



Teaching Children with Autism Extended Verbal Utterances Under Audience Control in the Context of Show-and-Tell

Mark R. Dixon¹ · Anne Blevins² · Jordan Belisle¹ · Bambi Bethel²

Published online: 7 May 2018

© Association for Behavior Analysis International 2018

Abstract

The present study evaluated the efficacy of a discrete-trial-training procedure to bring extended verbal behavior under the convergent control of audience and contextual variables during a show-and-tell activity. Three children with autism were exposed initially to a baseline condition in which they were presented with a preferred item and asked to tell the class about it. Following low rates of responding, a differential reinforcement procedure was implemented that reinforced extending the verbal utterance word length beyond baseline levels allowing for an appropriate display of “show-and-tell” behavior. The results show that the procedures were efficacious in application with three children with autism, providing a method that can be conducted in classroom settings to teach a complex form of verbal operant behavior.

Keywords Audience control · Autism · PEAK · Verbal behavior

Skinner (1957) differentiated between the listener and the audience and their influence on verbal behavior, where the former is part of an occasion in which the verbal behavior of a speaker is reinforced, and the latter serves as a discriminative stimulus in the presence of which speaking is generally reinforced (p. 172). In the presence of an audience, verbal utterances come under the convergent multiple controls of audience and motivational and contextual variables (Michael, Palmer, & Sundberg, 2011). One contextual variable may be the size of the audience, where verbal behavior may be extended in length in the presence of a large audience as single-word utterances are unlikely to result in generalized reinforcement. The ability to emit extended verbal utterances in front of an audience is a deficit experienced by many children (Greer & Speckman, 2010) and is especially challenging for children with autism and related disabilities. Skinner (1957) discussed several ways in which people may learn to emit extended verbal behavior, one of which was through intraverbal response chains. In an intraverbal response chain, a discriminative stimulus that is

often vocal in nature occasions the emission of an intraverbal response, which serves as the discriminative stimulus for subsequent intraverbal responses resulting in a response chain, the topography of which is extended verbal behavior. In practice, vocal prompt fading procedures have been used to teach intraverbal response chains to children with and without disabilities (e.g., Ingvarsson, Tiger, Hanley, & Stephenson, 2007), but more research is needed in terms of how to bring the emission of intraverbal response chains under appropriate audience control.

The purpose of the present study was to evaluate the efficacy of a procedure typical in classroom settings used to bring extended verbal behavior under the control of an audience. In the study, three children with autism were taught to describe everyday objects to an audience (i.e., their teacher and classmates) when given a vocal discriminative stimulus to do so. Although traditional show-and-tell may provide an effective opportunity to reinforce extended verbal utterances emitted by typically developing children, opportunities to engage in the target behavior are infrequent and the stimuli generally poorly controlled, which may hinder the ability of children with lower-functioning forms of autism to benefit from this experience. Show-and-tell in the present study was therefore conducted in a discrete-trial-training format, where the emission of extended intraverbal response chains (i.e., 15 consecutive words or more) was reinforced. As well, least-to-most intrusive vocal stimulus prompt fading was used until a mastery

✉ Mark R. Dixon
MDixon@siu.edu

¹ Rehabilitation Institute, Southern Illinois University, Carbondale, IL 62901, USA

² Collinsville School District, Collinsville, IL, USA

criterion was achieved. To aid in replication of the procedures both clinically and in research, implementation and assessment of the target operant were guided by the *PEAK Direct Training Module* (PEAK-DT; Dixon, 2014), which is a Skinnerian-based verbal behavior curriculum that contains 184 skill targets, including extended verbal response chains under audience control. We selected this curriculum over other available alternatives (e.g., VB-MAPP, ABLLS-R) because it provided a task analysis of implementing the skill of interest and because it has accrued some research on effectiveness for children with autism (Dixon et al., 2017), including psychometric validation of the assessment (Dixon, Whiting, Rowsey, & Belisle, 2014b; Rowsey, Belisle, & Dixon, 2014), as well as single-subject and between-group efficacy studies (Dixon, Belisle, Stanley, & Rowsey, 2018; McKeel, Dixon, Daar, Rowsey, & Szekely, 2015). In addition, many of the skills assessed in PEAK-DT appear to measure more complex verbal behaviors than other available assessments (Dixon et al., 2015), including the skill targeted in this study.

Methods

Participants, Settings, and Materials

Three 10-year-old boys with a diagnosis of autism participated in the study. All participants had prior experience taking part in discrete trial training as part of their individualized education plan; however, no participant had any known history with the training procedure or stimuli used in the current investigation. Prior to the investigation, PEAK-DT assessment scores and IQ scores were obtained from existing client records. The PEAK-DT assessment contains 184 items that correspond directly with the curricular programs, where a full score of 184 has been shown to correspond with performance expected of a typically developing 8-year-old (Dixon, Belisle, Whiting, & Rowsey, 2014a). Typical expected IQ is 100 at any age. James had a PEAK-DT score of 149 and a full-scale IQ score of 37, Kirk had a PEAK score of 168 and a full-scale IQ of 48, and Larz had a PEAK score of 114 and a full-scale IQ score of 43. The participants' norm-referenced PEAK scores were 5–6, 6–7, and 4–5 years, respectively, and taken together with IQ, suggest all participants were performing below typically developing peers of the same age. All PEAK and IQ scores were acquired within 1 year of the present study.

All training took place in a self-contained classroom in a Midwestern American school, and all sessions were conducted in the students' home classroom during the school day. Sessions were conducted in the home classroom to simulate a naturalistic environment where training would likely take place. Each classroom contained several desks, tables, chairs, and preferred stimuli. The typical classroom had between three and eight students, one and two teachers, and one and

two paraprofessionals. Training was conducted by the classroom teacher, who had a previous familiarity with the participants. Sessions lasted between 20 and 40 min and were conducted five times per week over the course of 3 weeks. The procedures and materials were taken directly from PEAK-DT program *14Q – Audience: Show and Tell* (Dixon, 2014). Each participant was taught to describe five items (e.g., toy train, plush animal, reading book), which were individualized based on student preferences observed by the classroom teachers in daily interactions. The same stimuli were used in the baseline and training phases. To avoid exposure of the participants to the verbal responses of the other participants, participants were not present during the show-and-tell performances of the other participants. PEAK-DT data sheets were used to record participant responses during baseline and training conditions, which uses a scoring method that accounts for prompting levels (described below), and data were taken by the teacher on every trial and a second observer on a subset of trials. The procedures were embedded within the participants' existing ABA curriculum.

Dependent Variable and Interobserver Agreement

Participant responses in both the baseline and training phases across all programs were recorded using PEAK scores derived from the PEAK-DT data sheets. PEAK scores were used to allow for a demonstration of how the data would be collected and displayed in a clinical setting. The PEAK scoring system uses a metric that allows for the inclusion of prompt levels in the analysis of participant performance. Within the PEAK scoring metric, participant scores on each trial range from 0 to 10, where scores of 0, 2, 4, 8, and 10 are possible depending on the prompt level required to evoke the response. The prompt levels and corresponding score values assigned in the present study are described in the “**Procedure**” section. Each session was conducted in ten-trial blocks, where each stimulus was presented twice randomly within each block. The PEAK score for each session was determined by finding the sum of each trial within the block. As such, the maximum PEAK score that a participant could achieve within a session was 100.

Interobserver agreement (IOA) was assessed for 23% of the trials to evaluate the reliability of the data, and IOA probes were conducted equally in each of the phases. An interval-by-interval method was used, where the agreement between observers was calculated for each trial. Agreement was assessed on a trial-by-trial basis and occurred when observers assigned the same PEAK score for the trial. The total percentage of agreement was calculated by dividing the number of agreements by the total number of trials, multiplied by 100. The IOA in the present study was 100%.

Procedure

A multiple-baseline across-subjects experimental design was used to evaluate the efficacy of the procedures described in the current study. The procedures were embedded within the participants’ existing ABA curricula which were also implemented by the teachers throughout the study. The data acquired from those programs are not reported in the present study; however, the trial blocks in which the other skills were targeted are shown in Fig. 1, where there are no data points at the given location along the x-axis. Therefore, the baseline phase was conducted as a probe design. There were two phases in the study for each of the participants, which have been described below as baseline and training.

Baseline

The program goal was “When provided with an item, the participant will describe it with at least 15 words in front of several other people” (Dixon, 2014, p. 220). A trial block began by having the teacher saying “Class, can I have your attention for a moment, (Participant) has something to tell you.” Once the class was attending, the participant stood in front of the class, and the teacher gave the participant a preferred item. The teacher then delivered the discriminative

stimulus, “Tell us about your (Item).” A correct response occurred when the participant used at least 15 different words (i.e., each of the 15 words was different from the others during a single trial) to describe the item. The 15 or more words were delivered as word strings in sentence format (e.g., “this is my toy truck, it is red, and I play with it every day during my choice time”). If the participant demonstrated the correct response within 30 s, then the trial was scored as a 10. If the participant failed to demonstrate the correct response, then the trial was scored as a 0. Neither prompting nor contingent delivery of verbal praise was delivered in the baseline phase. Therefore, only a PEAK score of 0 or 10 was possible in this phase. The five stimuli for each participant were presented twice in each trial block, and the presentation order of the stimuli as randomized within each block.

Training

The delivery of the discriminative stimulus was identical to that used in the baseline phase. If the participant correctly described the item, then they were provided with verbal praise. If the participant failed to demonstrate the correct response, then a most-to-least intrusive prompting hierarchy was used. If the participant did not demonstrate the correct response independently in the first trial block, then the most intrusive prompt was used (i.e., providing the full verbal response, see specific prompts below). If the participants successfully demonstrated the response following the prompt, then a less intrusive prompt was used in the subsequent trial. When the less intrusive prompt was ineffective in evoking the correct response, the teacher progressed to a more intrusive prompt within the trial. The most intrusive prompt in the present study involved the teacher providing the student with the complete correct response and requiring them to echo the response (PEAK score of 2). The next most intrusive prompt involved the teacher providing between one and ten words (PEAK score of 4), and finally the teacher merely says “what are some more things that you would say to describe (item)?” (PEAK score of 8). Praise was gradually faded for trials that required prompting, as the participant demonstrated increased mastery of the response. Following each trial, the participant was given the next item, and the same discriminative stimulus was delivered. After ten trials, the other students in the classroom were told to continue what they were doing prior to the beginning of the trial block.

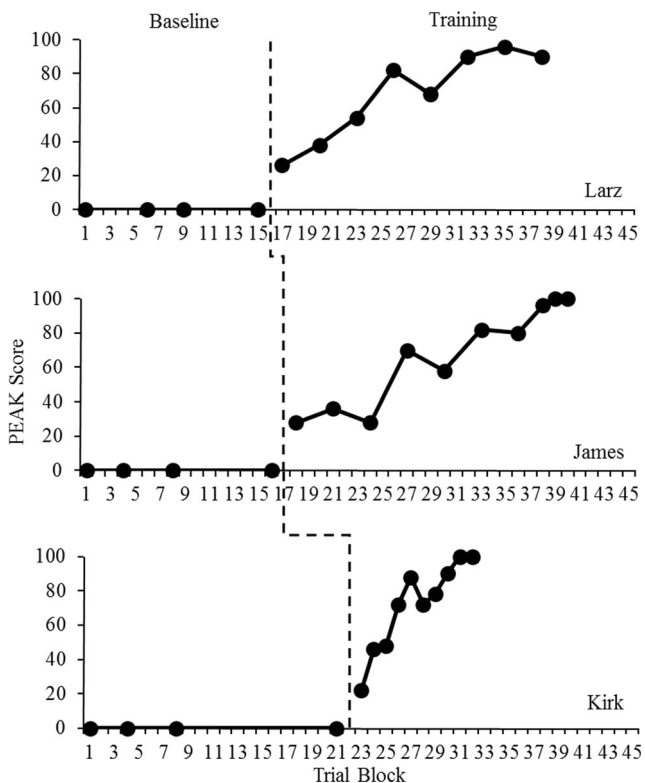


Fig. 1 Multiple-baseline across-subjects evaluation of participant performance during a show-and-tell activity. Data points show participant PEAK scores within each trial block

Results and Discussion

The results of the study are shown in Fig. 1. The results show that none of the participants were able to demonstrate the extended verbal utterance (i.e., 15 words or more describing an object) in the context of the audience following the delivery

of the vocal discriminative stimulus. All participant scores were 0 in the baseline phase across all trial blocks. The introduction of training was staggered across the participants with their existing ABA curricular programming. For Larz, the results show a steady learning curve, with an average PEAK score of 70 (range, 22 to 100). Larz achieved the mastery criterion of two consecutive trial blocks of 90 or greater in the final two trials of the training phase. For James, the data also show a steady learning curve, with an average PEAK score of 70 (range, 28 to 94). The mastery criterion was achieved on the eighth and ninth trial blocks. For Kirk, the data show a more rapid learning curve relative to the other two participants. Kirk achieved an average PEAK score of 89 (range, 52 to 100), and mastery was achieved in the final two trial blocks. Taken together, the results show that each of the participants were able to demonstrate the extended verbal utterances as intraverbal response chains following direct training, in the context of show-and-tell.

The results therefore provide a demonstration of a procedure that may be efficacious in bringing complex forms of verbal behavior under the appropriate contextual control of audience members in a classroom setting. Show-and-tell is a common classroom activity; however, the uncontrolled nature of this activity may limit the instructional utility of this procedure when used with lower-functioning children with autism and related disabilities. The procedures outlined in the present study provide a method for how traditional show-and-tell can be altered, using a program taken from a behavior analytic tool available to teachers and staff in school settings. The results therefore expand upon a growing body of literature on how to develop the verbal behavior of individuals with disabilities in a meaningful way. The results also provide further evidence that the extended verbal behavior of children with autism can come under the convergent control of audience and contextual variables when contingencies are appropriately arranged.

The results of the present study should be considered preliminary due to limitations inherent in the design. A first limitation may be that only a single baseline and training phase were conducted with each participant, where introducing a second baseline with additional stimuli would have allowed for replication both within and between participants. A second limitation was that the same number of test probes was conducted with each of the participants in the baseline phase, so similar exposure to the baseline test conditions limits the inferences that can be generated in terms of the participants' pre-existing skills prior to training. It should be noted, however, that none of the participants were able to demonstrate a correct response in baseline. A third limitation was that additional stimuli were not tested following acquisition of trained responses; therefore, we do not know the degree to which the skill generalized to novel stimuli. A final limitation was that fidelity measures were not obtained to ensure that the treatment was conducted as intended, although all implementers

had conducted training guided by PEAK for at least 6 months prior to the study. Future research may expand upon these procedural limitations, as well as further explore behavioral strategies for bringing extended verbal behavior under appropriate audience control. One such avenue may involve teaching participants to respond differentially to different audience members given certain contextual cues, providing greater external validity outside of the classroom setting. Taken together, the results, limitations, and avenues for future research add to a growing literature on the application of Skinner's theories of verbal behavior in applied settings, teaching socially valid skills to children with autism and related disabilities.

Compliance with Ethical Standards

Ethical Approval All procedures performed in this study which involved human participants was in accordance with the ethical standards of the institution and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained for participation in this research.

Disclosure First author receives small royalties from sales of the PEAK curriculum.

References

- Dixon, M. R., Belisle, J., Stanley, C. R., & Rowsey, K. (2018). Student outcomes after 1 year of front line staff implementation of the PEAK curriculum. *Behavioral Interventions*, <https://doi.org/10.1002/bin.1516>.
- Dixon, M. R. (2014). *PEAK relational training system: direct training module*. Carbondale, IL: Shawnee Scientific Press.
- Dixon, M. R., Small, S. L., & Rosales, R. (2007). Extended analysis of empirical citations with Skinner's verbal behavior: 1984–2004. *The Behavior Analyst*, *30*, 197–209.
- Dixon, M. R., Belisle, J., Whiting, S. W., & Rowsey, K. E. (2014a). Normative sample of the PEAK relational training system: direct training module and subsequent comparisons to individuals with autism. *Research in Autism Spectrum Disorders*, *8*, 1597–1606. <https://doi.org/10.1016/j.rasd.2014.07.020>.
- Dixon, M. R., Whiting, S. W., Rowsey, K., & Belisle, J. (2014b). Assessing the relationship between intelligence and the PEAK relational training system. *Research in Autism Spectrum Disorders*, *8*, 1208–1213. <https://doi.org/10.1016/j.rasd.2014.05.005>.
- Dixon, M. R., Belisle, J., Stanley, C., Rowsey, K., Daar, J. H., & Szekely, S. (2015). Toward a behavior analysis of complex language for children with autism: evaluating the relationship between PEAK and the VB-MAPP. *Journal of Developmental and Physical Disabilities*, *27*, 223–233. <https://doi.org/10.1007/s10882-014-9410-4>.
- Dixon, M. R., Belisle, J., McKeel, A., Whiting, S., Speelman, R., Daar, J. H., & Rowsey, K. (2017). An internal and critical review of the PEAK relational training system for children with autism and related intellectual disabilities: 2014–2017. *The Behavior Analyst*, *40*, 493–521.
- Greer, R. D., & Speckman, J. (2010). The integration of speaker and listener responses: a theory of verbal development. *The Psychological Record*, *59*, 449–488.

- Ingvarsson, E. T., Tiger, J. H., Hanley, G. P., & Stephenson, K. M. (2007). An evaluation of intraverbal training to generate socially appropriate responses to novel questions. *Journal of Applied Behavior Analysis, 40*, 411–429.
- McKeel, A. N., Dixon, M. R., Daar, J. H., Rowsey, K. E., & Szekely, S. (2015). Evaluating the efficacy of the PEAK Relational Training System using a randomized controlled trial of children with autism. *Journal of Behavioral Education, 24*, 230–241.
- Michael, J., Palmer, D. C., & Sundberg, M. L. (2011). The multiple control of verbal behavior. *The Analysis of Verbal Behavior, 27*, 3–22.
- Rowsey, K. E., Belisle, J., & Dixon, M. R. (2015). Principal component analysis of the PEAK relational training system. *Journal of Developmental and Physical Disabilities, 27*, 15–23. <https://doi.org/10.1007/s10882-014-9398-9>.
- Skinner, B. F. (1957). *Verbal behavior*. Englewood Cliffs, NJ: Prentice Hall.