Arrangement

Prior to the meeting, your supervisee should have finalized their *Concurrent Chains Plan* that they began working on during group supervision. Review their finished document and provide feedback as necessary. Ask your supervisee to implement the plan with you playing the role of the client. Ensure that they implement the procedures accurately according to their written plan with at least 85% accuracy. Provide praise and corrective feedback according to the procedures described in the documented plan. Discuss situations in which these procedures would be appropriate for their clients.

Client-Directed Activities

The purpose of this activity is to prepare your supervisee to coordinate a collaborative meeting with a client or caregiver regarding goal development. Review the evaluation form provided in Rohrer et al. (2021) Table 1 with your supervisee. Encourage your supervisee to ask any questions they may have regarding the items on the tool. Following this discussion, ask your supervisee to role-play the conversation they plan to have with the client or caregiver. Make sure to respond in ways that might challenge your supervisee and force them to problem solve in the moment. During and following the role-play activity, provide feedback on your supervisee's facilitation of the conversation. Allow your supervisee the opportunity to practice portions of the conversation that did not go smoothly during the role-play.

Homework for Individual Supervision without a Client

1. Prepare materials for meeting with client or caregiver.

Individual Supervision Meeting with a Client

Below is a plan for activities to incorporate into a 1-hour supervision session in which you observe your supervisee with a client.

Individual Supervision Meeting with a Client Agenda

Time	Activity
0:00–30:00	Client/Caregiver Collaboration Meeting
30:00–45:00	Session Procedures
45:00–60:00	Performance Feedback

Materials Needed

- *Compassionate Collaboration Tool*
- *Supervision Observation Form*

Client/Caregiver Collaboration Meeting

Prior to the meeting, your supervisee should have prepared any materials required for the meeting. During this meeting, your supervisee will facilitate a conversation related to goal development with their client or their client's caregiver. If possible, observe the conversation from a distance to limit the amount of interference caused by your presence. Bring a copy of the *Compassionate Collaboration Tool* (Table 1; Rohrer et al., 2021) to evaluate your supervisee's performance during the meeting. During the conversation if the conversation proceeds in a direction other than that which was intended, you may need to intervene to ensure the discussion is considerate as well productive.

Session Procedures

Following the client or caregiver meeting, continue to observe your supervisee target goals with their client. During this portion of the observation, collect data using the *Supervision Observation Form.*

Performance Feedback

After you observe your supervisee's meeting, provide feedback using the *Compassionate Collaboration Tool* to guide the discussion. First, review the scores with your supervisees. Provide a rationale for why specific scores were given and guidance for how they can improve with each component in the future. Next, for the components which were scored as a 1 or 2, provide a model of using the skills

appropriately. Answer any questions posed by your supervisee. Finally, for all components that your supervisee received a score of 1, ask your supervisee to role-play engagement in these skills with you. If your supervisee requests to role-play engagement in skills that they received a score of 2 on, make sure to provide these opportunities as well.

Mastery Criterion

In order to progress from this lesson, your supervisee must receive at least 68 points out of a possible 84 points (80%) on the *Compassionate Collaboration Tool*. If they receive fewer than 68 points, a second individual meeting without a client should be scheduled. This meeting should include intensive role-play and feedback. Then, another observation with performance feedback should be conducted.

Future Growth

- ☐ Observe your supervisee assessing for treatment preference with a client.
- ☐ Observe your supervisee providing feedback to another supervisee on their implementation of interventions targeting self-advocacy.

Appendix A: Concurrent Chains Plan

Initial link stimuli
Contingencies associated with initial link stimuli
Procedures for exposure trials
Procedures for choice trials

Example of Plan

Initial link stimuli
1. Red math worksheet 2. Blue math worksheet 3. Orange math worksheet
Contingencies associated with initial link stimuli
1. 80% accuracy on the entire worksheet results in reinforcement. 2. Completion of the entire worksheet in less than 5 minutes results in reinforcement. 3. Reinforcement is not provided for worksheet completion.
Procedures for exposure trials
☐ Before conducting choice trials, the practitioner presents the three worksheets. ☐ The practitioner simultaneously gives the instruction "pick one" and physically guides the client to select one of the worksheets. ☐ The client is then instructed to complete the worksheet and reinforcement is provided according to the corresponding contingency. ☐ This is repeated for the other two worksheets.
Procedures for choice trials
☐ The practitioner presents the three worksheets. ☐ The practitioner gives the instruction "pick one" and waits for the client to select one of the worksheets. ☐ The client is then instructed to complete the worksheet and reinforcement is provided according to the corresponding contingency. ☐ The order (L, M, R) of the worksheets will be randomized to prevent a position bias. ☐ Two to three additional trials will be conducted. ☐ Cumulative selections will be graphed.

References

Briggs, A. M., Akers, J. S., Greer, B. D., Fisher, W. W., & Retzlaff, B. J. (2018). Systematic changes in preference for schedule-thinning arrangements as a function of relative reinforcement density. *Behavior Modification, 42*(4), 472–497. https://doi.org/10.1177/0145445517742883

Brodhead, M. T., Higbee, T. S., Gerencser, K. R., & Akers, J. S. (2016). The use of a discrimination training procedure to teach mand variability to children with autism. *Journal of Applied Behavior Analysis, 49*(1), 34–48. https://doi.org/10.1002/jaba.280

Chezan, L. C., Drasgow, E., McWhorter, G. Z., Starkey, K. I., & Hurdle, B. M. (2019). Discrimination and generalization of negatively-reinforced mands in young children with autism spectrum disorder. *Behavior Modification, 43*(5), 656–687. https://doi.org/10.1177/0145445518781957

Hanley, G. P., Piazza, C. C., Fisher, W. W., & Maglieri, K. A. (2005). On the effectiveness of and preference for punishment and extinction components of function-based interventions. *Journal of Applied Behavior Analysis, 38*(1), 51–65. https://doi.org/10.1901/jaba.2005.6-04

Hanratty, L. A., & Hanley, G. P. (2021). A preference analysis of reinforcer variation and choice. *Journal of Applied Behavior Analysis, 54*(3), 1062–1074. https://doi.org/10.1002/jaba.835

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2012). *Acceptance and commitment therapy: The process and practice of mindful change* (2nd ed.). The Guilford Press.

Morris, C., Detrick, J. J., & Peterson, S. M. (2021). Participant assent in behavior analytic research: Considerations for participants with autism and developmental disabilities. *Journal of Applied Behavior Analysis, 54*(4), 1300–1316. https://doi.org/10.1002/jaba.859

Rajaraman, A., Hanley, G. P., Gover, H. C., Staubitz, J. L., Staubitz, J. E., Simcoe, K. M., & Metras, R. (2022). Minimizing escalation by treating dangerous problem behavior within an enhanced choice model. *Behavior Analysis in Practice, 15*(1), 219–242. https://doi.org/10.1007/s40617-020-00548-2

Rohrer, J. L., Marshall, K. B., Suzio, C., & Weiss, M. J. (2021). Soft skills: The case for compassionate approaches or how behavior analysis keeps finding its heart. *Behavior Analysis in Practice, 14*(4), 1135–1143. https://doi.org/10.1007/s40617-021-00563-x

Skinner, B. F. (1974). *About behaviorism*. Alfred A. Knopf.

Valentino, A. L., Fu, S. B., & Padover, J. L. (2019). Teaching mands for information using "why" to children with autism. *The Analysis of Verbal Behavior, 35*(2), 245–257. https://doi.org/10.1007/s40616-019-00113-1

Index

T. N. Davis, J. S. Akers, *A Behavior Analyst's Guide to Supervising Fieldwork*,
https://doi.org/10.1007/978-3-031-09932-8