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Using behavioral skills training and video examples to teach undergraduates to identify the function of behaviors

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Abstract

This study investigated the relative effectiveness and efficiency of three different training sequences in teaching undergraduate students in psychology and/or special education to identify the function of undesirable behaviors in video examples. The study also evaluated whether the procedures were effective in promoting the generalization from videos of role-played practitioner-child interactions to videos of children displaying undesirable behaviors similar to those depicted in the training videos, but in naturalistic environments. Behavior skills training (BST) and multiple exemplar training were utilized in all three training sequences. The data were supposed to be analyzed through a multiple baseline across participants embedded within a stacked ABC or ABCD design with comparison across participants. However, due to unforeseen circumstances that affected participant recruitment, data were ultimately analyzed through an ABC or ABCD design, with comparison across participants.

Introduction

The functional approach

Applied behavior analysis (ABA) applies the principles of learning theory to create interventions for socially significant behaviors and evaluate the effectiveness of those procedures in changing behavior (Baer, Wolf, & Risley, 1968). In order to create these interventions, behavior analysts must first determine the function, or cause, of behaviors through their relationship with the environmental events that occur immediately before and after the behavior, the antecedents and consequences. Research has demonstrated that individuals who display topographically similar problem behaviors may have considerable variability regarding their function (Iwata, Dorsey, Slifer, Bauman, and Richman, 1994; Kennedy, Meyer, Knowles, & Shukla, 2000). Behavioral interventions are more effective in reducing undesirable behaviors, when they are based on the function of the behavior (Hanley, Jin, Vanselow, & Hanratty, 2014). Thus, behavior analysts conduct a functional behavioral assessments (FBA) before intervening on a behavior. FBA is a process through which we attempt to identify the variables that occasion and maintain a target behavior. (Rooker, DeLeon, Borrero, Frank-Crawford, & Ruscoe, 2014).

Numerous studies have shown the connection between undesirable behaviors and their maintaining consequences in the individual's environment. For example, early behavioral research demonstrated that contingent social attention as a consequence for self-injurious behavior (SIB) and tantrum behaviors maintained those behaviors (Lovaas, Freitag, Gold, & Kassorla, 1965; Lovaas & Simmons, 1969; Stokes & Osnes, 1985). Other studies showed that negative reinforcement in the form of escaping from difficult tasks can maintain tantrums, SIB, and aggression (Carr, Newsom, and Blinkoff, 1980; Guess, Sailor, Rutherford, & Baer, 1968; Stokes & Osnes, 1985; Weeks & Gaylord-Ross, 1981). Rapp, Miltenberger, Galensky, Ellingson, and Long (1999) found that a woman with intellectual disability and cerebral palsy continued to pull her hair when she was alone, suggesting that her hair-pulling was not maintained by a socially-mediated consequence. It can therefore be hypothesized that her hair-pulling was automatically reinforcing (Rapp et al., 1999).

In summary, there are three environmental contingencies that maintain behaviors: social positive reinforcement (access to attention or a tangible item or activity), social negative reinforcement (escape), and automatic reinforcement (Rooker et al., 2014). The purpose of the FBA is to use the information gathered to develop an intervention that disrupts relationship between the target behavior and its reinforcer and/or arrange for the client to access the same reinforcer in a more appropriate way (Rooker et al., 2014). Pelios, Morren, Tesch, and Axelrod (1999) found that after functional variables are identified, researchers were more likely to choose reinforcement-based procedures and less likely to use punishment procedures to treat problem behaviors.

There are two primary methods for analyzing the function of a behavior through direct observation: an experimental functional analysis (FA) and descriptive FBA. The descriptive method was described early in the history of applied behavior analysis by Bijou, Peterson, and Ault (1968). They outlined the procedures of a descriptive analysis which were to: describe the setting in objective terms, define and record behavioral and environmental events in observable terms, and measure observer reliability. They implemented these procedures to observe the social behavior and of a child in his preschool and his engagement in the school activities. Through analyzing the data of this descriptive assessment, they found that the data suggested relationships between the behavior of the child and the behavior of his teachers and peers. Without an experimental analysis, we cannot hypothesize a functional relation, but the strong correlations between the occurrence of the target behavior and particular environmental events suggested that if they were to experimentally manipulate those variables, we would see a functional relationship emerge.

FAs require a great deal of effort and professional expertise and may not be feasible in all settings (Cooper, Heron, & Heward, 2007). Additionally, because FAs occasion and reinforce problem behaviors, they may temporarily strengthen an undesirable behavior, or the behavior may acquire additional functions (Cooper et al., 2007). Due to these limitations, many practitioners conduct descriptive FBAs instead. Despite the inability to claim a causal relation, there are several benefits to conducting a descriptive FBA. It allows observers to identify potential contingencies in naturalistic settings, obtain a natural baseline level of the target behavior to assess an intervention (Rooker et al., 2014), and does not disrupt the client's routine (Cooper et al., 2007). Descriptive FBAs are conducted by taking ABC data, and then analyzing the data for correlations between the target behavior and its antecedents and consequences. ABC data involves recording the event that occurs immediately before the target behavior (antecedent A), the target behavior (B), and the event that occurs immediately after the target behavior (consequence C).

Ingram, Lewis-Palmer, and Sugai (2005) compared the effectiveness of interventions based on the results of a descriptive FBA to interventions that were not based on function for two sixth-grade students. They found that the behavior plans that were based on the function identified from the descriptive FBA were associated with greater reductions in problem behavior than the plans that were not based on the function. For one of the participants, levels of problem behavior in the non-function-based intervention were similar to baseline levels. The authors also found that the descriptive FBA was effective in identifying the function of behavior in that the interventions based on those functions reduced the levels of problem behavior (Ingram et al., 2005).

Lalli, Browder, Mace, and Brown (1993) assessed teacher's use of descriptive FBA data to implement behavior reduction interventions with their students. The descriptive FBA allowed the teachers to identify potential reinforcers that may be maintaining a student's inappropriate behavior as they occurred during class. The interventions that were implemented put the relationship between the inappropriate behavior and its possible maintaining consequence on extinction. The subsequent decrease in the frequency of the inappropriate behaviors supported the correlations from the descriptive FBAs.

A meta-analysis of 69 articles on FBA-based interventions implemented in schools for students with or at-risk for emotional and/or behavioral disorders found that the FBA-based interventions reduced the problem behavior by 70.5 percent from baseline to intervention (Gage, Lewis, & Stitcher, 2012). Other meta-analyses have also supported that FBA-based interventions resulted in a reduction of problem behavior (e.g., Martinez, Werch, & Conroy, 2016).

Training parents and emerging professionals in Behavior Analysis/Education

Parent Training. The majority of the current FBA literature has been conducted in group home, clinic, or school settings (e.g., Anderson & Long, 2002; Borrero, Woods, Borrero, Masler, & Lesser, 2010; Erbas, Yucesoy, Turan, & Ostrosky, 2006; Gage, Lewis, & Stitcher, 2012; Kennedy, Meyer, Knowles, & Shukla, 2000; Lalli et al., 1993; Leon, Gregory, Flynn-Privett, & Ribeiro, 2018; Ndoro, Hanley, Tiger, & Heal, 2006; Thompson & Iwata, 2001). Parents of children who have function-based behavior plans may or may not be trained on the intervention. However, training parents to implement a procedure does not give them the tools to problem-solve independently when behaviors change, or new behaviors arise. If parents were trained on the primary procedure of a descriptive FBA, identifying ABCs to hypothesize function, they may respond to the problem behaviors more appropriately. Giving parents more autonomy in managing their child's behaviors may lead to improved behaviors in the home and community, facilitate generalized behavior changes across settings (as opposed to only improved behavior in school, for example), and reduce familial stress related to the problem behaviors.

Many studies have supported the associations between a child's problem behaviors and parent stress (Lecavalier, Leone & Wiltz, 2006), depression, and martial stress (Baker, Blacher, & Olsson, 2005). Baker et al. (2003) studied behavior problems in children with and without developmental delay. They found that parental stress was explained by the extent of the child's behavior problems, not whether they had a developmental delay. These results support the increased need for parent training programs in behavior management.

Numerous studies have shown that parents can be trained to implement behavior-analytic procedures. Marcus, Swanson, and Vollmer (2001) trained mothers to implement function-based interventions on their children's problem behaviors during weekly or biweekly sessions across seven weeks. The interventions trained were differential negative reinforcement, differential reinforcement of alternative behavior (DRA), and non-contingent reinforcement (NCR). Sessions for three out of the four participants took place in the child's home. The mothers' training involved written protocols, role play, modeling, and both immediate and delayed feedback. Results showed that when mothers implemented the procedures with high integrity, children's aggression and tantrums decreased and their compliance and communication increased. Results were maintained in a one-month follow-up measure. These results show that parents can be effectively trained to implement behavior reduction procedures.

McNeil, Watson, Henington, and Meeks (2002) trained parents to identify and operationally define problem behaviors displayed in videos of children in their homes, identify the antecedents of those behaviors in operational terms, and select appropriate replacement behaviors. They then trained parents in procedures to increase appropriate behaviors such as positive and negative reinforcement. Finally, they trained the parents in strategies to decrease problem behaviors such as differential reinforcement and time-out. They found that just four sessions were sufficient to train parents to identify and assess the function of a problem behaviors and design an appropriate intervention.

Gerencser, Higbee, Akers, and Contreras (2017) used an interactive computerized training (ICT) to teach parents to implement visual schedules with their children with autism. Parents' fidelity in the implementation of the visual schedule intervention increased in role-play sessions following ICT, generalized to implementation with their children, and maintained at a two-week follow-up. These results replicate previous studies showing that parents can be trained to implement behavior analytic procedures (e.g., Marcus et al., 2001; McNeil et al., 2002) and shows that ICT is effective and may promote generalization to the naturalistic setting.

Parent training programs may have benefits beyond the skill development of the parent and behavior change of the child. Koegel, Bimbela, and Schreibman (1996) found that teaching parents Pivotal Response Training was associated with increased parent happiness, lower stress, and a more pleasant interaction style between the parent and child. Group parent training on teaching compliance and on-task behaviors to children with ADHD involving role-playing, modeling, and homework assignments was also shown to decrease parent stress (Pisterman et al., 1992). The authors also found that the training led to the parents' ratings of an increased sense of competence. Reduced stress and increased competence scores maintained at a three-month follow-up.

Training emerging professionals in Behavior Analysis and Education. Similar to parents, emerging professionals in Behavior Analysis and education could also benefit from trainings in how to identify the ABCs and hypothesize the function of problem behaviors. When these emerging professionals are challenged with an individual who has particularly severe problem behaviors, they would likely conduct a descriptive FBA or FA under the close supervision of their supervisor. However, they also need to be able to use their clinical judgement to decide how to respond to behaviors as they occur. Training emerging professionals to identify the ABCs and hypothesize the function of problem behaviors could help them develop their clinical judgement and allow them to practice more effectively when their supervisor is not present.

Computer-based training. Within the past 12 years, many studies have emerged in which technology is used as a training medium for college students and new professionals. Dempsey, Iwata, Fritz and Rolider (2012) compared the effectiveness of in-vivo training to video instruction in training undergraduates to record data on the target behaviors they observe. Results showed that both methods were effective, but the video instruction was more efficient, in that participants reached mastery criteria in fewer sessions. Many of the studies described below replicate the effectiveness and efficiency of video or computer-based instruction. A possible explanation for the efficiency of the video training is the ability to control the occurrences of the target behaviors. Videos included examples of progressively more complex situations and this degree of control is not possible while conducting in-vivo training.

Schnell, Sidener, DeBar, Vladescu, and Kahng (2018) investigated the effectiveness of a one-day computer-based training in teaching graduate students to identify the relevant antecedents and consequences in the different FA conditions, hypothesize the function based on visual analysis of the FA data, and make procedural modifications when the FA data do not display differentiated results. Results showed that performance improved after the training for 19 out of the 20 participants. Mastery criteria was set at 90 percent correct responses. Mean performance increased from 68 to 94 percent for one group of participants and from 63 to 93 percent for the other group of participants. Participants also generalized the skills to a novel case and maintained mastery criteria at a two-week follow-up.

Behavioral Skills Training (BST). Many studies on the use of technology to train emerging professionals implement Behavioral Skills Training (BST). BST is an evidence-based training paradigm that involves giving verbal and/or written instructions, a model of the procedure, and rehearsal of the procedure with instructive feedback (Tarbox, Wallace, Penrod, & Tarbox, 2007). Numerous studies have demonstrated the efficacy of BST in training many different skills to different types of participants, including parents (Drifke, Tiger, & Wierzba, 2017; Seiverling, Williams, Sturmey, & Hart, 2012; Tarbox *et al.*, 2007), teachers (Koegel, Russo, & Rincover, 1977; Sarokoff & Sturmey, 2004), direct care staff (Aherne & Beaulieu, 2018; Ducharme & Feldman, 1992), and college students (Rosales, Stone, & Rehfeldt, 2009; Trahan & Worsdell, 2011).

For example, Moore et al. (2002) used BST to train teachers how to conduct the attention and demand conditions of an FA. In the first phase, the authors gave the teachers verbal and written information on the FA conditions, and the teachers accurately answered all questions on the information provided. Teachers then implemented simulated FA conditions, and their performance was variable, ranging between zero and 60 percent correct implementation of the FA condition. In the next phase, participants received training that involved modeling, rehearsal, and feedback, and all participants surpassed 95 percent correct implementation of the FA condition. This study is one of many that show that BST is an effective strategy to teach adults behavior analytic practices.

Moore and Fisher (2007) compared the effectiveness of three different training modalities (complete video model, partial video model, and lecture only) in teaching three staff members in a clinic to conduct functional analyses. The staff members all had bachelor's degrees in psychology, and two of them had no experience in any behavior analytic methods. One of the three participants was enrolled in a master's program for Behavior Analysis and had training in many behavioral methods, but not in functional analysis. The video models were five minutes long. The full video models depicted about double the number of potential therapist behaviors compared to the partial video model. Many of the behaviors that were omitted in the partial video model were responses to behaviors other than the target behavior and prompting procedures used in the demand condition. Each participant was randomly assigned one of the FA conditions to receive a lecture training (verbal instruction) that acted as the control, the complete video model, or the partial video model. In the next training phase, the FA condition that received the lecture training received the complete video model and the condition that received the partial video model remained in that training if the participant did not reach mastery criteria in the previous phase. In the last training phase, the FA condition that received partial video modeling received the full video model if they still had not reached mastery. After each training, participants ran a simulated functional analysis for the given condition with the experimenter acting as a client. Mastery criteria was set at 80 percent correct responses. After the lecture training, participants increased their percentage of correct responding, but responding was still below 60 percent for all participants. Similar increases in responding occurred after the partial video model training. Mastery criterion was reached after the complete video model for eight out of the nine FA implementations. These results show that adults with little to no exposure to behavioral analytic procedures can be trained through brief video trainings (5 minutes per condition, 15 minutes total) combined with components of BST, leading to adequate performance. Results also replicate previous studies that demonstrated that instructions are not sufficient for the development of new behavioral skills (e.g., Ducharme & Feldman, 1992). Additionally, performance in FAs with a client was similar to that of the simulated FA, suggesting that the brief video trainings were also sufficient to promote generalization to other clients and to a naturalistic setting.

Drifke *et al.*, (2017) used BST to teach parents to implement three-step prompting, which involves giving increasingly more intrusive prompts in order to comply with a demand, to treat non-compliance in their children. They conducted trainings and the home, and also conducted a component analysis of the steps of BST to determine which steps are necessary to sufficiently train the parents. They trained the parents to implement the three-step prompting under one instructional context (e.g., putting on shoes), but took generalization data on the implementation of the procedure in three additional contexts (e.g., cleaning up, sorting silverware, and math). In the written instructions and modeling condition, parents had improved implementations compared to baseline, but did not meet mastery. The full BST package was necessary for parents to meet mastery. These findings replicate those of Severtson and Carr (2012) and Kornacki *et al*. (2013). They also found that the results of BST generalized to the three tasks that were not specifically trained (Drifke *et al*., 2017).

Aherne and Beaulieu (2018) assessed the maintenance of discrete trial teaching (DTT) that was trained through BST among in-home providers of behavior analytic services. BST was effective in training the staff in DTT, and one participant maintained her performance in two-, four-, six-, and eight-week follow ups. For the other two participants who did not maintain criterion-level performance at the two-week follow up, the researchers implemented a self-evaluation phase, during which the participants recorded themselves implementing DTT with their client, watched the recording, and took treatment fidelity data on their performance. The experimenter also watched the video, collected fidelity data, and compared the data to that of the participant. BST was also used to train the participants in the fidelity data collection. If DTT performance increased to 100 percent across the two subsequent sessions, a follow-up session was conducted two weeks later. If the participant did not meet mastery criterion, he or she continued in the self-evaluation phase. Results showed that once self-evaluation was implemented, the participants maintained mastery criterion for accurate DTT implementation at a six- or seven-week follow-up. These results replicated studies showing that BST is effective in training DTT (Rosales *et al.*, 2009, Sarokoff & Sturmey, 2004).

Ward-Horner and Sturmey (2012) conducted a component analysis of the different components of BST in training teacher's assistants to conduct functional analyses. In the baseline condition, participants were given instructions because previous literature supports that instructions alone does not lead to appropriate skill acquisition. The other components of BST were assessed independently via an alternating treatments design and the subsequent phases assessed combinations of BST components (rehearsal and modeling and then rehearsal, modeling, and feedback). The researchers found that feedback was the most effective component of BST and video modeling was somewhat effective as well. In the rehearsal conditions, participants did not improve compared to baseline, suggesting that practicing a skill does not lead to improved performance if feedback is not given regarding the practice. However, the authors caution against generalizing these findings too broadly because it is possible that instructions would have been more effective if presented differently and rehearsal would have been more effective if the participants could have practiced for longer periods of time. The investigators also conducted a social validity questionnaire and found that the participants liked the modeling and feedback components of BST the most, suggesting that if instructions and rehearsal without feedback were eliminated from BST, this may not affect the social acceptability of the training paradigm and would reduce the time investment in training. In conclusion, the literature suggests that BST is effective in teaching adults a wide variety of behavior analytic skills, and that modeling, rehearsal, and feedback are all necessary components of the training package.

Jenkins and DiGennaro Reed (2016) used BST to train undergraduate students to conduct FAs. They conducted a parametric analysis to determine whether one, three, or 10 rehearsal opportunities would lead to undergraduate students' most accurate implementation of an FA. The authors performed an "efficiency analysis" to determine which rehearsal condition would be the most efficient. The analysis involved adding the total number of rehearsal opportunities and the total number of seconds each participant was in rehearsal and feedback before meeting mastery criteria. The efficiency analysis showed that the single rehearsals followed by feedback required the least amount of time and rehearsals to achieve mastery criteria (Jenkins & DiGennaro Reed, 2016). This expands on the results of Ward-Horner & Sturmey (2012), which showed that rehearsals were not effective without feedback.

Training emerging professionals using technology and BST

BST requires a significant amount of time and resources. Technology is a useful tool to make behavioral trainings more efficient and cost-effective (Geiger, LeBlanc, Hubik, Jenkins, & Carr, 2018), and to more widely disseminate behavioral trainings (Carr & Fox, 2018). However, studies have shown that feedback is necessary for participants to be effectively trained (Jenkins & DiGennaro Reed, 2016; Ward-Horner & Sturmey, 2012). Therefore, technology-based trainings should be combined with live feedback to maximize the effectiveness and efficiency of behavioral trainings. Trahan and Worsdell (2011) investigated the effectiveness of an instructional DVD in training undergraduate and graduate students to conduct FAs. The DVD depicted video models of the different FA conditions with a voice-over providing verbal instructions. Participants were also given a pamphlet with written instructions of which behaviors the therapist should emit in each FA condition. The day after watching the DVD, the participant acted as the therapist in a simulated FA. Participants achieved an average of 76.7 percent correct implementation of the FA conditions after watching the DVD, compared to an average of 48.3 percent in baseline. However, participants only reached mastery criteria for two or three out of the five FA conditions after watching the DVD. Because they did not reach mastery criteria for all five of the FA conditions, all participants then moved to a feedback phase. Participants only required one or two feedback sessions to reach mastery criterion. These results show that a technology-based training was somewhat effective in training undergraduate and graduate students to conduct FAs. However, the feedback component of BST was required for all participants to reach mastery criteria, replicating the results of Ward-Horner and Sturmey (2012).

Higbee *et al*. (2016) used an interactive computer training (ICT) to teach DTT to undergraduates and special educators. ICT includes components of BST such as instructions, video modeling and rehearsal and was combined with role-playing. All participants acquired the DTT skills after the computer training, and five out of eight participants required feedback to reach proficiency, replicating the results of other studies (Trahan & Worsdell, 2011; Ward-Horner & Sturmey, 2012). These results also replicate previous findings that computer-based trainings that incorporate BST procedures can be effective in teaching behavior analytic skills to adults without experience with behavior analysis (Trahan & Worsdell, 2011).

Geiger *et al*. (2018) compared the effectiveness of computer-based instruction (CBI) versus BST in training undergraduates to implement DTT. Mastery criteria was set at 85 percent accurately performed steps of DTT. After CBI, average performance increased from 12 to 87 percent. After BST, average performance increased from eight to 96 percent. Twenty-three of the 25 participants who received BST met mastery criteria. In contrast, only 16 of the 25 participants who received CBI training met mastery criteria. Participants who did not meet mastery criteria then received feedback on their performance. All participants met mastery criteria after just one feedback session. These results replicate previous studies showing that feedback is a necessary component of behavioral trainings (Higbee *et al.*, 2016; Trahan & Worsdell, 2011; Ward-Horner & Sturmey, 2012), and support the claim that trainings that use technology should be combined with feedback to achieve optimal performance.

Scott, Lerman, and Luck (2018) assessed the use of a computer-based training program with lectures, models, and practice to train teachers and paraprofessionals on how to identify and document the antecedents and consequences of a problem behavior. Specifically, they investigated under what video conditions the teachers would best learn to identify the controlling variables of the behavior. These conditions were: single exemplars of antecedents and consequences, multiple exemplars of antecedents and consequences, and simultaneously occurring antecedents and consequences. They found that simultaneously occurring variables were necessary for most teachers to accurately detect antecedents and consequences in test videos. Further, they found that prior multiple exemplar training was not necessary to achieve the same levels of performance.

The present study: Technology and BST to teach the functional approach

Teaching emerging professionals to analyze behavior functionally is perhaps the most important, most widely generalizable skill in the practice of ABA. Numerous studies have shown that function-based interventions based on descriptive FBAs are effective (e.g., Gage et al., 2012; Ingram et al., 2005; Lalli et al., 1993; Martinez et al., 2016). Descriptive FBAs are conducted through collecting ABC data. The primary skills needed to conduct a descriptive FBA are the ability to identify the antecedents and consequences of a behavior, and the ability to hypothesize a function based on the correlations between behaviors and their consequences. While ABA is a scientific and data-driven practice, it also requires practitioners to make quick, in-the-moment decisions. If we can effectively train emerging professionals to continuously interpret behavior in terms of its antecedents and consequences, they may be able to more quickly develop their clinical judgement when deciding how to respond to behaviors immediately, and thus practice more efficiently in the absence of their supervisors.

Due to the success of the aforementioned studies in combining video and computer-based instruction with BST to teach behavior analytic skills, the present study utilized videos and BST to teach undergraduate psychology students to identify the antecedents and consequences of undesirable behaviors, similar to Scott et al. (2018). The videos allowed for more control over extraneous variables a naturalistic teaching, which could lead to more efficient training. (Dempsey et al., 2012). As was previously mentioned, the addition of technology to behavioral trainings can lead to more efficient and cost-effective learning (Geiger et al., 2018) and allow the trainings to be more easily disseminated to emerging professionals (Carr & Fox, 2018). The present study expanded on the findings of Scott et al. (2018) by not only training the participants to identify antecedents and consequences, but also to hypothesize the function of undesirable behaviors. Additionally, the researcher examined whether it is necessary to train the identification of antecedents before the identification of the function, and which of three training sequences will lead to the most efficient training. The investigator also compared the following training sequences: (1) BST to identify ABCs (BST$_{\text{ABC}}$), followed by BST to identify function (BST$_{\text{FUNCTION}}$), (2) BST$_{\text{FUNCTION}}$ followed by BST$_{\text{ABC}}$, and (3) a combined training that teaches the identification of ABCs and function in the same session (BST$_{\text{ABC+FUNCTION}}$).

Scott *et al*. (2018) found that training multiple exemplars of antecedents and consequences was not necessary; the simultaneous presentation of antecedents and consequences was sufficient in getting the teachers to reach mastery criteria. However, because the authors did not assess for generalization to naturalistic settings, it is possible that this step would have been necessary to promote generalization. Because it has been shown that training multiple exemplars is an effective method to promote generalization (Stokes, Baer, & Jackson, 1974), this study used multiple exemplars of antecedents, behaviors, and consequences in the training videos. Finally, the study assessed whether the multiple exemplar video training was sufficient to promote generalization from the contrived, role-played videos to actual videos of children displaying similar behaviors in naturalistic settings.

Method

Participants

The participants were four undergraduate students in psychology at a state university. Angela, Jim, and Meredith were in their third year of their undergraduate career, enrolled in a psychology of learning course. Kelly was a fourth-year student and was a teaching assistant in the psychology of learning course. Meredith had experience working with individuals with intellectual disability and autism spectrum disorder, but none of the participants had any coursework or experience with ABA. Participants were recruited in response to flyers sent out to psychology professors at the university.

The primary investigator, a second-year master's student in Behavior Analysis, conducted the training sessions under the supervision of a Board-Certified Behavior Analyst (BCBA). The primary investigator was a Registered Behavior Technician (RBT) who had two years of work experience in ABA prior to starting graduate school. An undergraduate research assistant assisted with data collection. The research assistant was in her fourth year of her undergraduate degree in psychology, was completing a coursework for a Behavior Analysis concentration, and had worked as an RBT in the summer before her fourth year.

Materials

A series of training videos were presented to participants via a laptop computer. The videos consisted of graduate students in behavior analysis role-playing adult-child interactions that may result in the child emitting undesirable behaviors. Each video included three exemplars of antecedents, behaviors, and consequences. The videos depicted examples of behaviors for which the function is attention, escape, or access to tangibles. Multiple exemplar training was applied to the types of attention and tangibles used. No videos were shown that depict automatically-reinforced behavior. During training phases, participants were given handouts with information on how to identify the ABCs and function of behaviors. The primary researcher and research assistant used a data sheet and pen to record the participants’ responses.

Procedure

Setting. The study was conducted in the Alvin V. Baird Attention and Learning Disabilities Center (Baird Center) located in the Institute for Innovation in Health and Human Services in the Fall of 2019 and the Spring of 2020. The Baird Center is a university-based assessment and intervention clinic for children and families. The Baird Center clinic consists of an observation room and a play room which share one wall and are separated by a one-way mirror. Both rooms are approximately 2.75 meters wide and 3.75 meters long. Training and testing sessions were conducted with both the participant and investigator in the play room.

Observation room. The observation room contains a locked filing cabinet for data records, one table for observers, seven chairs for clinical research assistants, and a passcode-protected desktop computer without internet connection for recording purposes.

The table is up against the one-way mirror and contains a computer monitor and television displaying video recordings and coding sheets. The undergraduate research assistant coded data in the observation room.

Play room. The play room consists of a child-sized table with four child-sized chairs. A love seat was placed against an adjacent wall. The play room was equipped with two recording cameras mounted on the ceiling in the corner of the room and adjacent to the door to capture family interactions. Play room video recordings were saved to the Video Audio Learning Tool (VALT) software in a locked room according to approved Institutional Review Board (IRB) standards.

Informed Consent. Informed consent was reviewed with each participant and the participant was given the option to sign the consent form. The consent form contained contact information of the principal investigator, faculty advisor, and the chair of the IRB, in case of any questions regarding the students' rights as participants in a research study.

Variables and Data Collection

Independent variable. The independent variables of this study were the training in ABC data collection, training in identifying the function of a behavior, and the combined training in both ABC data collection and function identification. All of these trainings were conducted using BST and multiple exemplar training.

Dependent variable. The present study measured percentage of correct identification of antecedents, consequences, and functions. The researcher conducted efficiency analyses to determine which training sequence requires the fewest number of sessions and time for the participants to reach mastery criteria for training (Jenkins & DiGennaro Reed, 2016).

Data collection and IOA. Three categories of antecedents were depicted in the videos: demand placed, attention diverted, and denied access to a tangible. There were also be three categories of consequences, which corresponded to the three functions of behavior that were being trained in this study: escape, attention, and access to a tangible. Prior to the start of the study, the primary investigator recorded ABC data on all of the videos and hypothesized the function of the behaviors displayed in each video. An additional graduate student in Behavior Analysis independently recorded ABC data on all of the videos and hypothesized the functions of the behaviors (Scott et al., 2018). The graduate student had one year of work experience as an RBT prior to graduate school. Inter-observer agreement (IOA) of the primary investigator and the other graduate student was calculated by adding the total number of agreements of the antecedents, behaviors, consequences, and functions across the two observers, dividing that number by the total number of antecedents, behaviors and consequences presented, and multiplying that number by 100 to obtain the percentage of agreement across the two observers (Scott et al., 2018). All videos that were included in the study had 100 percent IOA (Scott et al., 2018). The second observer was also used to determine whether the instructions delivered to the participants were appropriate for the expected answers. In other words, the primary investigator wanted to determine whether “Pause the video when you see an important event and describe that event.” would prompt individuals with ABA experience to describe ABCs.

After IOA was taken on all of the videos, "gold standard" (Scott *et al.,* 2018) data sheets were created with different examples of observable descriptions of the antecedents and consequences that would be counted as correct, and the category in which the antecedent and consequence fall (i.e., demand placed/removed, attention diverted/delivered, denied access to tangible/access to tangible). There were spaces on the sheet for the data collectors to mark whether the participants' verbal reports were correct responses.

Responses were counted as correct if they were identical to any of the examples of acceptable responses, or if they could be judged by a trained observer to have the same meaning as an acceptable response, even if they do not use identical language. Responses that stated the category of antecedent or consequence present but do not describe the event were also counted as correct. The hypothesized function was scored as correct only if it is identical to the one on the gold standard data sheet.

The efficiency analyses were calculated by adding the total number of rehearsal opportunities before meeting mastery criteria for training (Jenkins & DiGennaro Reed, 2016). For the participants who do not receive the combined training, the rehearsal opportunities were summed across the two different trainings. The training sequence that required the fewest number of rehearsal opportunities to reach mastery criteria was determined to be the most efficient training sequence (Jenkins & DiGennaro Reed, 2016).

After each session, the percentage of correct identification of ABCs was calculated by dividing the number of correct responses by the nine opportunities presented in each video and multiplying that number by 100. The research assistant conducted independent observations for at least 33 percent of the trials for each participant in each phase of the study (range: 33% to 100%). IOA was calculated by adding the total number of instances that the two observers agreed on the scoring of the antecedents, behaviors, consequences, and functions, dividing that number by ten (9 ABCs and 1 function) presented, and multiplying that number by 100 to obtain the percentage of agreement between the two observers.

IOA was calculated for at least 50 percent of trials in each phase of Angela's training (range: 50 -100%), averaging 94.58 percent agreement (range: 83.3-100%). For Jim, a second observer coded data for at least 33 percent of trials in each phase (range 33-100%), with an average of 95.27 percent agreement across all phases (range 85-100%). The researcher calculated IOA for at least 50 percent of Kelly's trials in each phase (range: 50-100%), with an average of 95.7 percent agreement (range: 82.5-100%. For Meredith, IOA was recorded for at least 33 percent of trials (range 33-100%), with an average of 99.17 percent agreement (range: 95-100%).

Experimental conditions and design.

Participants were quasi-randomly assigned to one of three training sequences: (1) BST$_{\text{ABC}}$, post-training$_{\text{ABC}}$, BST$_{\text{FUNCTION}}$, post-training$_{\text{FUNCTION}}$, (2) BST$_{\text{Function}}$, post-training$_{\text{FUNCTION}}$ BST$_{\text{ABC}}$, post-training $_{\text{ABC}}$, or (3) BST$_{\text{ABC+FUCNTION}}$, post-training$_{\text{ABC+FUCNTION}}$. All training sessions were conducted with individual participants. Assignment was such that the first participant was randomly assigned to one of the three training sequences, the second participant was randomly assigned to the two remaining sequences, the third participant was assigned to the final sequence, and the fourth participant was once again randomly assigned to one of the three training sequences. If there had been an opportunity to run more participants, this pattern of quasi-random assignment would have continued. Data collection was concluded when the Baird Center was closed mid-semester because of the arrival of the coronavirus pandemic.

According to the assignment procedures described, two of the participants received the same training sequence. These participants did not have contact with one another during any of the sessions and were not aware of each other's participation in the study. The data from these participants were analyzed in a non-concurrent multiple baseline across participants design, embedded within a stacked ABC design with comparison across participants.

Due to unforeseen circumstances, the researcher was unable to run more than four participants. Therefore, she was unable to implement the non-concurrent multiple baseline across participants design for the other two training sequences. Thus, data for the other two training sequences were analyzed through ABC or ABCD designs.

Baseline. During baseline, the researcher played one or two videos for each of the three functions in a random order Videos were quasi-randomly assigned to them, ensuring that they experienced at least one video of each function of behavior that will be covered in this study. The researcher asked the participant to pause the video immediately after an important event occurred and describe the event to the researcher. Immediately after each video ended, the researcher asked the participant why the behavior occurred. No feedback was given to the participant on his or her responses during baseline.

BST$_{ABC}$. The researcher showed the participant a handout that defined antecedent, behavior, and consequence, and described how to identify them in observable terms. The researcher read the handout out loud to the participant while the paper remained in the participant's view. After reading the handout, the researcher asked the participant if he or she had any questions regarding the information on the handout and answered any questions that were asked. Next, the researcher removed the handout from the participant's view and asked the participant to define ABCs. The researcher then played one randomly selected video for the participant. Videos that were shown during baseline were excluded from training video selection and were reserved for the post-training phase. As the video was played, the researcher modeled for the participant the identification of ABCs by pausing the video immediately after the antecedent occurred, described the event, and labeled it as the antecedent. The same modeling procedure was implemented for subsequent antecedents, behaviors, and consequences. The researcher then played two additional quasi-randomly selected videos for the other two functions of behavior and conducted the same modeling procedure.

After modeling one video of each function, the researcher gave the same instructions as baseline: Paused the video immediately after an important event occurred and described the event. After each description the participant made, the researcher gave the participant specific feedback. If the participant failed to pause the video at an antecedent, behavior, or consequence, the researcher would rewind the video to right before the event occurred, pause the video, and identify the event for the participant. These procedures continued until the participant identified ABCs with 100 percent accuracy for one video of each of the three functions.

If the participant was assigned to experience $BST_{FUNCTION}$ before BST_{ABC}, a maintenance check was conducted prior to the start of the BST session. In the maintenance check, the participant was asked: (1) for the definition of function (2) how function is determined, and (3) what the three functions of behavior are that were covered in this training. In this case, the participant was asked why the behavior occurred at the end of each video and had to identify both ABCs and function with 100 percent accuracy in order to complete training.

BST$_{\text{FUNCTION}}$. The researcher showed the participant a handout that defined function and described and gave examples of the four functions of behavior. The researcher read the handout out loud to the participant while the paper remained in the participant's view. After reading the handout, the researcher asked the participant if he or she had any questions regarding the information on the handout and answered any questions that were asked. Then, the researcher removed the handout from the view of the participant and asked the participant to name the three functions of behavior that were covered in this study. Next, the researcher modeled identifying the consequence and hypothesizing the function of the behavior, for one video of each function, using the same procedures as BST$_{\text{ABC}}$. Rehearsal and feedback were then conducted, as with ABC training. Training sessions ended once the participant was able to correctly identify the consequences and function of the behavior across three videos, one for each function of behavior. If the participant was assigned to experience BST$_{\text{ABC}}$ before BST$_{\text{FUNCTION}}$, a maintenance check was conducted prior to the start of the BST session. In the maintenance check, the participant was asked: (1) what ABC stands for in behavior analysis (2) the definitions of antecedent and consequence, and (3) how we describe antecedents and consequences of behavior (i.e., only observable behaviors). In these cases, the participant had to identify both ABCs and function with 100 percent accuracy to complete the training phase.

BST$_{\text{ABC+FUNCTION}}$. The researcher gave the participant the ABC handout and read it out loud to the participant. The researcher then gave the participant the function handout and read it out loud to the parent. After reading both handouts, the researcher asked the participant if she had any questions regarding the information on the handouts. Next, the researcher asked the participant to define ABCs and function and name the three functions of behavior covered in this study, without looking at the handout. Modeling, rehearsal, and feedback were conducted in the same manner as the other two training conditions. Rehearsal and feedback continued until the participant correctly identified the ABCs and function for each function of behavior.

Post-training phases. After participants met mastery criteria in training, they were re-presented with the first three videos they had been shown in baseline. The same instructions were given as in baseline and training phases, but no feedback was given after the participant's responses. For participants who received BST$_{\text{ABC,}}$ BST$_{\text{FUNCTION}}$ followed post-training$_{\text{ABC}}$, and vice versa. For participants who received BST$_{\text{ABC+FUNCTION}}$, the generalization phase followed post-training$_{\text{ABC+FUNCTION}}$. Feedback was given after the participant identified the function in the last video of the phase.

Generalization. Once participants completed training for both ABCs and function, they moved to a generalization phase. In the generalization phase, participants were shown two videos from YouTube that depicted antecedents, behaviors, and consequences in natural settings. In order to qualify as generalization videos, several criteria had to be met. (1) The videos had to depict at least three antecedents, behaviors, and consequences so that the participants had the same number of opportunities to respond as they did in the previous phases in the study. (2) The three consequences of the behavior could be topographically different but had to be in the same functional response class (i.e., in all three consequences, the child had to either get attention, escape/avoid a demand, or gain access to a tangible). (3) The researchers and an additional graduate student in behavior analysis had to have 100 percent IOA in identifying the ABCs and function of the videos. The researcher was unable to find a video for the attention function that met all three of these criteria. Therefore, only two generalization videos were used: one for the escape function and one for the tangible function. The escape video showed a child engaging in elopement and aggression in order to avoid the demand of getting on a swing during occupational therapy. The tangible video showed an infant putting a closed tube of antibacterial cream into his mouth and a parent taking the tube away from him. Each time this occurred, the infant cried, and the parent gave the tube back. As in the post-training condition, the researcher asked the participant to pause the video when an important event occurred, describe the event, and hypothesize why the behavior occurred at the end of the video. Feedback was withheld until after the participant hypothesized the function of both of the videos.

Social Validity

After participants completed training, they were given a participant satisfaction questionnaire. On the questionnaire, participants were asked to evaluate on a Likert scale (1-5) the degree to which they felt that trainings were effective, were satisfied with the amount of time dedicated to training and felt that the skills they learned would be helpful to their future careers.

Results

The count of correct identification of antecedents, behaviors, and consequences across each video is depicted by the horizontal axis on the left side of figures one to four. The axis ranges from zero to nine correct responses, because there were three behavioral events depicted in each video and three expected responses per behavioral event (one antecedent, one behavior, and one consequence), totaling nine opportunities per trial. Whether the participant correctly identified the function of behavior for each video is depicted by the horizontal axis on the right side of the figures. For all four participants, the trainings were effective, in that all participants met mastery criteria for identifying ABCs and function after six to nine total rehearsal opportunities.

In post-training phases after ABC training, Angela (Figure 1) Meredith (Figure 2) and Kelly (Figure 3, bottom panel) responded correctly to all ABCs for two out of three videos. Both Meredith and Kelly identified eight out of nine ABCs correctly in the tangible video. They both errored by stating one antecedent in unobservable terms (e.g., She *wanted* the lego), which is a relatively minor error. Jim (Figure 3, top panel) maintained nine out of nine correct identification of ABCs in his post-training phase. In post-training phases after function training, all participants identified function correctly across three trials, one for each function.

For Jim and Kelly, the two participants who received function training before ABC training, learning how to identify antecedents was not necessary for them to learn how to identify function. Additionally, the function training had no effect on the participants' ability to identify antecedents. Kelly's ability to identify ABCs did increase from an average of 2.3 out of nine correct in baseline to six out of nine correct in posttrainings, but this was due to an increase in ability to identify behaviors and consequences, which is part of function training. Jim's ability to identify ABCs did not show a change from baseline to post-training, with an average of 5.67 out of nine correct responses in both baseline and post-training for function. Meredith, who received ABC training before function training, was still unable to identify function after receiving training in the identification of ABCs.

All participants correctly identified the function of behavior in the two generalization videos and identified all ABCs correctly in the generalization video depicting the tangible function. The identification of ABCs in the video depicting the escape function varied slightly across the participants, ranging from four to six correct responses.

Efficiency analysis. There was no difference in the number of training trials needed to meet mastery criteria across the different training sequences. Angela, who received the combined training, and Kelly, who received function training and then ABC training, both met mastery criteria for ABCs and function in six training trials. Meredith, who received ABC training and then function training, and Jim, who received the same training sequence as Kelly, both met mastery criteria for ABCs and function in nine training trials. When comparing the total number of trials needed to complete all phases of the study, the combined training was most efficient because it only required one post-training phase rather than two. Angela, who received the combined training, completed all phases in 15 trials, whereas the other three participants completed training in 19 to 20 trials.

Social validity. The social validity questionnaire was distributed to the participants immediately after their completion of the generalization phase. The questionnaire had five items, all scored on a scale of one (strongly disagree) to five (strongly agree). All participants scored a five for the second, fourth, and fifth items on the questionnaire. Items one and three had a mean score of 4.75 across participants. Overall, this indicates that participants were satisfied with the training they received.

Discussion

All participants improved in their ability to identify ABCs and function in videos depicting role-played adult-child interactions with problem behaviors. These findings replicate previous research that demonstrated trainings that used technology and BST were effective in teaching behavior analytic skills to undergraduates (Geiger *et al.*, 2018; Higbee *et al*., 2016; Trahan & Worsdell, 2011). The results also replicated the findings of Scott and colleagues (2018), who found that a computer-based training was effective in training teachers and undergraduates to identify the antecedents and consequences of behavior. The findings of the present study also expand on those of Scott *et al*. (2018) because the current trainings were also effective in teaching participants to identify function, and they promoted generalization of the skills to naturalistic videos.

Typically, individuals are trained to identify ABCs before they are taught to identify function. For the two participants who received function training before ABC training, learning how to identify ABCs was not necessary for them to learn how to identify function. Furthermore, the function training had no effect on participants' ability to identify antecedents. When conducting functional behavior assessments, behavior analysts often need to consider both the antecedents and consequences because this allows for a better analysis of motivating operations, leading to a more complete picture of the function of behavior (Cipani, 2018). Therefore, it seems that training function before ABCs does not lead to more efficient training. The reverse also seems to be true. The participant who received ABC training before function training was still unable to identify function after receiving training in the identification of ABCs. This suggests that trainees need to be explicitly taught that function is directly related to the consequences of behavior; they will not pick up on function simply through learning how to identify ABCs. These results were only shown in one or two participants, so replication would be needed to verify the findings that assessment of ABCs and of Function are two different response classes.

In the generalization phases, the identification of ABCs in the video depicting the escape function varied slightly across the participants. This video was judged by the experimenter and independently by five other graduate students in ABA to be qualitatively more difficult than the video depicting the tangible function. There were several factors that contributed to this analysis. Firstly, in the tangible video, the ABCs were consistent across the three behavioral events. In all three events, the antecedents were the removal of a tangible, the behavior was crying, and the consequences were a parent handing the item back to the infant. In contrast, in the escape video, behaviors varied (dropping to the floor, elopement, kicking), and while all consequences involved escaping a demand, they were topographically different. Additionally, the escape video depicted a chain of behaviors, in which the consequence of one behavior became the antecedent for the next behavior. While this is quite common in natural settings, all of the role-played videos depicted discrete rather than chained behaviors. Also, while the most immediate consequences in the escape video were that the child escaped the demand, he also received attention. This is also quite common in natural settings. This may be consistent with the results of Scott and colleagues (2018), who found that training to identify co-occurring events was required for participants to attain the highest level of performance. However, the study by Scott *et al.* (2018) did not assess for generalization. Future studies should analyze whether training to identify co-occurring events and chained behaviors are necessary for generalization. It is interesting to note that although participants only identified an average of five out of nine of the ABCs in the generalization video for escape, they were all still able to identify the function. This suggests that although the trainings were not sufficient to identify more complex examples of ABCs, they may be sufficient to understand behavior on a more macro level. However, replication, both across more naturalistic videos and across more participants, would be needed to confirm this result. The limited sample of generalization videos was one major limitation to this study. As was explained in the “Experimental Conditions” section, it was quite difficult to find videos that met all of the inclusion criteria for the study. In the future researchers should look into different strategies for assessing generalization, such as obtaining consent to record clients in a clinic setting, or having a participant describe ABCs in-vivo.

Due to time constraints of the study, each video only depicted three examples of ABCs, while the videos in Scott and colleagues’ training (2018) depicted 11. Showing more exemplars within each video may help to further promote generalization to naturalistic videos. Future research should assess this question. Showing more examples in each video may also more closely approximate the experience of taking ABC data in real-time. This is also consistent with recommendations to promote generalization by training sufficient multiple exemplars (Stokes & Baer, 1977; Stokes & Osnes, 1989).

The limited number of participants was another limitation of this study. The researcher planned to recruit at least nine participants, three for each training condition. If this were the case, the data could have been analyzed through a non-concurrent multiple baseline across participants design, which has stronger experimental control than the ABCD design of this study. The researcher began her second round of participant recruitment the week before undergraduate students were leaving campus for spring break. During spring break, the World Health Organization declared COVID-19, the novel coronavirus, as a pandemic (Cucinotta & Vanelli, 2020). Nationally, universities responded by requesting that students not return to campus after spring break and moved to online courses for the rest of the semester. Therefore, recruitment of additional participants was barred by the university, limiting the interpretation of the results of this study. In addition, in order to make true comparisons between the different training sequences, a between-subjects group design with statistical analysis would need to be employed with at least 30 participants.

While the present study had several limitations, it also had many benefits for those who participated. The participants were trained to evaluate the potential function of undesirable behaviors as they occurred. Training undergraduate students who are likely to be professionals in ABA or in related fields to continually evaluate behavior in that way has social significance in its potential to produce practitioners who are able to more effectively respond to behaviors. Conducting these types of trainings with undergraduate students before they enter the field could also have benefits in that ABA companies and schools will have to dedicate less time and fewer resources in training those employees after they are hired. Additionally, the development of training protocols that use videos and computer-based instruction can help to more widely disseminate behavioral trainings across different regions, lessening the burden of individual ABA companies and school divisions to develop these trainings. Computer-based trainings can also help disseminate ABA trainings to regions where resources are more limited. In order to further extend the reach of a technology-based training, the verbal/written instruction and feedback components of the training in the present study could be part of a computer-based training format, similar to Scott *et al*. (2018).

Future research should assess whether similar strategies would be effective in training RBTs, individuals working toward an RBT certification, teachers, and parents. This research could also extend upon the current training procedures to determine whether those individuals could generalize the skills to their clients, students, or children. It would also be interesting to assess whether a similar computer-based BST model could be used to train those same individuals on how to respond to problem behaviors based on the function they have learned to hypothesize. While all formal assessment of behavior should be closely supervised by a BCBA, and assessment is required before beginning an intervention (Behavior Analyst Certification Board, 2014), BCBAs can only be present with their clients for a limited time, and teachers and parents spend countless hours coping with the behavior of their students and children in the absence of a BCBA. Therefore, it is important for these individuals to be able to learn how to briefly analyze and respond to problem behaviors in the moment.

In conclusion, the results of this study expanded the current literature by showing that a BST model using video examples is effective in that it promotes generalization to naturalistic, rather than scripted, videos. To the author's knowledge, no previous studies have analyzed whether training ABCs and function in a different order than is typical would lead to a more efficient training. Based on the results of this study, it seems as though training ABCs and function concurrently, rather than sequentially, is the most efficient method. However, these results are based on four participants, so extensive replication would be needed to confirm efficiency of training outcomes.

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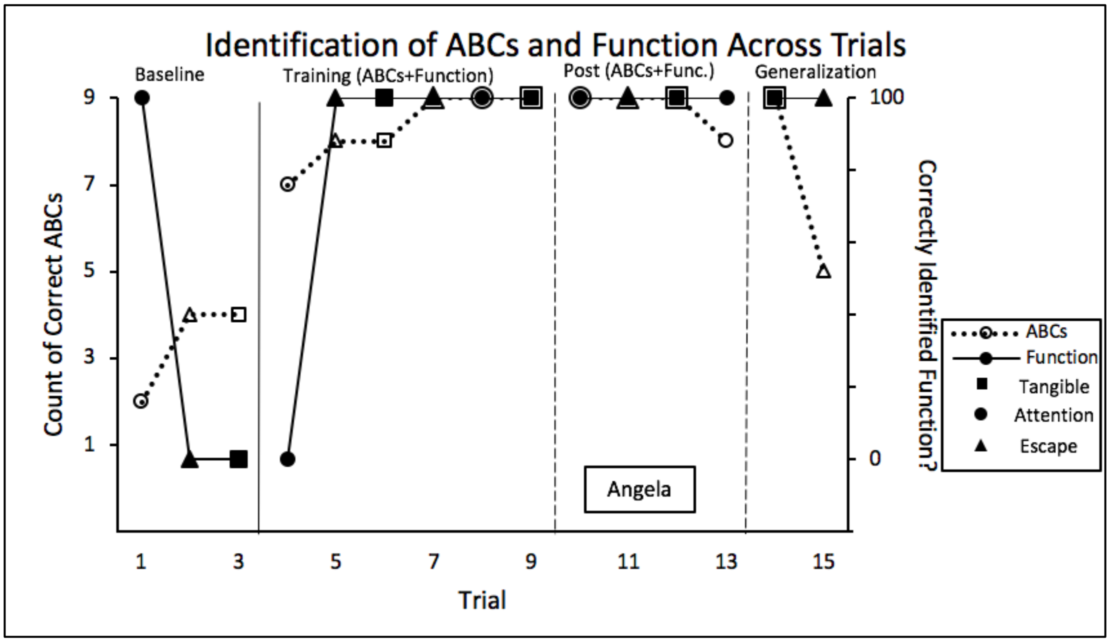

Figure 1: This figure displays Angela's correct identification of ABCs across trials as a count out of nine total opportunities on the left vertical axis, represented by the open shapes and dotted lines. Whether she correctly hypothesized the function correctly is depicted on the right vertical axis, with zero representing that she did not correctly identify the function and 100 representing a correct hypothesis. Hypothesized functions are depicted by the filled-in shapes and solid lines. Angela received the ABC and function trainings in the same session.

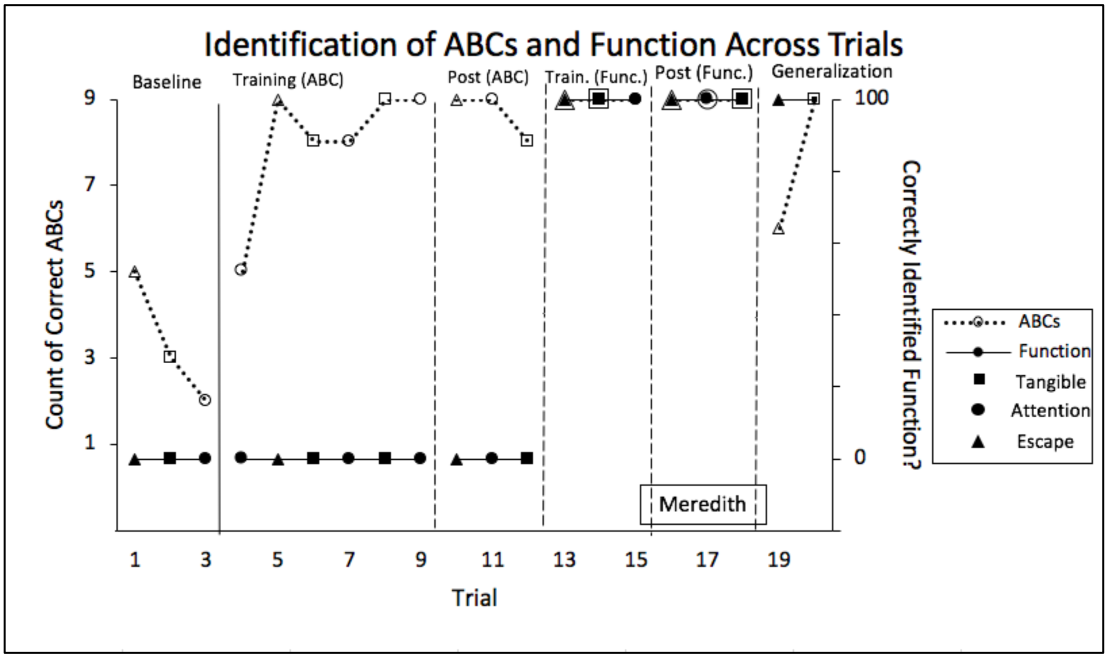

Figure 2: This figure displays Meredith's correct identification of ABCs across trials as a count out of nine total opportunities on the left vertical axis, represented by the open shapes and dotted lines. Whether she correctly hypothesized the function correctly is depicted on the right vertical axis, with zero representing that she did not correctly identify the function and 100 representing a correct hypothesis. Hypothesized functions are depicted by the filled-in shapes and solid lines. Meredith received the ABC training first, and received function training the following week.

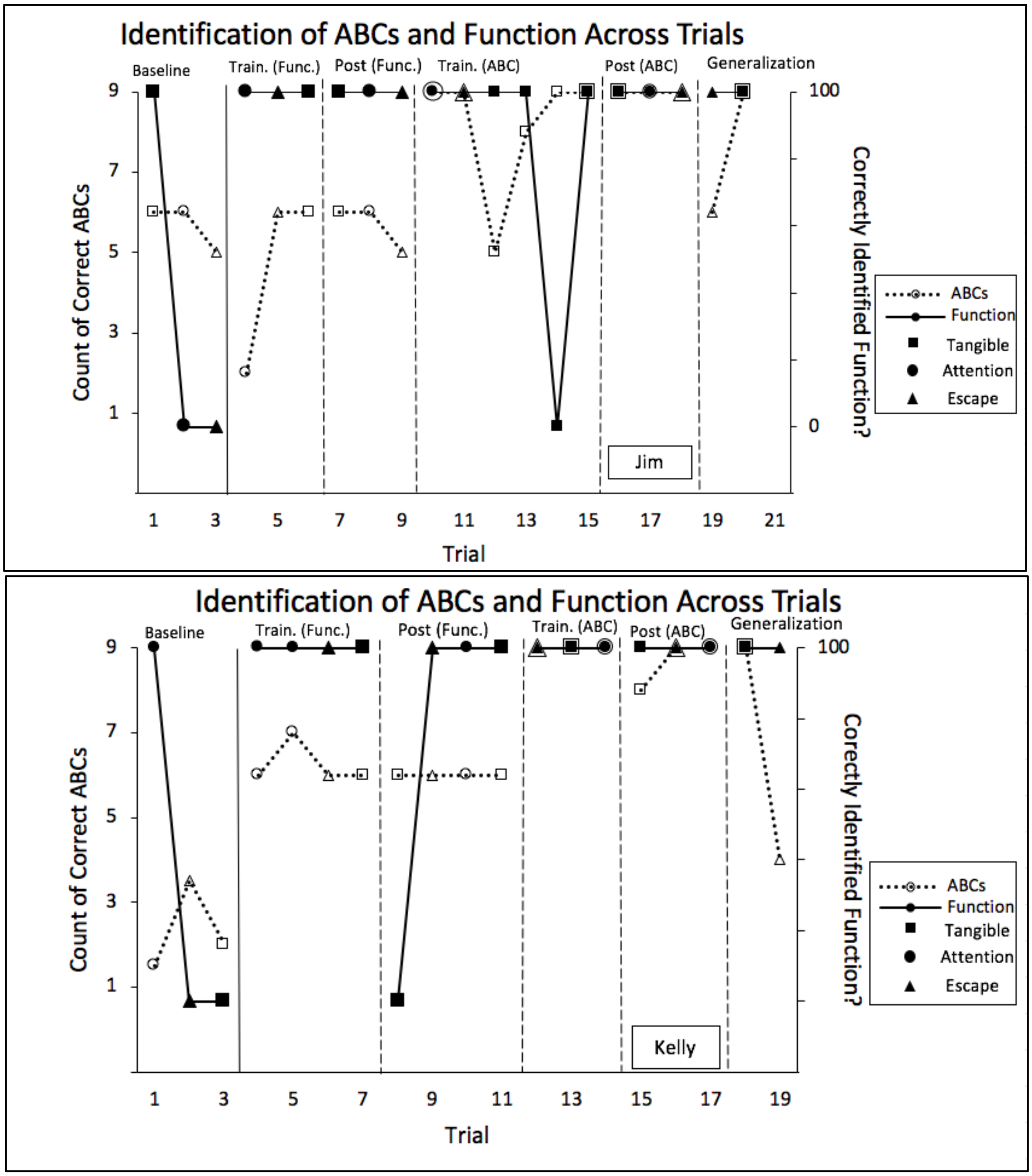

Figure 3: This figure displays Jim's and Kelly's correct identification of ABCs across trials on the left vertical axis, represented by the open shapes and dotted lines. Whether they correctly hypothesized the function correctly is depicted on the right vertical axis, represented by the filled-in shapes and solid lines. Jim and Kelly each received the function training individually, and received individual ABC training the following week.

Appendix A: ABCs Information Sheet

Information Sheet – ABCs

A	Antecedent	What happened immediately before the behavior?
B	Behavior	What happened?
C	Consequence*	What happened immediately after the behavior?

*Consequence ≠ punishment (no negative or positive connotation)

Antecedents, behaviors, and consequences should all be described in observable terms

Unobservable	**Observable**
She felt sad.	She was crying.
He was in a good mood.	He was smiling.
She was concentrating on her drawing.	She was looking at the paper and drawing, without looking elsewhere.
He was tired.	He put his head down on the table.
She was frustrated.	She sighed deeply and furrowed her brows.
He wanted to go home.	He turned the doorknob.

Questions??

Appendix B: Function Information Sheet

Information Sheet – Function

Consequence*	What happened immediately after the behavior?

*Consequence ≠ punishment (no negative or positive connotation)

Function	What is the consequence that is maintaining the behavior?

	The Four Functions of Behavior	Examples (Cooper, Heron, & Heward, 2007)
E	Escape (get out of/avoid a demand)	• Hang up phone → don't talk to telemarketer • Take out trash → mom stops nagging • Call out in class → get sent out of class (escape instructional demands)
A	Attention (get attention from another person)	• Hits teacher → Surprised facial expressions • Call out in class → Reprimands • Tantrum → Attempts to soothe/distract
T	Tangible (get access to an item/activity)	• Turn on TV → get TV show • Steal candy → get candy
S	Sensory* (the behavior itself produces reinforcement)	• Sucking thumb → sensation in mouth • Twirling hair → feeling on fingers

*This study will only focus on the first three functions (EAT = escape, attention, tangible)

Questions??

Appendix C: Data Sheet Example

Data Sheet

Video code: 102 Participant code________ Date_________

Circle: Primary IOA

Circle: Baseline Training$_{ABC}$ Training$_{FUNC}$ Training$_{ABC+FUNC}$

Post-training$_{ABC}$ Post-training$_{FUNC}$ Post-training$_{ABC+FUNC}$ Generalization

	Antecedent	**+/-**	**Behavior**	**+/-**	**Consequence**	**+/-**
Behavior 1	**Attention diverted** - The parent was talking/complimenting/giving attention to the other child.		Crying		**Gained attention** - The parent complimented/talked to/gave attention to the crying child.	
Behavior 2	**Attention diverted** - The parent was drawing. - The parent was not paying attention/talking to the child.		Crying.		**Gained attention** - The parent said, “Did you have a really bad day at school?”. - The parent talked to the child.	
Behavior 3	**Denied access to tangible** - The child tried to take/grab the other child’s paper, but the other child pulled away.		Crying		**Gained attention** - The parent said, “You cannot have her crayon right now”. - The parent talked to/gave attention to the child.	
Hypothesized function					Attention	

Appendix D: Participant Satisfaction Questionnaire

Participant Satisfaction Questionnaire

Please rate on a scale of 1 (strongly disagree) to 5 (strongly agree) the degree to which you agree with the following statements:

	1 Strongly disagree	**2** Disagree	**3** Neither agree nor disagree	**4** Agree	**5** Strongly agree
The training I received through my participation in this study was effective.					
I am now more comfortable describing events in observable terms than I was before I participated in this study.					
I now understand why children may emit undesirable behaviors better than I did before I participated in this study.					
The amount of time I spent participating in this study was worth my time when I consider what I learned.					
The training I received through my participation in this study will be helpful to me in my career.					

Additional comments (optional):

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