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)

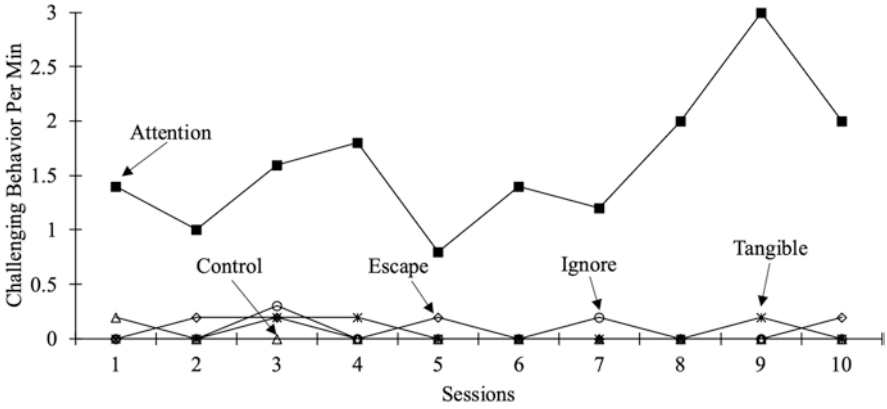

Fig. C.1 Functional analysis results for Client A. Conducted with 5-minute sessions

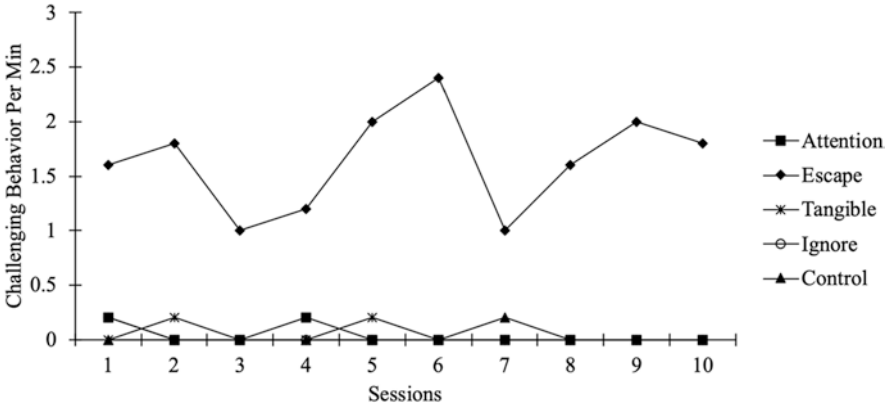

Fig. C.2 Functional analysis results for Client B. Conducted with 5-minute sessions

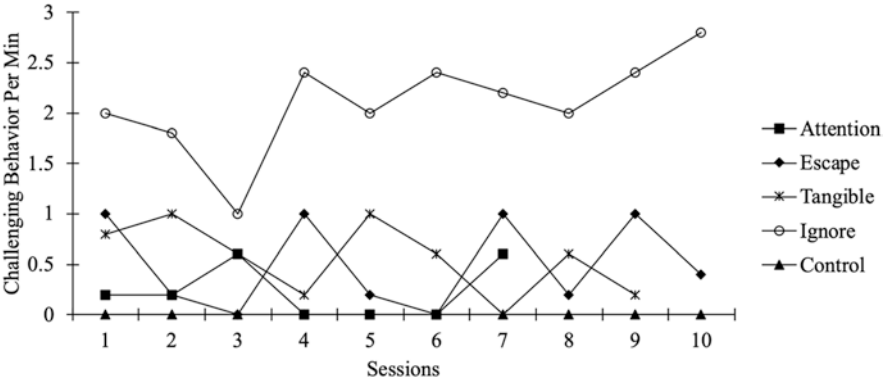

Fig. C.3 Functional analysis results for Client C. Conducted with 5-minute sessions

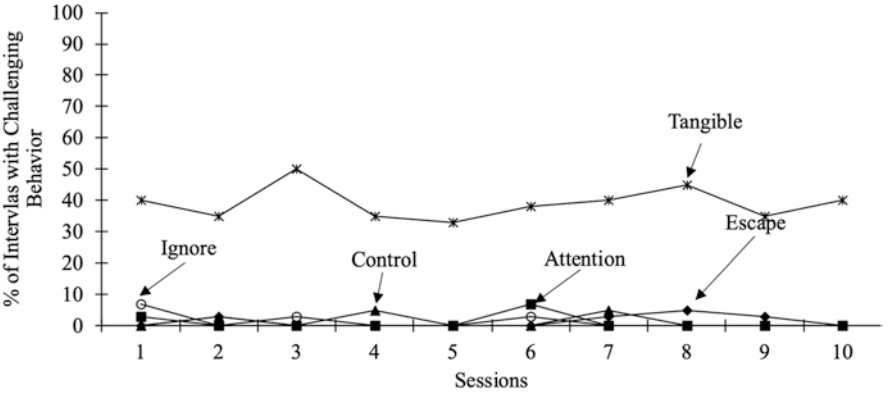

Fig. C.4 Functional analysis results for Client D. Conducted with 15-minute sessions

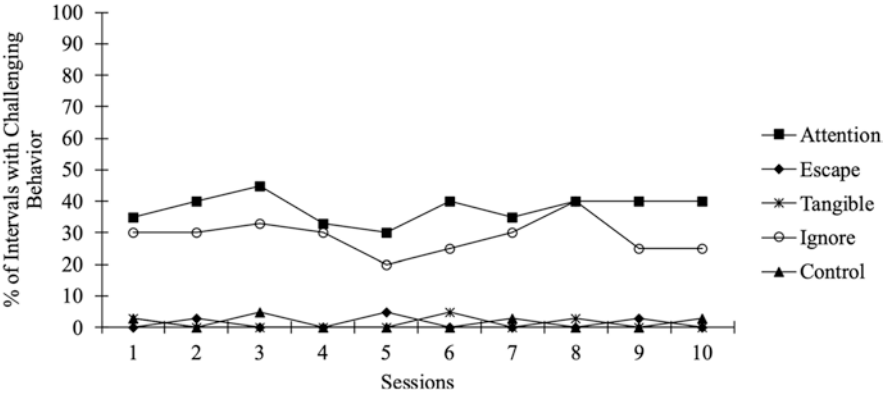

Fig. C.5 Functional analysis results for Client E. Conducted with 15-minute sessions

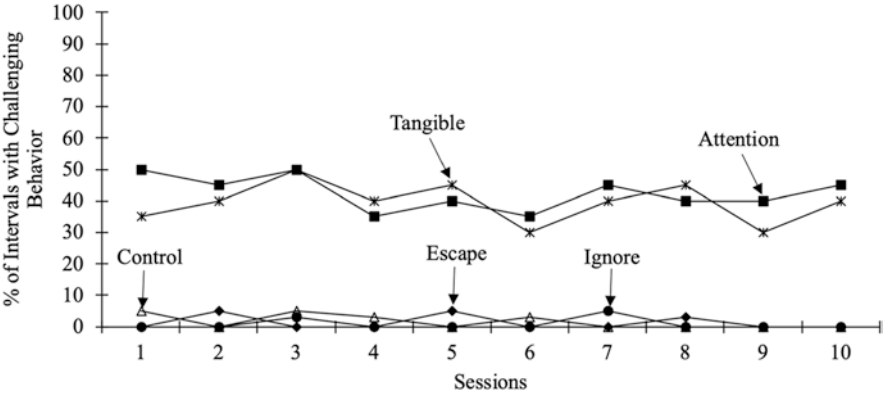

Fig. C.6 Functional analysis results for Client F. Conducted with 15-minute sessions

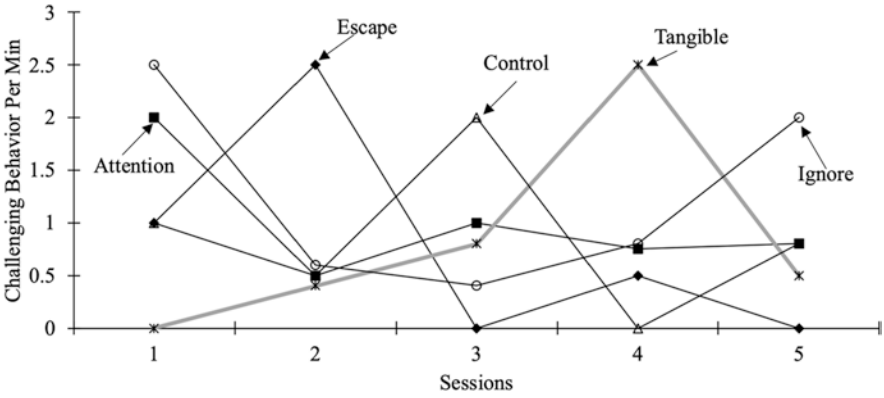

Fig. C.7 Functional analysis results for Client G. Conducted with 5-minute sessions

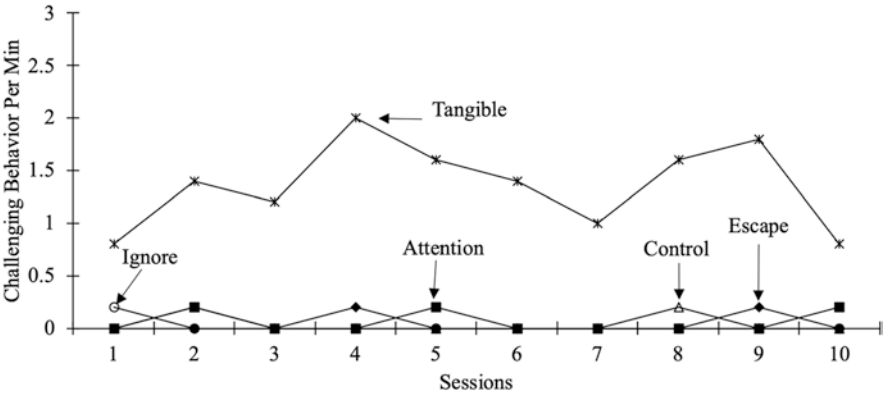

Fig. C.8 Functional analysis results for Client H. Conducted with 5-minute sessions

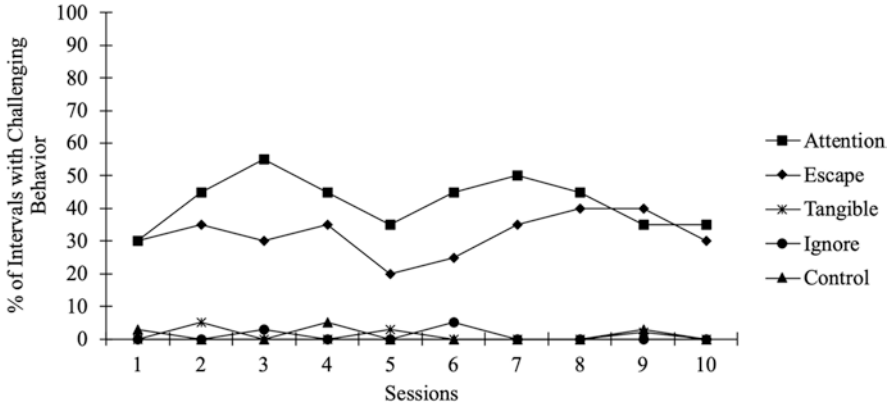

Fig. C.9 Functional analysis results for Client I. Conducted with 10-minute sessions

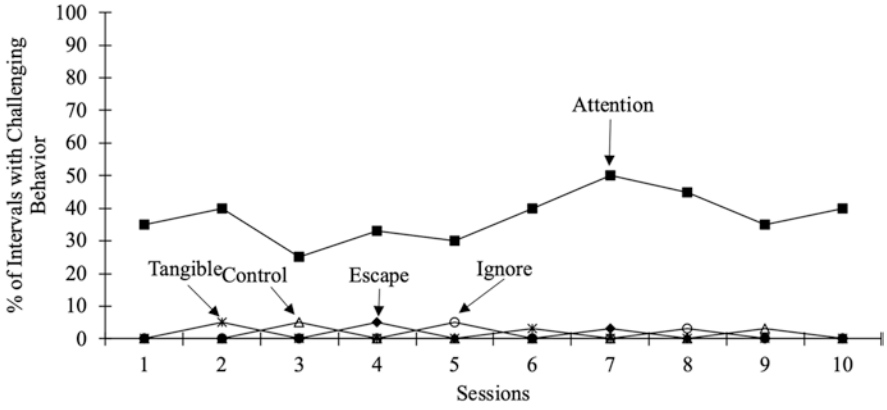

Fig. C.10 Functional analysis results for Client J. Conducted with 10-minute sessions

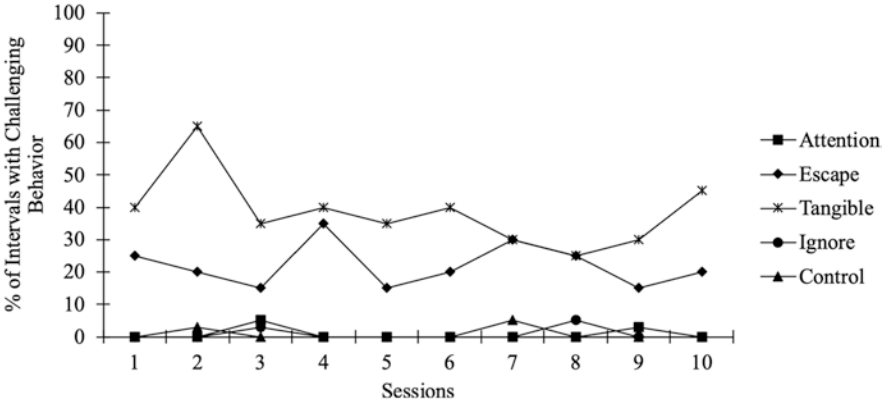

Fig. C.11 Functional analysis results for Client K. Conducted with 10-minute sessions

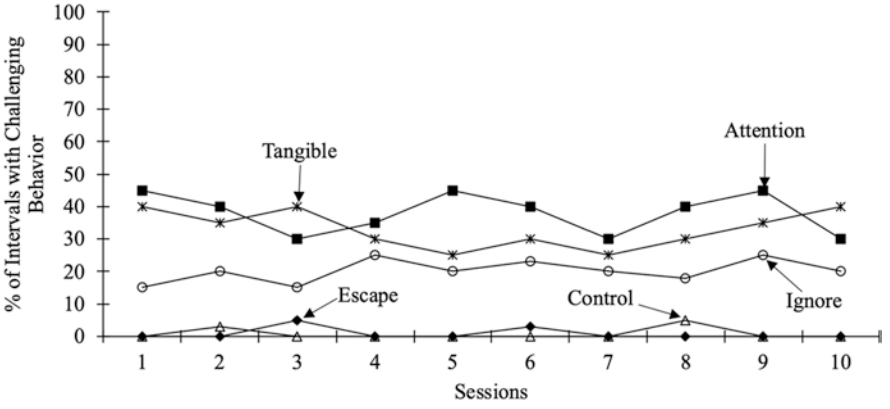

Fig. C.12 Functional analysis results for Client L. Conducted with 10-minute sessions

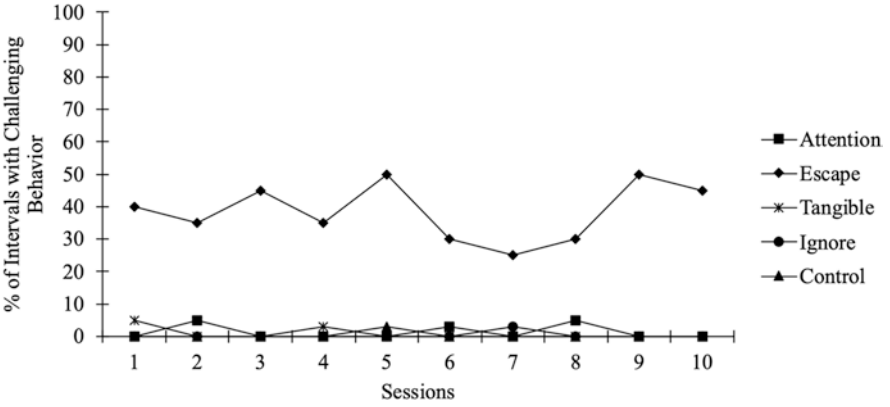

Fig. C.13 Functional analysis results for Client M. Conducted with 10-minute sessions

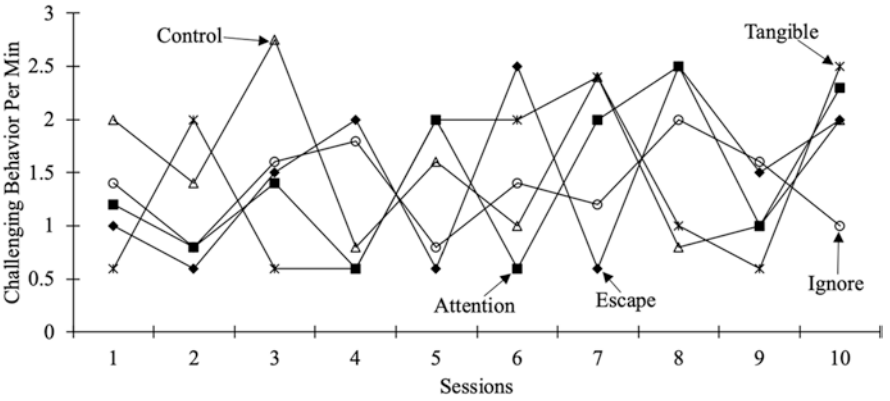

Fig. C.14 Functional analysis results for Client N. Conducted with 15-minute sessions

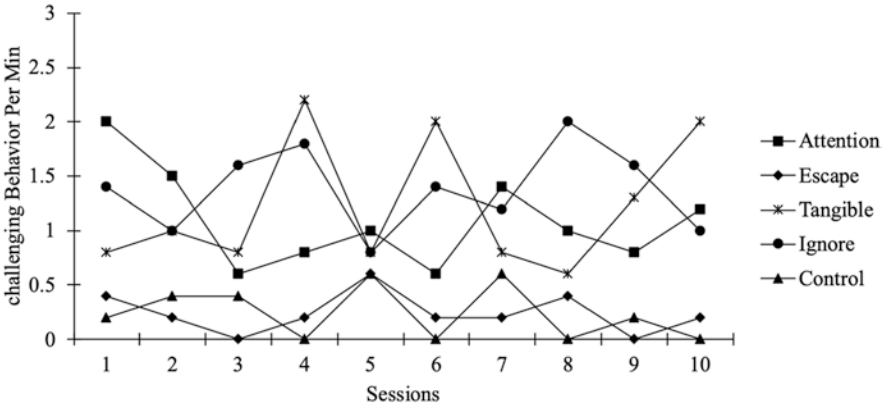

Fig. C.15 Functional analysis results for Client O. Conducted with 15-minute sessions

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.