An annotated bibliography of verbal behavior articles published outside of *The Analysis of Verbal Behavior*: 2016

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Abstract An annotated bibliography is provided that summarizes journal articles on verbal behavior published outside of *The Analysis of Verbal Behavior* in 2016, the primary journal for scholarship in this area. Thirty-seven such articles were identified and annotated as a resource for practitioners, researchers, and educators.

Keywords Annotated bibliography · Language · Verbal behavior

An annotated bibliography is a list of citations of scholarly books, articles, and other documents. Each citation includes a brief summary of the publication. Annotated bibliographies offer practitioners, researchers, and educators an efficient way to identify relevant literature on a particular topic. To date, there have been two annotated bibliographies of journal articles on the topic of verbal behavior published outside of *The Analysis of Verbal Behavior* (Carr, Nosik, Lechago, & Phillips, 2015; Lechago & Phillips, 2016). The present article is the third annual annotated bibliography in this series and includes articles published in 2016. We used identical search procedures to those described in Carr et al. and Lechago and Phillips, which yielded 37 articles. One noteworthy publication trend thus far is the significant increases in verbal behavior publications outside of *The Analysis of Verbal Behavior* journal from 2014 to 2016. There was an increase from 17 to 30 publications from the first to the second annotated bibliographies, and an increase again to 37 publications in the current article. Mands and functional communication training (FCT) were the most researched topics and were examined in 32.5% of the publications. Research on emergence or generative responding declined with 8 articles published in 2016 compared to 19 articles published in 2015. The most common sources of articles in

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the bibliography were *Journal of Applied Behavior Analysis* (12 articles, 32%), *Behavioral Interventions* (6 articles, 16%), and *The Psychological Record* (5 articles, 13.5%). The annotated bibliography for 2016 appears below.

Annotated bibliography

1. Balka, K. E., Hausman, N. L., Schaller, E., & Kahng, S. (2016). Discriminated functional communication for attention: Evaluating fixed and varied durations of reinforcer availability. *Behavioral Interventions*, 31, 210–218.

A potential challenge with functional communication training is that the learner may engage in the alternative response at inconvenient times or at excessive rates. Implementation of discriminated functional communication, wherein distinct visual stimuli are associated with conditions which signal the availability and un-availability of the reinforcer, has been shown to maintain responding at manageable levels. Researchers have also demonstrated that responding can come under the control of naturalistic environmental signals of busy moments (talking on the phone), and non-busy moments (reading a magazine) (Kuhn, Chirighin, & Zelenka, 2010). Typically, conditions of reinforcer availability and un-availability are presented for fixed durations, and it is possible that the predictable passage of time has a greater influence over responding than do the naturalistic environmental signals. The primary focus of the current study was to examine the effects of teaching responding under both fixed and varied durations of reinforcer availability. The outcomes demonstrate that participant's responding was under discriminative control during fixed durations of reinforcer availability and responding under varied durations was discriminated only if the varied condition followed a fixed duration condition. The authors suggest functional communication training may need to be initiated with a fixed duration of the availability of the reinforcer in order to facilitate discrimination during varied duration conditions.

2. Belloso-Díaz, C., & Pérez-González, L. A. (2016). Emergence of symmetrical intraverbals facilitated by learning skills with the intraverbal responses. *The Psychological Record*, 66, 269–281.

Emergent verbal behavior is verbal behavior that is not directly taught. Identifying procedures to promote emergent verbal behavior has desirable clinical and educational implications, one of which is developing efficient language training programs for children with communication deficits. In the first experiment of the current publication, the authors examined the effects of teaching tacts with the same response as probed intraverbals on the emergence of intraverbal responding. The participants were six, typically developing Spanish-speaking children. The results of the first experiment demonstrated that there was no emergence of the probed intraverbal relations until the tacts with the same name as the probed intraverbals were trained. Six different, typically developing Spanish-speaking children participated in the second experiment of the current publication. The authors replicated the first experiment except instead of teaching tacts that shared a name with the probed intraverbal relations they taught novel intraverbals that shared the name with the probed intraverbal. Again, there was no emergence of the probed intraverbal until the

novel intraverbals with the shared name as the probed intraverbals were trained. Based on the outcomes of these two experiments, the authors suggest that teaching a response with a shared name with the probed intraverbal is the feature that facilitates emergence of the probed intraverbal.

3. Benitez, P., & Domeniconi, C. (2016). Use of a computerized reading and writing teaching program for families of students with intellectual disabilities. *The Psychological Record*, 66, 127–138.

Reading and writing skills are fundamental to social, educational, and professional success. Treatment packages that include behavior-analytic strategies, such as matching-to-sample, feedback, and differential reinforcement, have been shown to be effective to teach reading and writing to typically developing individuals and learners with developmental disabilities (De Rose, De Souza, & Hanna, 1996). The authors of this study examined whether caregivers could effectively implement a computerized behavior-analytic reading and writing program with their children with developmental disabilities in their own homes. The teaching program included ongoing feedback, and the tasks involved three conditional discriminations: 1) matching printed words to spoken samples, 2) matching pictures to spoken samples, and 3) matching-to-sample using printed words or pictures as samples and syllables as comparisons. The outcomes suggest that caregivers were successful and significant increases in reading and writing skills were observed for all participants. The authors emphasize two primary points: 1) this program is effective to teach reading and writing to children with disabilities, and 2) researchers, teachers, or therapists are not essential for effective implementation of this program, and caregivers can be effective teaching agents in the home.

4. Bergstrom, R., Najdowski, A. C., Alvarado, M., & Tarbox, J. (2016). Teaching children with autism to tell socially appropriate lies. *Journal of Applied Behavior Analysis*, 49, 405–410.

Telling socially appropriate lies (e.g., telling jokes, keeping secrets, protecting a friend's feelings) contributes to maintaining friendships and professional relationships. Telling socially appropriate lies involves perspective taking, a skill that many individuals diagnosed with autism spectrum disorder (ASD) fail to display. The authors examined the effects of rules, role-playing, and feedback to teach children diagnosed with ASD to tell socially appropriate lies. The authors found all participants learned to tell socially appropriate lies following training, and the skill generalized to untrained people and stimuli. Results of this study contribute to our understanding of how to teach perspective-taking skills to people diagnosed with ASD.

5. Bloh, C. (2016). Assessing topography-based versus stimulus-selection-based verbal behavior: A comparison from the literature. *Behavior Analysis: Research and Practice*, 16, 12–18.

Skinner's (1957) analysis of verbal behavior employs a function-based approach in which verbal behavior is analyzed by its influencing antecedents and consequences. When a communication system includes responses that are topographically different

from one another, this is defined as topography-based verbal behavior (e.g., vocal-verbal behavior). Alternately, when a communication system requires the individual to point, touch, or select a stimulus, typically as part of an array of stimuli, this is defined as selection-based verbal behavior (e.g., picture exchange). This article is an exposition on topography-based and selection-based verbal behavior and the relative benefits of each for people diagnosed with ASD. The author concludes the review with a recommendation for additional research on both types of verbal behavior systems and suggests that the selection of a communication system should be predicated on the individual learner's skills and environments, instead of the individual's disability.

6. Bordieri, M. J., Kellum, K. K., Wilson, K. G., & Whiteman, K. C. (2016). Basic properties of coherence: Testing a core assumption of relational frame theory. *The Psychological Record*, 66, 83–98.

Relational frame theory (RFT) is a conceptual framework to describe language and thinking, or cognition. According to RFT, verbal behavior is defined as arbitrarily relating stimuli, and those stimuli affect responding because they participate in various types of relational frames (Hayes, Barnes-Holmes, & Roche, 2001). The authors of this paper used a matching-to-sample paradigm to experimentally examine one of the primary assumptions of RFT: verbally capable individuals engage in coherent derived relational responding because doing so has been reinforced in the past. An RFT definition of “coherence” is the reinforced and contextually situated patterns of mutual and combinatorial relational responding (Quinones & Hayes, 2014). In the first experiment, during which there were no instructions or programmed reinforcers, the participants demonstrated coherence by categorizing items by shape (e.g., triangle) or semantics (e.g., healthy, disgusting). In the second experiment, during which participants were directly trained on a few relations (e.g., A-B and A-C) and probed for derived relational responding (B-A and C-A), participants demonstrated a preference for coherence by selecting contexts where strategies to solve a problem were available based on information that was consistent with the trained relations. Based on both studies' outcomes, the authors suggest that most participants preferred contexts where coherent responding was possible. The authors acknowledge that preference for coherence is not a demonstration of the reinforcing properties of coherence and offer recommendations for future research.

7. Brodhead, M. T., Higbee, T. S., Gerencser, K. R., & Akers, J. S. (2016). The use of a discrimination-training procedure to teach mand variability to children with autism. *Journal of Applied Behavior Analysis*, 49, 34–48.

Repetitive responding is common in individuals diagnosed with ASD. Lag schedules of reinforcement have been shown to increase variability in behavior, including verbal behavior. The authors of this study sought to extend the literature on increasing variability in verbal behavior by examining the effects of script-fading, lag-schedules of reinforcement, and discrimination training on increasing mand variability in three preschool children diagnosed with ASD. The results demonstrate this treatment

package was successful in producing varied manding for most participants. The authors highlight that this was the first study to demonstrate that discriminative control may be established over mand variability.

8. Cariveau, T., Kodak, T., & Campbell, V. (2016). The effects of intertrial interval and instructional format on skill acquisition and maintenance for children with autism spectrum disorders. *Journal of Applied Behavior Analysis*, 49, 809–825.

Discrete trial training (DTT) is an instructional format that includes the instruction, the delivery of a prompt, the learner's response, the consequence, and an intertrial interval (ITI). DTT enjoys popularity in most early and intensive behavioral intervention programs for individuals with ASD. There are multiple features of DTT that require further examination to determine ideal approaches to its implementation. The authors of this study examined two such features including the instructional format (massed-trial versus varied-trial) and the ITI (progressive, short, and long) on the acquisition and maintenance of tacts and intraverbals in one child with autism and a second child with autism and Fragile X syndrome. Results indicate that short ITIs and the varied-trial format produced the most efficient learning. Overall, the varied-trial format, regardless of ITI duration, produced more efficient responding compared to the fixed-trial format.

9. Chezan, L., Drasgow, E., Legg, J., & Hollborn, A. (2016). Effects of conditional discrimination training and choice opportunities on manding for two young children with autism spectrum disorder and language delays. *Journal of Developmental and Physical Disabilities*, 28, 557–579.

Mand training is common to teaching children with ASD. Mands are initially reinforced on an FR1 schedule to facilitate acquisition. However, an FR1 schedule of reinforcement may produce high rates of manding, which can be disruptive for the learner and for those in the learner's environment. The goals of this study were threefold: 1) to examine conditional discrimination training on the frequency of mands that do not function as alternative mands to problem behavior (i.e., the authors were not examining the effects of the training procedure on the frequency of functional communication training responses) for two children with ASD, 2) to evaluate response allocation when a choice of alternative activities was provided during the delay to reinforcement, and 3) to assess maintenance of low-rate mands after the conditional discrimination + choice training procedure had been discontinued. Both participants engaged in low-rate manding in the presence of a discriminative stimulus and both displayed a preference for a leisure activity during extended delays when reinforcement was unavailable. Additionally, both participants maintained the skills eight weeks post-treatment.

10. Chezan, L. C., Drasgow, E., Martin, C. A., & Halle, J. W. (2016). Negatively-reinforced mands: An examination of resurgence to existing mands in two children with autism and language delays. *Behavior Modification*, 40, 922–953.

Negatively reinforced mands offer a speaker the opportunity to escape an aversive situation or stimulus and may prevent resurgence of inappropriate behavior belonging to the same response class that had been negatively reinforced in the past. The authors taught

two children with ASD two socially appropriate negatively reinforced mands to replace existing inappropriate mands. The authors observed responding under immediate and delay-to-reinforcement conditions to examine the patterns of resurgence of inappropriate mands. Both participants acquired the socially appropriate mands, and one participant demonstrated resurgence of inappropriate mands during delay-to-reinforcement conditions., Responding also generalized to novel listeners for both participants.

11. Contreras, B. P., & Betz, A. M. (2016). Using lag schedules to strengthen the intraverbal repertoires of children with autism. *Journal of Applied Behavior Analysis*, 49, 3–16.

Repetitive verbal behavior is common in individuals with ASD. Potential problems associated with repetitive or rigid verbal behavior (i.e., non-variable responding) include extinction of the response and a limited number of responses available to expand the individual's verbal behavior repertoire. Lag schedules of reinforcement have been demonstrated to increase variability in responding. The authors investigated the extent to which lag schedules of reinforcement produced already-established intraverbal responses or established novel intraverbal responses in children with ASD. Lag schedules were sufficient for increasing the number of varied responses for two of the participants, but additional variability training was required for one participant. The authors discuss the potential of lag schedules of reinforcement to expand response classes.

12. Critchfield, T. S., Becirevic, A., & Reed, D. D. (2016). In Skinner's early footsteps: Analyzing verbal behavior in large published corpora. *The Psychological Record*, 66, 639–647.

The authors suggest that quantitative-descriptive behavioral analyses (QDBA), which are methods not commonly employed in the field behavior analysis, represent fruitful approaches to exploring topics of social significance, including those not amenable to experimental investigation. An example of a topic not amenable to experimental investigation would be the verbal behavior of an entire nation of people. Using QDBA, the authors mined data from large databases of words and examined the positive valence of those words. Valence, in this case, refers to the likelihood of those words to produce desirable responding on the part of listeners. The results suggest that QDBA are compatible with a functional analysis of verbal behavior and functional analysis can be extended to large-scale domains. Additionally, the authors discuss how QDBA can help the field of behavior analysis participate in mainstream theoretical discussions about verbal behavior.

13. Curiel, E. L., Sainato, D. M., & Goldstein, H. (2016). Matrix training of receptive language skills with a toddler with autism spectrum disorder: A case study. *Education & Treatment of Children*, 39, 95–109.

Matrix training is a procedure used to produce generative responding. The goal of this procedure is to produce recombinative generalization, which occurs when stimulus components (like words) are taught and then rearranged with other stimulus components

to produce new stimulus arrangements. In the iteration of matrix training explored in this study, stimuli or constituents (words) are arranged along the horizontal and vertical axes of a rectangle that is divided into cells, and each cell includes a different word. Words on the vertical axis are combined with two words on the horizontal axis during training so that there is overlap, with the goal of recombinative generalization (Goldstein, Angelo, & Moussetis, 1987). The authors evaluated matrix training to teach receptive identification and instruction following in a young child diagnosed with ASD. Matrix training with overlap resulted in recombinative generalization in a toddler diagnosed with ASD, and resulted in emergence of multiple untrained relations.

14. Dixon, M. R., Belisle, J., Stanley, C. R., Speelman, R. C., Rowsey, K. E., Kime, D., & Daar, J. H. (2016). Establishing derived categorical responding in children with disabilities using the PEAK-E curriculum. *Journal of Applied Behavior Analysis*, 50, 134–145.

The PEAK-Equivalence (PEAK-E; Dixon, 2015) module employs equivalence technology to promote the establishment of complex categorical classes. This module includes 184 skills that include simple and complex equivalence classes. The authors evaluated a PEAK-E relational-training procedure to promote categorical responding, specifically with receptive labeling and intraverbals. A matching-to-sample procedure was used to teach three 4-member classes to the participants. Relational training produced receptive and derived categorical responding. This study extends the literature on using matching-to-sample preparations to produce emergent relational responding in individuals with disabilities.

15. Dixon, M. R., Belisle, J., Rowsey, K. E., Speelman, R. C., Stanley, C. R., & Kime, D. (2016). Evaluating emergent naming relations through representational drawing in individuals with developmental disabilities using the PEAK-E curriculum. *Behavior Analysis: Research and Practice*, 17, 92–97.

Naming is defined as an individual speaker responding to a stimulus as both a listener and speaker (Horne & Lowe, 1996). An individual is said to name if she is taught a speaker response (e.g., tact) for a given stimulus and engages in a listener response (e.g., point to) with the same stimulus without direct training (and vice versa). Naming offers one behavior-analytic account of generative responding. The authors used the PEAK-E (Dixon, 2015) curriculum module to evaluate representational drawing as an alternative to conventional selection-based listener responding to assess naming with individuals with disabilities. All three participants demonstrated emergence of representational drawings of blended animal pictures. These results suggest that representational drawings are effective for assessing the naming repertoire and preclude the need for a stimulus array, common to conventional listener-based responding.

16. Drasgow, E., Martin, C. A., Chezan, L. C., Wolfe, K., & Halle, J. W. (2015). Mand training: An examination of response-class structure in three children with autism and severe language delays. *Behavior Modification*, 40, 347–376.

A mand is a verbal operant that occurs under the influence of motivating operations and that specifies its reinforcer (Skinner, 1957). Appropriate mands can be taught to

replace inappropriate mands or responses. The authors of this study examined the effects of teaching two novel mands to replace a socially inappropriate mand in three children diagnosed with ASD. They examined immediate and delay-to-reinforcement conditions to examine the structure of response classes and resurgence. The authors successfully taught two new mands to all participants, and each participant emitted the second, novel mand when their social partners did not reinforce the first novel mand. Generalization to novel social partners was also observed.

17. Frampton, S. E., Wymer, S. C., Hansen, B., & Shillingsburg, M. A. (2016). The use of matrix training to promote generative language with children with autism. *Journal of Applied Behavior Analysis*, 49, 869–883.

Individuals with ASD often demonstrate deficits in communication, including generating novel word combinations. Matrix training is employed to produce recombinative generalization, a process by which individuals produce and respond to novel combinations of words after they have learned to respond to the component stimuli (words). The authors of this study demonstrated matrix training with overlap to be effective to teach children and adolescents diagnosed with ASD to engage in recombinative generalization after teaching them to tact nouns and verbs.

18. Fryling, M. J. (2016). The functional independence of Skinner's verbal operants: Conceptual and applied implications. *Behavioral Interventions*, 32, 70–78.

The author offers an exposition on the literature related to the functional independence of the verbal operants (Skinner, 1957), wherein he highlights the mixed outcomes in the research literature demonstrating instances of independence and interdependence. The commentary takes an interbehaviorist perspective and considers the distinction between events and constructs in science. This distinction relates to what behavioral scientists study compared with what it is they say they study, and the author asserts that this distinction is important in the exploration of functional independence. Avenues for future research in the functional independence of verbal operants are also discussed.

19. Gevarter, C., O'Reilly, M. F., Kuhn, M., Mills, K., Ferguson, R., Watkins, L., & Lancioni, G. E. (2016). Increasing the vocalizations of individuals with autism during intervention with a speech-generating device. *Journal of Applied Behavior Analysis*, 49, 17–33.

Augmentative and alternative communication modalities (e.g., picture exchange systems, speech generating devices [SGD]) are commonly used for individuals who have non-existent or limited vocal verbal behavior. While these communication systems are implemented to provide a functional communication system for an individual, some have suggested that these communication modalities may facilitate the acquisition of vocal verbal responding. The authors found that vocal language instructional methods that included reinforcer delays, differential reinforcement, and an echoic prompt in conjunction with the SGD-based intervention were effective in producing

independent target vocalizations. For three of the four participants, vocalizations generalized to settings in which preferred items were available but the SGD was not present.

20. Giunta-Fede, T., Reeve, S. A., DeBar, R. M., Vladescu, J. C., & Reeve, K. F. (2016). Comparing continuous and discontinuous data collection during discrete trial teaching of tacting by children with autism. *Behavioral Interventions*, 31, 311–331.

Data collection is central to a behavior-analytic approach to teaching. Continuous data collection is typically recommended, especially during DTT. However, there are times when continuous data collection may not be feasible. The authors of this study compared continuous and discontinuous data collection systems on the acquisition, generalization, and maintenance of tacts and on-task behavior during DTT with three children diagnosed with ASD. Additionally, the authors evaluated experimenter integrity when using both data collection systems. The results reveal that continuous data collection resulted in minimally faster acquisition of tacts compared to discontinuous data collection for two of the three participants. No differences were revealed for the third participant. Treatment integrity outcomes for the experimenters were high in both conditions. The authors recommend the use of a continuous data collection system for teaching tacts due to its greater sensitivity in measuring behavior changes.

21. Greer, B. D., Fisher, W. W., Saini, V., Owen, T. M., & Jones, J. K. (2016). Functional communication training during reinforcement schedule thinning: An analysis of 25 applications. *Journal of Applied Behavior Analysis*, 49, 105–121.

Functional communication training is used to eliminate problem behavior and teach a socially appropriate communication response that is functionally equivalent to the problem behavior. Multiple schedules of reinforcement and schedule thinning are used to maintain appropriate mands at manageable levels for caregivers and teachers. The authors examined 25 consecutive clinical applications of FCT (within 20 cases) in which schedule thinning and discriminative stimuli (multiple schedules, response restriction, and chained schedules) were used. The authors also reported the terminal reinforcement schedules used during each application and the percentage of functional communication responses that occurred in the presence of the discriminative stimulus. This analysis extends the literature on schedule thinning and FCT by examining the only large-scale analysis of consecutive cases to date in which schedule thinning was implemented by using discriminative stimuli to signal periods of reinforcer availability and unavailability for the functional communication response (FCR). The results of this analysis suggest that using scheduling thinning with discriminative stimuli is effective for teaching and maintaining the FCR, without having to use alternative reinforcement or punishment. The authors recommend that future investigations compare using discriminative stimuli to thin schedules of reinforcement with

FCT to using delayed reinforcement with FCT using a within-subjects experimental design.

22. Hansen, B., & Shillingsburg, M. A. (2016). Using a modified parent-child interaction therapy to increase vocalizations in children with autism. *Child & Family Behavior Therapy*, 38, 318–330.

Parent-Child Interaction Therapy (PCIT) is a dyadic parent-child intervention program for children between the ages of 2 and 7 years. PCIT focuses on reducing maladaptive behaviors, and on increasing social interaction and cooperation between the caregiver and the child. Therapists coach the parents to use play-therapy skills as social reinforcers. The authors examined the effects of a modified version of PCIT on the vocalizations of two children diagnosed with ASD. This iteration of PCIT involved training caregivers to (a) conduct mand training, (b) follow their child's lead, (c) provide attention for desirable behavior, (d) ignore undesirable behavior, (e) present effective commands, and (f) follow through with demands. Post-training probes demonstrated an increase in vocalizations for both participants. Results indicate that this modified version of PCIT is effective in increasing vocalizations in younger children diagnosed with autism.

23. Helton, M. R., & Ivy, J. W. (2016) A preliminary examination of a vocal generalized conditioned reinforcer. *Behavioral Interventions*, 31, 62–69.

Generalized conditioned reinforcers (GCRs) are a class of conditioned reinforcers whose reinforcing properties are established through pairings with multiple established reinforcers. These types of reinforcers are potent because they do not rely on only one source of deprivation to maintain their effectiveness. The authors of this study examined the effects of pairing a novel vocal stimulus with four edible reinforcers to condition the vocal stimulus as a GCR. The vocal stimulus was delivered contingent on completion of math problems with two typically developing children with minor math deficits to determine its reinforcing effectiveness. The results indicate that the vocal stimulus functioned as a GCR for completing math problems following conditioning. A progressive-ratio contingency comparison was conducted with one of the participants, and the results show the GCR was more effective than the backup reinforcers alone.

24. Kisamore, A. N., Karsten, A. M., & Mann, C. C. (2016). Teaching multiply controlled intraverbals to children and adolescents with autism spectrum disorders. *Journal of Applied Behavior Analysis*, 49, 826–847.

Intraverbals are a verbal operant controlled by a verbal stimulus with which is formally similar but does not have point-to-point correspondence (Skinner, 1957). Intraverbal responding is essential to social, scholastic, and professional success. Most intraverbal responses have multiple sources of antecedent control. The authors of this study examined the effects of conditional discrimination training on the acquisition of multiply controlled intraverbal responses in seven children and adolescents diagnosed with ASD. Specifically, they investigated the effects of a prompt delay with error correction, a differential observing response, and a differential observing response plus blocked trials procedure on the acquisition of intraverbals. The results suggest that a prompt delay with error

correction may be sufficient for some learners to acquire multiply controlled intraverbals. When these procedures are insufficient, prompted differential observing responses may be effective in establishing multiply controlled intraverbals.

25. Leaf, J. B., Taubman, M., Milne, C., Dale, S., Leaf, J., Townley-Cochran, D., Tsuji, K., Kassardjian, A., Alcalay, A., Leaf, R., & McEachin, J. (2016). Teaching social communication skills using a cool versus not cool procedure plus role-playing and a social skills taxonomy. *Education & Treatment of Children*, 39, 44–63.

The cool versus not cool procedure is a discrimination training program (Leaf, Sheldon, & Sherman, 2010) used to teach social skills to individuals with ASD in which appropriate behaviors are labeled “cool” and inappropriate behaviors are labeled “not cool”. Learners are then taught to discriminate whether a demonstrated behavior was either cool or not cool. The components of this social skills program include: (a) the teacher demonstrating either cool or not cool behavior; (b) the teacher asking the learner to tact the performance as cool or not cool; (c) the teacher reinforcing correct tacting of the behavior or providing corrective feedback; (d) the teacher asking the learner to describe why the behavior was cool or not cool; (e) the teacher reinforcing correct explanations or providing corrective feedback; and (f) the learner demonstrating the appropriate (cool) social behavior. The authors examined this intervention to teach social communication skills to three children with ASD. The results demonstrate that the program was successful in increasing social communication skills to the mastery criterion; however, two participants’ responding did not maintain post-training.

26. Leaf, J. B., Townley-Cochran, D., Mitchell, E., Milne, C., Alcalay, A., Leaf, J., Leaf, R., Taubman, M., McEachin, J., & Oppenheim-Leaf, M. L. (2016). Evaluation of multiple-alternative prompts during tact training. *Journal of Applied Behavior Analysis*, 49, 399–404.

Prompting and prompt-fading strategies are ubiquitous to verbal behavior teaching programs. The authors of this study examined two prompting strategies to teach tacts. They compared standard echoic prompts and prompt fading to multiple-alternative prompts during tact training with three individuals diagnosed with ASD. Multiple-alternative prompting involved asking the learner a question that included the target response and two distractor responses (e.g., “It this a dog, kite, or spoon?”) and fading the prompt by increasing the difficulty of the discrimination. The results demonstrate that the two prompting techniques were comparable with respect to error rates and the rate of acquisition of tacts, for all participants. However, multiple-alternative prompts produced better maintenance of tacts. These are preliminary findings and the authors recommend additional research on the two prompting techniques.

27. Lorah, E. R. (2016). Comparing teacher and student use and preference of two methods of augmentative and alternative communication: Picture exchange and a

speech-generating device. *Journal of Developmental and Physical Disabilities*, 28, 751–767.

Augmentative and alternative communication modalities are popular options for individuals with language delays who cannot engage in vocal responding. Common forms of augmentative systems include speech-generating devices (SGD), and common forms of alternative communication systems include picture exchange (PE) systems. More recently, the iPad® has been introduced as a SGD option for families. The authors compared the effects of the iPad® as a SGD and a PE system on the acquisition of mands for seven children with ASD or Down syndrome. They also assessed client and caregiver preference for each system. The results demonstrate comparable acquisition rates of mands between the two communication modalities, and a preference by learners and caregivers for the iPad® as a SGD. The authors suggest that a standardized preference assessment was not included and would have benefitted the study. Additionally, generalization and maintenance were not compared in this study and should be examined in future research on SGDs. The results of this study on acquisition rates and preference are consistent with previous research on computing technology as an SGD, and the authors highlight the importance of consideration of teacher preference in the selection of an SGD system.

28. Luque, F. C., & O'Hara, D. (2016). Verbal reports in the experimental analysis of behavior. *International Journal of Psychology and Psychological Therapy*, 16, 157–177.

The authors conducted a review of verbal reports to examine the utility of verbal reports as a dependent variable in the experimental analysis of behavior literature. Given the field's commitment to scientific rigor, the use of verbal reports is restricted on experimental grounds and their validity requires empirical support. The authors reviewed the literature on two tools used to examine verbal reports: (a) the protocol analysis procedure; and (b) the silent dog procedure. Both procedures were found to have utility in analyzing verbal reports but there is a lack of standardization across the two procedures. The authors describe the strengths and limitations of these two procedures and make recommendations for additional research.

29. Ma, M. L., Miguel, C. F., & Jennings, A. M. (2016). Training intraverbal naming to establish equivalence class performances. *Journal of the Experimental Analysis of Behavior*, 105, 409–426.

Naming occurs when an individual relates to a given stimulus as both a speaker and listener, and it represents one behavior-analytic account of generative and symbolic behavior. The two types of naming implicated in the establishment of equivalence classes are common naming and intraverbal naming. Common naming involves a bi-directional relation between a tact and conventional listener response (pointing or selecting). Intraverbal naming occurs when the auditory stimulus produced by a tact evokes an intraverbal

response that leads to the individual responding to the final response product as a listener. A verbal rule linking the stimuli together is created, as a result of intraverbal naming. The authors conducted three experiments to examine whether intraverbal naming would result in the establishment of three-member equivalence classes, and whether intraverbal behavior would co-occur with matching-to-sample (MTS) performance consistent with symmetry and transitivity in eight college students. All participants demonstrated emergent MTS and intraverbal relations following tact training and unidirectional intraverbal training. Additionally, all of the participants emitted experimentally defined or self-generated tacts, or intraverbally named the correct sample-comparison pairs at some point during MTS posttests. However, verbal reports and latency data suggest that participants did not have to use intraverbal naming during the MTS posttests. Tact and intraverbal training of baseline relations (A'B' and B'C') was sufficient to produce emergent baseline, symmetrical, transitive, and equivalence relations.

30. Majdalany, L., Wilder, D. A., Smeltz, L., & Lipschultz, J. (2016). The effect of brief delays to reinforcement on the acquisition of tacts in children with autism. *Journal of Applied Behavior Analysis*, 49, 411–415.

Discrete trial training often includes a brief delay to reinforcement delivery. Some reasons for the brief delay may be that the therapist takes a few seconds to record the data, or may take a few seconds to find and deliver the reinforcer. There is a dearth of research examining the effects of brief delays to reinforcement on skill acquisition. The authors examined the effects of brief reinforcement delays (0 s, 6 s, 12 s) during DTT to teach tacts to three children diagnosed with ASD. The results demonstrate that participants acquired tacts even with brief delays of 6 s to reinforcement. However, for 2 of the 3 participants, acquisition was faster with the 0 s delay, suggesting that even brief delays to reinforcement can negatively impact training.

31. May, R. J., Downs, R., Marchant, A., & Dymond, S. (2016). Emergent verbal behavior in preschool children learning a second language. *Journal of Applied Behavior Analysis*, 49, 711–716.

Training preparations that produce derived relational responding represent one approach to teaching a second language. The authors directly taught listener responses in the native language (English) and intraverbal responses in the second language (Welsh) to three typically developing preschool children. Then they probed for the emergence of second language tacts and listener responses. The authors also extend research on second-language training by reinforcing maintenance probes during test sessions. Untaught second-language tact and listener responses emerged for all of the participants. For two of the participants, follow-up probes demonstrate that the derived responding maintained for 2–4 weeks after the initial post-test. Teaching procedures that facilitate derived relational responding are an

effective way to teach second-language tact and listener responses in typically developing children.

32. Pennington, R. C., Ault, M. J., Schmuck, D. G., Burt, J. L., & Ferguson, L. L. (2016). Frequency of mand instruction reported in behavioral, special education, and speech journals. *Behavior Analysis in Practice*, 9, 235–242.

The authors reviewed 10 years of research literature on mand training with individuals with developmental disabilities. They searched journals associated with the following three professional organizations: (a) Association for Behavior Analysis; (b) Council for Exceptional Children; and (c) American Speech and Hearing Association. The search included 11 journals and articles that were published between 2004 and 2014. This review reported a variety of variables including (a) participant age, (b) instructional change agent, (c) instructional setting, (d) response topography, and (e) assessment of generalization and maintenance of manding. The authors discuss the trends in the data and highlight that the majority of articles were published in behavior-analytic journals. The authors invite researchers in behavior analysis to consider publishing research outside of behavior analytic outlets and instead publish in mainstream special education and speech language pathology journals.

33. Pérez-González, L. A., & García-Asenjo, L. (2016). Emergence of intraverbals with antonyms derived from relations with verbal and nonverbal stimuli. *The Psychological Record*, 66, 351–368.

Intraverbals are ubiquitous in daily conversation and constitute an important part of a verbal behavior training program. While many intraverbals are directly trained (e.g., answering “What is your name?”), some intraverbals may emerge after training other intraverbals or other verbal operants. The authors examined the emergence of intraverbals after learning relations among nonverbal stimuli. Specifically, the authors explored the effects of teaching antonym relations (e.g., “full is the opposite of empty”), related tacts (saying “empty” in the presence of the picture of an empty jar), and listener relations (presented with two stimuli and a sample stimulus and given the instruction, “point to the opposite”) on the emergence of intraverbals with five typically developing children. All of the participants demonstrated the emergence of most or all of the intraverbals. The authors also highlight how intraverbals never emerged prior to auditory-conditional discrimination training, even if tact and selection responses were mastered. However, all intraverbals emerged after learning the auditory-conditional discrimination, suggesting the necessity of auditory-conditional discrimination for the emergence of intraverbals.

34. Plavnick, J. B., & Vitale, F. A. (2016). A comparison of vocal mand training strategies for children with autism spectrum disorders. *Journal of Positive Behavior Interventions*, 18, 52–62.

The mand is a verbal operant under the influence of a relevant motivating operation and which specifies its reinforcer (Skinner, 1957). Mand training is recommended as one of the initial targets of an early intensive behavioral intervention program due to the benefits it brings the speaker, including accessing preferred and needed items and

activities. The authors of this study compared in vivo mand training and video-based mand training for four children diagnosed with ASD. All of the participants acquired more mands in the video-based training condition compared to the in vivo training condition. The authors suggest that one reason for the superiority of the video-based training was that participants were consistently exposed to the relevant contingency through observation, whereas during in vivo training, the participants contacted the contingency only if they performed the target behavior. The authors also suggest that for some learners, initial training with video-based instruction may be effective to establish manding, but that mand acquisition may become equally or more efficient using an in vivo method of instruction.

35. Ringdahl, J. E., Berg, W. K., Wacker, D. P., Ryan, S., Ryan, A., Crook, K., & Molony, M. (2016). Further demonstrations of individual preference among mand modalities during functional communication training. *Journal of Developmental and Physical Disabilities*, 28, 905–917.

Functional communication training has been demonstrated to be effective in reducing problem behavior and establishing a functionally equivalent appropriate response. Individual preferences for response modalities may affect FCT outcomes. The authors evaluated the preference between two selected response modalities with each participant (e.g., microswitch activation and picture card touch; manual sign and picture card touch). The communication modalities included in the study were vocal, manual sign, microswitch activation responding, picture card touch, and pragmatic organization dynamic display (PODD) in 18 individuals with developmental disabilities. The authors found that preferences for communication modalities were variable. All of the participants demonstrated a preference for one of the two communication modalities. The authors suggest that unknown aspects of a response modality may affect client preference. While both modalities were successfully taught, the authors suggest that more research is required to determine whether the preferred treatment has other clinically beneficial outcomes, such as superior maintenance of responding. The current results also suggest that assessing client preference should be a consideration in communication training.

36. Vladescu, J. C., & Kodak, T. (2016). The Effect of a multiple-schedule arrangement on mands of a child with autism. *Behavioral Interventions*, 31, 3–11.

Multiple-schedules of reinforcement are employed to produce discriminated responding in a learner. Usually, a multiple schedules arrangement involves alternation between periods of extinction and periods of reinforcement for a given response with each condition accompanied by a unique stimulus. The authors of the current study examined two aspects to using multiple-schedules of reinforcement to teach mands to a 6-year old boy diagnosed with autism. The two treatment aspects were: (a) teaching responding to naturally occurring stimuli versus arbitrarily selected stimuli associated with each schedule; and (b) training mands without using schedule thinning. The results of the study demonstrated that providing rules in conjunction with using multiple-schedules of reinforcement was effective for teaching responding to naturally occurring stimuli, and the authors were able to achieve appropriate levels of responding without schedule thinning.

The authors also included a unique experimental feature in which the naturally occurring stimuli that were associated with each of the schedules were also present during baseline sessions. This further demonstrated the effectiveness of the treatment procedure in establishing discriminative control of those stimuli over manding.

37. Yosick, R. N., Muskat, L. R., Bowen, C. N., Delfs, C. H., & Shillingsburg, M. A. (2016). Increasing single-word requests to multiword requests in children with autism and related disabilities. *Behavioral Interventions*, 31, 28–43.

Mand training typically begins with teaching a few single-word responses. An important treatment goal involves increasing the mean length of utterance (MLU) of mands. The authors examined the effects of prompts and differential reinforcement to increase the MLU of mands in children with developmental disabilities and ASD. The current study extended the literature by including a larger sample size ($n = 30$) and calculating nonoverlap of all pairs (NAP; Parker & Vannest, 2009) as an overall measure of intervention effectiveness. Nonoverlap of all pairs is an effect size measure for single-case research that is strongly correlated with visual analysis outcomes. It is a probability score that ranges from .5 to 1 and can be interpreted as the probability that a treatment phase data point will be higher than a baseline phase data point. The results demonstrate the intervention was successful in increasing MLU, and for 70% of the participants, strong treatment effects were achieved according to the NAP analysis.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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