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DISCUSSION AND REVIEW PAPER

Frequency of Mand Instruction Reported in Behavioral, Special Education, and Speech Journals

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Abstract The authors reviewed 10 years of research literature on teaching mands to individuals with developmental disabilities. Articles were selected from journals associated with three professional organizations (e.g., Association for Behavior Analysis, Council for Exceptional Children, and American Speech and Hearing Association). Findings were reported as frequencies of publication across journals and sets of journal. Furthermore, we reported on the several contextual variables reported within each study (i.e., age of participants, setting, change agent, response topography, generalization). Implications for practitioners are discussed.

Keywords Mand · Developmental disability · Communication intervention

Many individuals with developmental disabilities (DD) do not acquire functional communication (Kent-Walsh et al. 2008; Prizant 1996), defined as a system of responses used to effectively and efficiently convey a message to a communicative partner. The absence of this skill repertoire may preclude individuals' access to a range of important environments (e.g., school, employment, community) and putative reinforcers. For example, in educational settings, these individuals may have difficulty acquiring content, asking for assistance, and engaging in conversation with peers. Additionally, these individuals may engage in problem behavior maintained by access to or escape from environmental stimuli, placing them at an increased risk for maltreatment, abduction, social isolation, and placement in more restrictive settings (Westling et al. 2010).

Fortunately, researchers have demonstrated that communication deficits are amenable to intervention and have evaluated technologies for establishing a range of skills across response topographies (Ganz et al. 2012). One class of responses, mands, has been the focus of extensive research over the last decade. Skinner (1957) first defined the mand as "a verbal operant in which the response is reinforced by a characteristic consequence and therefore, comes under functional control of relevant conditions of deprivation and aversive stimulation" (pp. 35–36). The acquisition of a mand repertoire is critical in that it permits an individual to regulate his/her exposure to desirable and undesirable stimuli. Additionally, researchers have demonstrated that mand instruction has resulted in decreases in functionally equivalent aberrant behavior (Tiger et al. 2008).

In educational settings, students with DD may receive interventions for communication deficits from a range of professionals. For example, in public schools, the charge of teaching students to mand may be delegated to special education teachers, speech-language pathologists, and/or behavior analysts. These groups of professionals may implement treatment models informed by distinct and often competing bodies of research literature (Koenig and Gerenser 2006). These distinctions may be reflected in the recent decision by the Behavior Analysis Certification Board (2013) to discontinue a master's degree in speech pathology as an approved qualifying degree for certification as a board certified behavior analyst (BCBA)

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thereby creating potential further division between professional groups.

Despite the availability of practices that are common across disciplines (e.g., time delay (Goldstein 2002), incidental teaching (Rogers 2000), selection-based systems (Preston and Carter 2009)), disparity across sets of professional literature might impact the quality of communication programming individuals with DD receive. For example, discrepancies in the availability of current literature to a particular set of practitioners may preclude the application of the most refined and potentially efficacious instructional technologies. Additionally, a lack of common terminology and explanations of phenomena related to development of communication skills may hinder collaboration across intervention teams comprised of practitioners from multiple fields. For example, speech-language pathologists and special educators may refer to requesting and labeling as communication behaviors, whereas behavior analysts would use the terminology manding and tacting to refer to the same behaviors. A review of the literature is needed to better identify where these discrepancies occur so that (a) researchers can identify commonalities across disciplines and gaps in the extant literature; (b) professors at institutions of higher education and those involved in professional development can locate effective manding interventions to teach to others; (c) professionals can be aware of discrepancies in the literature which may help facilitate discussion and collaboration across the disciplines; and (d) practitioners know which literature to consult to locate manding interventions to guide their practice.

In the current investigation, we reviewed 10 years of professional literature from three related but distinct fields of intervention research (Applied Behavior Analysis [ABA]), Special Education [SPED], Speech-Language Pathology [SLP]). Our purpose was to identify differences in the availability of literature on increasing the use of mands by individuals with DD across these three professional groups. We compared the frequency of experimental studies that reported the application of procedures to increase the use of mands, requests, or questioning by individuals with DD across the three bodies of research literature. Furthermore, we reported on the several contextual variables reported within each study (i.e., age of participants, setting, change agent, response topography, generalization).

Method

We conducted a search of 11 journals, from three professional groups charged with the provision of language intervention to children with DD. We selected journals from the publications available as a part of the membership of three professional organizations including Association for Behavior Analysis International, Council for Exceptional Children, and American Speech and Hearing Association. We excluded journals that did not generally publish experimental studies (e.g., *Behavior Analyst*, *Teaching Exceptional Children*). In addition, we included the *Journal of Applied Behavior Analysis* (*JABA*) as it is commonly considered the flagship journal for practitioners of applied behavior analysis. Selected journals included *Augmentative and Alternative Communication* (*AAC*), *American Journal of Speech-Language Pathology* (*AJSLP*), *The Analysis of Verbal Behavior* (*TAVB*), *Behavior Analysis in Practice* (*BAP*), *Exceptional Children* (*EC*), *Education and Training in Autism and Developmental Disabilities* (*ETADD*), *Focus on Autism and Other Developmental Disabilities* (*FOCUS*), *Journal of Special Education Technology* (*JSET*), *Journal of Speech*, *Language*, *and Hearing Research* (*JSLHR*), and *Language*, *Speech*, *and Hearing Services in Schools* (*LSHSS*). Within each journal, we screened all articles published between January of 2004 and June of 2014 to determine if they met our inclusion criteria. After the initial screening process, the third author independently screened all articles published in last 10 years of *AAC*, *EC*, *FOCUS*, *JABA*, and *JSET* (45 % of all journals). Interrater reliability for the identification of articles meeting our inclusion criteria was 99.7 % (range, 99.27 to 100 %) and was collected on 2,115 articles.

Inclusion Criteria

Studies included in the current review met specific inclusion criteria. First, studies were those published in selected journals between 2004 and June 2014. Second, researchers in the studies measured the occurrence of responses identified as mands, requests, or questioning. These were behaviors in which participants requested objects, assistance, or activities and asked questions for information. Third, the participants were individuals with DD defined as those with diagnoses of autism spectrum disorder, intellectual disability, developmental delay, or any combination of these. And fourth, the study involved experimental manipulation of an independent variable that resulted in demonstration of a functional relation.

Data Analysis

Of the articles that fit our inclusion criteria, we extracted data regarding participants' ages, the intervention setting, the type of change agent who implemented the intervention, the targeted response topography, and if the generalization and maintenance of target behaviors were assessed. We deemed these variables important for this review as they are germane to the design and implementation of communication programming and may help to support or dispel perceived distinctions across professional fields. After initial data extraction, the third author independently coded 25 % of the articles across seven

different journals. Interrater reliability for extracted data was 94.63 % (range, 86 to 98 %). Totals for all articles were calculated and sorted by journal set (i.e., ABA, SLP, SPED).

Age of Participants We coded the number of participants that fell into one of five categories: (a) 0–2 years, (b) 3–5 years, (c) 6–11 years, (d) 12–17 years, and (e) 18 years and older. We defined a participant as an individual whose mands were targeted as a dependent variable for the reviewed study.

Settings We coded the occurrence of four types of settings across investigations (i.e., home, school, clinic, community). A setting was defined as the location in which a change agent implemented intervention procedures with the participant. We coded intervention that occurred in a participant's residence as home. Settings described as public or private school or summer camps were coded as schools. We coded clinical settings as those in which procedures were implemented in a clinic, hospital, university, treatment, or training center or described as an experimental setting. We coded community settings as those that existed outside of school, home, and clinical settings and were reported as occurring in the community (e.g., retail stores, community sites).

Change Agents We coded the occurrence of three classes of change agents across the investigations (researcher, practitioner, parent). A change agent was defined as an individual who directly applied an intervention procedure to the participant with a DD. We coded change agents described as a researcher or experimenter as a researcher. We coded change agents described as staff, teacher, therapist, trainer, or paraprofessional as a practitioner. Change agents described as parents were coded as parents.

Response Topography We coded three types of response topographies targeted within studies. Vocal mands were defined as the participant speaking to a communicative partner. Selection-based mands were described as the participant pointing to, exchanging, or pressing a symbol on paper, a card, switch, or device to make a request. Signed mands were defined as the use of a manual sign, approximation of a sign, or gesture to make a request.

Generalization and Maintenance We coded whether maintenance or generalization was assessed within the reviewed studies. Generalization assessment was defined as the measurement of the dependent variables across untrained settings, stimuli, or communicative partners. Maintenance assessment was defined as the measurement of dependent variables following the discontinuation of treatment procedures.

Results

We identified 98 articles that met the criteria for inclusion in our review (see Fig. 1). Seventy-three articles were published in ABA journals (i.e., *JABA*, *TAVB*, *BAP*). The majority of these articles (n=57) were published in *JABA. The Analysis of Verbal Behavior* published 15 manuscripts, and *BAP* published a single manuscript. Fourteen articles were published in SPED journals (i.e., *EC*, *ETADD*, *FOCUS*, *JSET*). The majority of these articles were published in ETADD (n=7) and FOCUS (n=5). *Exceptional Children* and *JSET* published one article each. Eleven articles were published in SLP journals. The majority of the articles were published in *AAC* (n=10). One article was published in *AJSLP*, and no articles were published in *JSLHR* and *LSHSS*.

In order to account for differences in the total number of manuscripts published by each journal, we also calculated the percent of articles per journal that met our inclusion criteria. Similarly, ABA journals published the highest proportion of articles (i.e., *JABA*, 6.94 %; *TAVB*, 11.72 %; *BAP*, 1.10 %), followed by SPED journals (*EC*, 0.30 %; *ETADD*, 1.40 %; *FOCUS*, 1.74 %; *JSET*, 0.28 %) and SLP journals (*AJSLP*, *0*.24 %; *JSLHR*, 0 %; *LSHSS*, 0 %; *AAC*, 3.42 %).

Ages of Participants

Participants' ages ranged from 10 months to 58 years (see Table 1). Across ABA journals, 39 % of participants were ages 5 years and under. Fifty-four percent were between the ages of 6 and 17 years and 6 % were 18 years or older. Across SPED journals, 48 % of participants were ages 5 years and under. Forty-six percent were between the ages of 6 and 17 years and 6 % were 18 years or older. Across SLP journals, 26 % of participants were 5 years old or less, and 74 % of participants were between the ages of 6 and 17 years. No participants were 18 years or older.

Settings

Researchers reported 113 settings across all included studies (see Table 2). Articles in ABA journals described 84 settings across investigations. Thirty-nine percent of investigations were conducted in school settings, 37 % in clinical settings, 21 % in homes, and 2 % in the community. Special education journals reported 16 settings across investigations. Sixty-two percent of investigations were conducted in schools, 13 % in clinical settings, 19 % in homes, and 6 % in the community. SLP journals

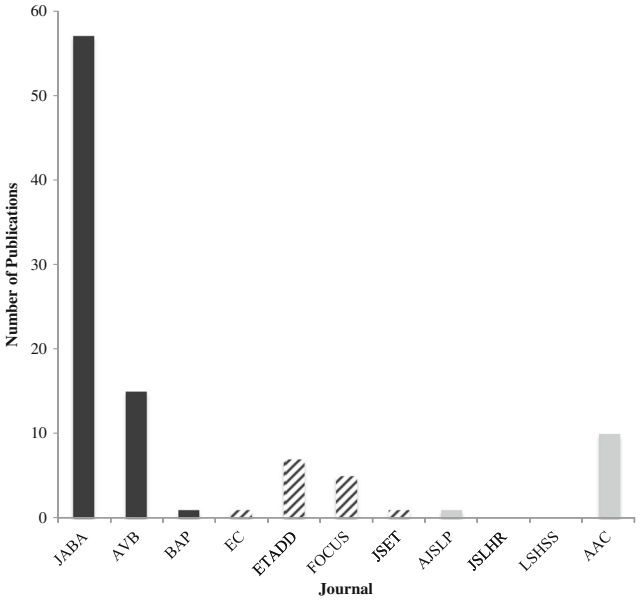

Fig. 1 Frequency of mand publications by journal and sets of journals. *Black bars* show applied behavior analysis journals, *lined bars* show special education journals, and *gray bars* show speech-language pathology journals

reported 13 settings across investigations. Sixty-nine percent of investigations were conducted in schools, 8 % in clinical settings, 23 % in homes, and no studies were conducted in the community.

Change Agents

Researchers reported 103 change agents across all included studies (see Table 3). Across all of the journals, researchers implemented the majority of intervention procedures (n=67). Across ABA journals, researchers conducted 73 % of training procedures, whereas practitioners and parents conducted 20 and 7 %, respectively. Across SPED journals, researchers conducted 47 %, and practitioners conducted 53 % of training procedures. In SLP journals, researchers and practitioners conducted 46 and 54 % of training procedures, respectively.

Response Topography

The majority of interventions targeted vocal mands for participants (see Table 4). Across ABA journals, interventionists targeted vocal mands for 57 %, signed mands for 14 %, and selection-based-mands for 29 % of participants. Across SPED journals, interventionists targeted vocal mands for 30 %, signed mands for 15 %, and selection-based mands for 55 % of participants. Across SLP journals, interventionists targeted vocal mands for 18 %, signed mands for 12 %, and selection-based mands for 70 % of participants.

Generalization and Maintenance

Across all journals, 56 % of studies included procedures for assessing generalization and 30 % included procedures for maintenance (see Table 5). Fifty-eight percent of articles within ABA journals reported the assessment of generalization and 27 % reported maintenance assessment. Fifty percent of SPED articles reported generalization assessment procedures and 21 % reported maintenance procedures. Across SLP journals, 55 % of articles included generalization assessment procedures and 55 % included maintenance procedures.

Discussion

Teaching individuals with DD to make requests is perhaps one of the most valued applications of our instructional technologies. The acquisition of mand repertoire has far reaching implications on an individual's quality of life. For example, the instruction of a few mands has been shown to result in decreases in harmful and potentially stigmatizing behavior

Table 1 Number of studies by age of participant per journal

	ABA			SPED				SLP			
Age	TAVB	BAP	JABA	EC	ETADD	FOCUS	JSET	AAC	AJSLP	JSLHR	LSHSS
0–2	9	0	14	0	5	9	0	1	0	0	0
3–5	10	2	45	0	8	1	0	4	1	0	0
6–11	20	1	74	4	8	4	0	13	0	0	0
12–17	2	0	13	0	2	1	3	4	0	0	0
18+	1	0	12	0	3	0	0	0	0	0	0

AAC Augmentative and Alternative Communication, *AJSLP* American Journal of Speech-Language Pathology, *TAVB* Analysis of Verbal Behavior, *BAP* Behavior Analysis in Practice, *EC* Exceptional Children, *ETADD* Education and Training in Autism and Developmental Disabilities, *FOCUS* Focus on Autism and Other Developmental Disabilities, *JABA* Journal of Applied Behavior Analysis, *JSET* Journal of Special Education Technology, *JSLHR* Journal of Speech, Language, and Hearing Research, *LSHSS* Language, Speech, and Hearing Services in Schools

Table 2 Number of studies by setting per journal

	ABA			SPED				SLP			
Setting	TAVB	BAP	JABA	EC	ETADD	FOCUS	JSET	AAC	AJSLP	JSLHR	LSHSS
Home	5	0	13	0	2	1	0	2	1	0	0
School	10	1	22	1	5	3	1	9	0	0	0
Clinical	2	0	29	0	1	1	0	1	0	0	0
Community	0	0	2	0	1	0	0	0	0	0	0

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(Tiger et al. 2008). Furthermore, improvements in communication skills may result in increased access to natural environments, increased control of the environment, and a reduced risk for maltreatment. Overall, our findings suggest that researchers have conducted considerable analyses of procedures and conditions that resulted in increased manding by individuals with DD. We identified 98 studies that were conducted across a broad range of settings, participants, and change agents. These general findings can be viewed with optimism as they highlight the availability of effective teaching technologies to address this deficit area. Furthermore, when compared to previous reviews (Sautter and LeBlanc 2006), these data reflect an increased emphasis on manding across selected journals (i.e., *TAVB*, *JABA*). This finding may be a result of interventionists' changing perceptions around the amenability of communication deficits to intervention, or it might reflect a sort of intervention momentum built upon increasing demonstrations of success within the literature.

Unfortunately, our findings also suggest that there has been a disproportionate emphasis on manding research across three prominent disciplines often charged with providing communication instruction to individuals with DD. The majority of investigations ($n=73$) were published in ABA journals, whereas SPED and SLP journals published 14 and 11 studies, respectively. Though it is not clear as to the reason for this discrepancy, we can speculate on the contributions of multiple interrelated factors. First, researchers may be influenced by their theoretical approach to communication intervention. For example, whereas educational and SLP researchers may perceive communication intervention with persons with DD as requiring highly specialized intervention, behavior analysts, viewing communication as verbal "behavior" controlled and maintained by environmental stimuli, may be more apt to adjust the environment in response to an individuals' failure to communicate. Similarly, it is plausible that the literature is shaped by the researchers' knowledge of communication intervention and disability. For example, SPED and SLP serve individuals across a wide range of ages and disability areas and have a broad scope of practice. This may limit the formal training professionals have received in communication intervention for persons with DD, whereas behavior analysts must demonstrate competencies in the promotion of verbal behavior prior to certification. Finally, the direction of intervention research may reflect contingencies within the applied contexts. For example, special education researchers have recently responded to calls for increased an emphasis on academic instruction (Spooner et al. 2011), which may compete with functional communication instruction.

Our findings indicate that the majority of investigations have involved school-age children within traditional

Table 3 Number of studies by change agent per journal

	ABA			SPED				SLP			
Agent	TAVB	BAP	JABA	EC	ETADD	FOCUS	JSET	AAC	AJSLP	JSLHR	LSHSS
Parent	0	0	5	0	0	0	0	0	0	0	0
Practitioner	5	1	9	1	2	6	0	5	2	0	0
Researcher	11	0	43	0	5	1	1	6	0	0	0

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Table 4 Number of studies by response topography per journal

	ABA			SPED				SLP			
Topography	TAVB	BAP	JABA	EC	ETADD	FOCUS	JSET	AAC	AJSLP	JSLHR	LSHSS
Vocal	11	1	36	1	3	2	0	2	1	0	0
Selection-based	2	0	23	1	5	3	2	12	0	0	0
Signed	4	0	8	1	0	1	1	2	0	0	0

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educational settings. This is not surprising as individuals with DD often receive the majority of formalized intervention services in school settings. Our review also highlights the potential positive impact that ABA, SPED, and SLP practitioners and researchers have on communication instruction within school settings. Interestingly, many of the studies described the application of interventions in schools by researchers. This finding may reflect the authors' description of practitioner-researchers as experimenters, but they also may call attention to the increased need for investigations that involve intervention delivered by natural change agents (e.g., practitioners, parents).

We also observed that within each set of journals, procedures were conducted in home settings approximately 20 % (range, 18–25 %) of the time. Furthermore, only *JABA* reported evaluating procedures implemented by parents. Though this finding is not surprising as potential participants may be more accessible in clinical and educational settings, it does further illustrate the need for an increased emphasis on conducting research in those settings where individuals are likely to spend the majority of their time. The fewest number of investigations involved intervention within community settings and with older participants. These data are consistent with literature indicating a limited availability of training and supports for adults with DD in postsecondary settings (Shattuck et al. 2012) and reflect a need for more research in community settings with older participants.

Interestingly, few studies involved young children (2 years and under) and adults (18 years), and the majority of these studies were published in ABA journals. Though these data suggest that behavior analysts may be producing the most research in manding for young children and adults, they also may reflect the limited samples of journals reviewed. It is plausible that a broader review of journals, especially those targeting non-school-age individuals (e.g., *Journal of Early Intervention*, *Topics in Early Childhood Special Education*, *Career Development and Transition for Exceptional Individuals*), might have produced different results.

Another compelling finding is that across the fields, researchers applied procedures to a variety of response topographies. Though the majority of studies in ABA journals addressed vocal response topographies, a large percentage targeted augmentative and alternative communication (AAC) responses. Conversely, the majority of studies in SLP and SPED journals involved AAC responses. SLP studies addressed the fewest vocal responses (8 %). This may be due to the majority SLP articles publication in the journal *AAC* that emphasizes alternative response forms. These findings suggest that despite some disagreement concerning the importance of teaching one response form over another (Tincani 2004), researchers across fields have demonstrated the effectiveness of procedures in teaching a range of response forms.

Finally, we observed that approximately half of the research teams attended to the generalization of targeted

Table 5 Number of studies including generalization and maintenance per journal

	ABA			SPED				SLP			
Design component	TAVB	BAP	JABA	EC	ETADD	FOCUS	JSET	AAC	AJSLP	JSLHR	LSHSS
Generalization	8	1	33	0	6	1	1	5	1	0	0
Maintenance	2	0	18	1	1	0	1	5	1	0	0

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responses. With the exception of articles published in SLP journals, fewer teams assessed maintenance. This finding is unsettling as it displays a lack of evidence of the effectiveness of interventions on improving outcomes outside of experimental conditions. It also is surprising as generality is considered a tenet of practice across fields (Baer et al. 1968; Horner et al. 2005).

Implications for Practice

The disproportionality of the published literature on the instruction of mands across disciplines poses challenges for practitioners in the field. Many practitioners do not read their own fields' current literature and may be less likely to read journals across disciplines due to unavailability of the journals or inflexibility to look beyond the frame of reference in which they were trained (Zipoli and Kennedy 2005). This paper should serve as a call to readers to search for information outside of their familiar resources into new areas of intervention research and to consult professionals other than those only within their own fields when designing manding interventions. Our investigation revealed that the majority of recent research on manding was published in ABA journals. Unfortunately, many individuals with DD, especially in public educational settings, may not have access to behavior analysts. Instead, they receive the majority of their intervention services from special education teachers and other interventionists. Furthermore, many students may receive communication intervention solely directed by SLPs. This is troubling considering their field's observed paucity of research on teaching mands.

Although it is possible that SPED and SLP practitioners may be accessing literature in other disciplines, in light of the current review, it appears they need increased access to publications that involve teaching mands. One solution involves marketing ABA journals to practitioners across fields. This unlikely route would require increased response effort by practitioners as they attempt to locate articles across a larger body of research. Furthermore, the cost of membership to multiple professional organizations would be prohibitive for many practitioners. A potentially more effective solution involves increasing the frequency of these publications within with mainstream SPED and SLP journals. This would require researchers to diverge from their familiar publication outlets and prepare manuscripts targeted at new audiences. Submission bias has recently been brought to light within the field of ABA, as prominent researchers have called for behavior analysts to publish "outside of the box" to increase the visibility of behavior analytic practices within other fields (Friman 2014; Schlinger 2014). This broader dissemination effort may require that authors employ the terminology used more commonly in SPED and SLP journals when writing for these outlets and collaborate with researchers outside of their discipline when conducting and publishing research. Second, journal editors for SPED and SLP outlets may need to solicit publications related to manding and work closely with researchers through the editorial process to craft manuscripts that are easily accessible by target audiences.

These preliminary findings should be viewed in the context of several additional limitations. First, it is not clear whether researchers in the current review addressed mands as consistent with the relation described by Skinner (1957). For example, researchers may have taught individuals responses that are widely recognized as requests by a verbal community, but these responses may not have been not under control of motivational variables. Second, as previously mentioned, this review reflects a small sample of the research journals. Our limited focus on journals associated with professional groups may have resulted in the exclusion of studies published in journals across specific topic areas including early childhood education (e.g., *Journal of Early Intervention*), autism spectrum disorder (e.g., *Journal of Autism and Developmental Disorders*), and specialty interdisciplinary journals (e.g., *Journal of Behavioral Education*, *Journal of Speech-Pathology-Applied Behavior Analysis*).

Though limited in its scope, this review supports an assertion that applied behavior analysis and its practitioners play a critical role in the treatment of communication deficits for individuals with DD. Our data suggest that there are discrepancies in the availability of literature on teaching mands across fields of practice, but the extent of these discrepancies across other skills and instructional technologies is still unknown. Future reviews might shed greater light on this systemic problem by addressing a broader range of dependent variables (e.g., employment, academic, self-help) and technologies (e.g., response prompting, multiple exemplar instruction, shaping) and the quality of research methodology. The availability of these data may further support the proliferation of behavior analytic practice for improving the lives of persons with disabilities across a range of contexts.

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