Published in final edited form as:

J Dev Phys Disabil. 2016 December ; 28(6): 905–917. doi:10.1007/s10882-016-9518-9.

Further Demonstrations of Individual Preference among Mand Modalities during Functional Communication Training

Joel E. Ringdahl¹, Wendy K. Berg², David P. Wacker², Stephen Ryan², Anna Ryan², Kayla Crook¹, and Maggie Molony¹

¹Department of Communication Sciences and Special Education, University of Georgia, Athens, GA, USA

²Department of Pediatrics, University of Iowa Carver College of Medicine, Iowa City, USA

Abstract

Previous research related to functional communication training has demonstrated its effectiveness across various communication modalities. Additionally, at least one study has demonstrated that, while the intervention can be effective across various communication modalities, individual participants demonstrate a preference among available communication modalities (indicated by response allocation under a concurrent schedules arrangement). The current study evaluated preference among concurrently available communication modalities for 18 individuals with developmental disabilities, including autism spectrum disorder and intellectual disability. Results of the study indicated that each of the individuals demonstrated a preference between communicative response modalities, though preference was not always immediately ascertained. The results are discussed within the context of implications for design and implementation of functional communication training.

Keywords

Functional communication training; Response preference; Developmental disabilities; Communication deficits

Since its initial demonstration of effectiveness (Carr and Durand 1985), functional communication training (FCT) has become the most widely used approach in the treatment of severe problem behavior exhibited by individuals with developmental disabilities (Tiger et al. 2008). A PsycInfo search using the phrase “functional communication training” yields

Correspondence to: Joel E. Ringdahl.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional 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 from all individual participants included in the study.

Conflict of Interest Joel E. Ringdahl declares that he has no conflict of interest. Wendy K. Berg declares that she has not conflict of interest. David P. Wacker declares that he has no conflict of interest. Stephen Ryan declares that he has no conflict of interest. Anna Ryan declares that she has no conflict of interest. Kayla Crook declares that she has no conflict of interest. Maggie Molony declares that she has no conflict of interest.

188 articles published demonstrating the efficacy of this intervention and its variations (see Falcomata and Wacker 2013, Hagopian et al. 2011, and Tiger et al. 2008 for reviews of FCT). The communication strategies evaluated in these articles vary widely and includes vocal communication (Carr and Durand 1985), manual sign (Falcomata and Wacker 2013), microswitch activation (Wacker et al. 2013), picture exchange or touch (Danov et al. 2010), among others. Treatment outcomes are typically robust across these response modalities.

Although studies involving evaluation of FCT generally support its effectiveness, differences in responding have been noted across dimensions of the communicative responses. For example, Horner and Day (1991) demonstrated that relatively higher effort responses (i.e., signing a full sentence) resulted in lower levels of communication than problem behavior. Relatively lower effort responses (i.e., signing a single word) yielded higher levels of communication and problem behavior was eliminated. Richman et al. (2001) replicated these findings related to response efficiency. Ringdahl et al. (2009) demonstrated differential treatment effects (e.g., higher rates of communicative behavior and lower rates of problem behavior) when conducting FCT with more proficient communicative responses (i.e., a communicative response requiring less invasive prompting for the participants to emit) relative to conducting FCT with a less proficient communicative responses (i.e., a communicative response requiring more invasive prompting for the participants to emit).

Another variable that may affect outcomes of FCT-based treatment is the preference for a response modality, given that an individual can use more than one appropriate communicative strategy to recruit functional reinforcers. Winborn-Kemmerer et al. (2009) demonstrated that FCT was effective in reducing severe problem behavior exhibited by two individuals with developmental disabilities. Two novel communicative responses were evaluated separately for each individual and appropriate responding and levels of problem behavior were shown to be similar across the two communication modalities. However, when both FCT communication modalities were concurrently available and produced reinforcement on a concurrent fixed ratio (FR) 1/FR 1 schedule, both participants in this limited sample demonstrated clear allocation to one of the available response modalities, suggesting these individuals had a preference for which modality they used.

The purpose of the current study was to evaluate preference between two appropriate communication modalities as indicated by response allocation under a concurrent schedule arrangement similar to the one described by Winborn-Kemmerer et al. (2009) with a larger sample of individuals. The evaluation was conducted in the context of FCT-based treatment for problem behavior ($N = 14$) and FCT-based communication training unrelated to the treatment of problem behavior ($N = 4$).

Method

Participants and Setting

Eighteen individuals with developmental disabilities and communication delays or deficits participated in the study. Table 1 displays individual demographics (age, gender, relevant diagnoses) for the 18 participants. Fourteen of the individuals participated in the study as part of an evaluation of FCT to reduce severe problem behavior. The remaining four

individuals participated in the study as part of an evaluation of the effectiveness of various communication strategies to recruit reinforcers.

Sessions took place in several settings including a therapy room (5 m × 5 m) located a rehabilitation facility at Southern Illinois University, a therapy room (8 m × 8 m) on the campus of the University of Iowa, a therapy room (6 m × 4 m) on the campus of the University of Georgia, or in participants' homes (family room or bedroom).

Response Definitions and Interobserver Agreement

For the 14 individuals who participated as part of a FCT-based treatment, problem behavior was individually defined and included aggressive behavior (e.g., hitting, kicking, biting others), self-injurious behavior (e.g., hitting, biting self), property destruction (e.g., destroying task materials, throwing toys), elopement (e.g., leaving or attempting to leave the session room), and disruptive behavior (e.g., kicking walls, climbing). Appropriate communication strategies included vocal statements (e.g., "break"), microswitch activation (touching a BigMack microswitch with sufficient force to play the pre-recorded message), picture/card touch (contact between any part of the participant's hand and a laminated card indicating the programmed reinforcer), pragmatic organization dynamic display (PODD), and manual sign ("please" defined as the participant touching their chest with the palm of their hand, or "more" defined as touching the tips of the fingers on both hands together with fingers held tightly together). For two participants, vocal and sign were consistently emitted simultaneously. Thus, for these participants, one response option consisted of two simultaneously occurring topographies. Table 2 displays individual target behaviors.

During functional analyses and all FCT sessions, data were collected in-vivo using laptop computers running behavioral data collection software. The software allowed for individual occurrences of count- and duration-based (i.e., events that took place over time such as screaming) responses to be recorded and the data stream for any sessions could be divided into intervals of various lengths. Interobserver agreement (IOA) for functional analyses and FCT was calculated for problem behavior and appropriate communication (mands) using the same approach. Two trained data collectors independently observed the sessions, recording the relevant responses for each participant. Observation took place either in vivo or via video recordings. Interobserver agreement was calculated by dividing each session into 10-s intervals and conducting an interval-by-interval comparison of the observers' records. Interobserver agreement was calculated by summing the number of intervals with exact agreement and then dividing that sum by the total number of intervals for the session (i.e., agreements plus disagreements). The quotient was then multiplied by 100 to obtain the agreement percentage for that variable for that session.

During the mand modality assessment, data were collected using paper and pencil. Interobserver agreement data were collected regarding the level of prompting required to bring about the response. Two trained data collectors independently observed the sessions and recorded the relevant responses for each participant. Observation took place either in vivo or via video recordings. Interobserver agreement was calculated by conducting a trial-by-trial comparison the observers' records. An agreement was scored for a trial if each observer scored the same prompt level (0 = independent; 1 = vocal prompt; 2 = model

prompt; and 3 = physical prompt). Agreements were summed and divided by the number of trials for a given session (i.e., 10). The quotient was then multiplied by 100 to obtain the agreement percentage for that variable for that session.

Interobserver agreement data were obtained for at least 31 % of all functional analysis sessions, at least 33 % of all mand modality proficiency sessions (with the exception of Wilma whose sessions were not video recorded and no IOA data were able to be collected), at least 30 % of all FCT Alternative sessions, and at least 33 % of all FCT Concurrent sessions across participants. During FA, agreement coefficients for problem behavior ranged for 96 % to 100 %. Agreement on level of prompting during the mand modality proficiency assessment ranged from 88 % to 100 %. During FCT Alternative, agreement scores ranged between 86.7 % and 100 % for communication and 96 % and 100 % for problem behavior. Finally, during FCT Concurrent, agreement scores ranged between 92 % and 100 % for communication and 96.7 % and 100 % for problem behavior. Individual IOA data are available from the authors upon request.

Procedures

Preference Assessment—We conducted a paired-choice preference assessment (Fisher et al. 1992) to identify preferred items or activities to use as stimuli during the functional analysis as well as reinforcers during communication training sessions. Lists of six hypothesized preferred stimuli were obtained from care providers for each participant. Each of the items was paired with each of the remaining items to form 15 paired choices for each participant. Each paired-choice was presented and the participant was prompted to select their preferred item (e.g., “Show me which one you want”). The participant then received 30-s of access to the selected item and the next choice was presented. The number of times each item was selected was recorded. The item selected most often was identified as the preferred item for that participant. For some individuals, preferences were updated at the outset of each day’s sessions by conducting a free operant preference assessment, as described by Roane et al. (1998).

Functional Analysis—Fourteen individuals’ problem behavior was evaluated via a functional analysis of problem behavior based on the design and procedures described by Iwata et al. (1994) with the addition of a tangible condition and exclusion of the alone condition for all but one participant. A test for automatic reinforcement was only conducted for one participant and was based on the care provider’s report that the target behavior was likely to occur when that participant was alone. Sessions during the functional analysis were 5 min in length, and programmed reinforcement intervals were 30 s across social reinforcement test conditions (escape, attention, and tangible).

Mand Modality Proficiency Assessment—Prior to beginning FCT¹ a modality assessment was conducted using the procedures described by Ringdahl et al. (2009). The purpose of this assessment was to identify two mand topographies for each participant that

¹FCT typically refers to functional communication conducted as an intervention for problem behavior. In the current study, we use the term broadly to refer to an intervention for problem behavior and a method for teaching individuals with a communication deficit how to use various communication strategies to accrue putative reinforcers.

could be displayed with similar levels of proficiency (i.e., requiring similar levels of prompting). We identified three mand topographies (e.g., card touches, vocal words, manual signs, POK use, or microswitch presses) for each participant based on information provided by the participant's care provider. During the modality assessment, the participant's proficiency with each modality was evaluated separately. Materials required for the mand (i.e., card or microswitch) were placed in front of the participant and the functional reinforcer as identified by the functional analysis or a preferred item as identified during the paired-choice assessment was set in view of the participant. A brief period of play or interaction was initiated before access to the stimulus was restricted. Following initial restriction of the stimulus, the therapist waited 5 s for an independent response to occur. If the participant did not emit the target mand after 5 s, a vocal prompt was provided (e.g., "If you want to play with the toy, hand me the card."). After the vocal prompt, the investigator waited 5 s for the participant to emit the mand. If the mand was not emitted within 5 s after the vocal prompt, the mand was modeled and the vocal prompt repeated. If the mand was not emitted within 5 s after the vocal prompt, the vocal prompt was repeated along with hand-over-hand guidance to produce the mand. In the case of a vocal modality, the participant's chin was touched while the therapist repeated the correct mand. As soon as the mand was emitted, regardless of the level of prompt provided, the participant received access to the preferred item for 30 s (or, 1 min if the stimulus was a preferred electronic activity). Following the reinforcement interval, the item was removed and the next trial began. Blocks of 10 trials were conducted for each mand modality and the level of prompt required during each trial was recorded. The number of trials with independent mands and prompted mands (including the level of prompt needed to obtain the mand) were compared across the three topographies. Two topographies requiring similar prompt levels were selected as the mand modalities for that participant. Typically, these topographies were emitted independently on a majority of trials.

Phase 1: FCT, Alternating Treatments (FCTA)—Following the MPA, FCT sessions were conducted across two conditions. All sessions were 5 min in length, and three to five sessions were conducted during any given participant visit. Each session began with the therapist establishing the relevant motivating operation (MO) identified in the functional analysis, or removing the preferred item identified in the preference assessment. The therapist then gave the prompt, "If you <want your item; to talk> touch the card/say 'toy please'/press the switch" or "It's time to work. If you want a break, say 'break'/touch the card/press the switch/sign 'break'." In each FCT condition, appropriate communicative responses resulted in 30 s or 1 min of access to the programmed reinforcer on a fixed ratio (FR) 1 schedule of reinforcement. The communication equipment targeted for reinforcement differentiated conditions. This phase continued until an 80 % reduction in problem behavior was maintained across five sessions and stable or increasing communicative response rates were observed for both communication modalities (participants who exhibited problem behavior) or until at least five sessions of each condition had been conducted with stable or increasing communicative response rates (participants who did not display problem behavior). Problem behavior was placed on extinction for the 14 participants who exhibited problem behavior.

Phase 2: FCT, Concurrent (FCTC)—Once criterion for Phase 1 had been met, the FCT intervention was altered so that preference between the two communication modalities could be identified for every participant. Sessions were 5 min in length. During this phase, FCT was conducted with both response stimuli available (i.e., communication equipment) and use of either communication modality resulted in access to the programmed consequence on an FR 1 schedule of reinforcement. Thus, sessions were similar to Phase 1, with the following changes: 1) Reinforcement was delivered following either communicative response on an FR1 schedule of reinforcement, and 3) therapist prompts were nonspecific (e.g., “if you want something, let me know” or “It’s time to work. If you need a break, let me know”). Phase 2 concluded when the participant demonstrated a clear preference for one response topography as measured by comparing the number of trials each modality was selected. Preference was defined as five consecutive sessions with allocation to one response modality greater than allocation to the other response modality. Placement of the communication stimulus or stimuli varied from trial to trial within any given session.

Results

Each of the 18 participants demonstrated differential responding during the FCTC phase of the investigation. Three basic response patterns related to preference were noted. The first pattern included immediate differentiation in responding. That is, only five sessions were required to meet criterion for identifying a preference among communication topographies. This was the most frequently observed pattern ($N = 11$ participants). The second pattern included undifferentiated responding at the outset of FCTC, with differentiation occurring between sessions 6 and 10 ($N = 3$ participants). The third observed pattern included responding that took longer than 10 sessions to differentiate ($N = 4$ participants). Collectively, preference emerged following an average of 7.3 sessions (range, 5–19; or, 36.6 min; range 25 to 90 min).

Preference for any given modality was mostly variable. For example, use of a manual sign was evaluated with four participants, and was selected most often by two of the participants (50 %). Use of a microswitch was evaluated with eight participants, and was selected most often by four of the participants (50 %). Touching a picture card was evaluated with 17 participants, and was selected most often by eight participants (47 %). PDD and iPad were evaluated one time each; neither was identified as preferred. The modality that was the most likely to be identified as the preferred modality was vocal communication. This modality was evaluated for five participants, and was selected most often by four of the participants (80 %). Each modality was paired against one of five alternative modalities, and none of the modalities was selected most often across all modalities.

Representative Results²

Figure 1 displays the results for Lawrence (Pattern 1). Problem behavior was observed most often during the tangible condition of the functional analysis (top panel). During the mand modality proficiency assessment (middle panel), manual sign required physical guidance

²While representative results are presented in this article, other participants’ graphical data are available by contacting the first author.

during 100 % of trials. However, microswitch activation and picture card touch occurred independently during 87 % of trials for both modalities. Similar percentages of trials requiring vocal prompts and physical guidance were observed. Thus, these two responses (microswitch and picture card) were selected for FCT. During FCTA (bottom panel), Lawrence exhibited both communication responses and problem behavior reduced to 0 across sessions and conditions. During FCTC, problem behavior remained at 0 occurrences and Lawrence selected the microswitch over the picture card during each of the five sessions.

Figure 2 displays the results for Seth (Pattern 2). Seth was one of the participants referred for communication assessment only, thus there are no FA results to display. During the mand modality proficiency assessment (top panel), microswitch activation was emitted independently during 100 % of the trials. Touching the picture card was emitted independently during 85 % of the trials, signing “please” was emitted independently during 80 % of the trials, and signing “More” was emitted independently during 75 % of the trials. Additional levels of prompting were required for each of these modalities during some trials (vocal and guided for picture card, vocal and model for the two signs). Signing “Please” and touching the picture card were selected for comparison for Seth, given their similar levels of independence. During FCTA (left side of bottom panel), Seth exhibited both communication responses across sessions and conditions. During FCTC, response allocation between the two modalities was initially variable. Consistent differentiation emerged beginning with the fourth session of FCTC and Seth consistently selected touching the picture card over making the manual sign.

Figure 3 displays the results for Boji (Pattern 3). Problem behavior was observed most often during the tangible condition of the functional analysis (top panel). During the mand modality proficiency assessment (middle panel), he showed independent responding on over 85 % of the trials with all three evaluated communication modalities. His proficiency in using the manual sign and using the PODD resulted in the closest scores ((98.7 % and 97.5 % independent, respectively), and these two modalities were selected for evaluation during FCT. During FCTA (left side of bottom panel), Boji emitted both communication responses and problem behavior reduced to 0 occurrences across sessions and conditions. During FCTC, problem behavior remained at 0 occurrences. Response allocation was undifferentiated during the first 14 sessions of this condition. However, during sessions 15 through 19, responding was exclusively allocated to the use of the manual sign.

Discussion

Various response topographies were reinforced either in the context of treatment for problem behavior (14 participants) or as an evaluation of the utility of AAC strategies for individuals with intellectual and developmental disabilities and communication deficits (four participants). Following a demonstration of the effectiveness of FCT and establishment of a reinforcement history for two communication modalities, we implemented a concurrent-operants arrangement (FCTC) to assess preference between the two communication modalities as measured via response allocation towards each modality. Results of the FCTC evaluation indicated that all of the 18 participants exhibited a preference for one of the two

communication modalities, though the time taken to determine preference and the specific communication modality that was preferred varied. The obtained results aligned with those reported by Winborn-Kemmerer et al. (2009). However, the current results were obtained with a larger sample of individuals and with individuals referred for either evaluation of severe problem behavior with communication deficits or individuals with intellectual and developmental disabilities (IDD) and communication deficits for whom severe problem behavior was not a clinical concern.

Collectively, the Winborn-Kemmerer et al. (2009) and current study indicate that individuals with IDD and communication deficits are likely to prefer one communication modality over another for recruiting reinforcement. From a conceptual standpoint, these results suggest that responses of similar proficiency, and perhaps effort, are not otherwise identical. Other unknown dimensions of the response may affect preference, making responses more or less likely to occur. From a practical standpoint, these results provide an initial basis for conducting systematic evaluations of response options when constructing either FCT-based interventions for problem behavior or when teaching AAC strategies to individuals with IDD and communication deficits.

Research related to FCT has demonstrated that response variables can impact the effectiveness of FCT-based intervention. Winborn et al. (2002) demonstrated that communicative responding during FCT varied as a function of whether a novel response or one already in the individual's repertoire was targeted for reinforcement. Specifically, existing responses were emitted at a higher rate than novel responses. Horner and Day (1991) and Richman et al. (2001) demonstrated that communicative responses of lower effort were more likely to be emitted than responses that required more effort. Ringdahl et al. (2009) demonstrated that communicative responses of greater proficiency were correlated with better FCT outcomes. Finally, Winborn-Kemmerer et al. (2009) and the current results indicated that communicative responses occurred at similar frequencies when evaluated separately, but when evaluated concurrently, one modality was likely to be preferred over the other. Collectively, these results suggested that development of effective FCT programs should include systematic evaluation of relevant communication response variables such as proficiency, effort, and preference.

The results of the current study set the occasion for additional research related to response preference and FCT. While the use of either communication modality in the course of FCT resulted in clinically successful outcomes for all participants, it remains unclear if or how these treatments may differ with respect to other important aspects of treatment, such as maintenance. Nevin and Wacker (2013) conceptualized treatment maintenance along two dimensions: continued expression of appropriate, replacement behavior and continued suppression of target, problem behavior in the face of treatment challenges. It may be the case that incorporating preferred responses into FCT-based treatments may differentially affect these aspects of treatment maintenance. Future research related to FCT and preferred responses could evaluate this relation.

The results of the current study also add to an established literature base demonstrating that individuals with IDD demonstrate preferences. Certainly, several studies related to

preference assessment methodology have been conducted with individuals with IDD (Fisher et al. 1992; Roane et al. 1998). These studies have demonstrated that individuals with IDD demonstrate preferences for items and activities. In addition, several published studies have demonstrated that individuals with IDD exhibit a preference for various aspects of behavioral treatment. For example, Hanley et al. (1997) demonstrated that the two participants in their study preferred FCT over noncontingent reinforcement as treatment for problem behavior. Similarly, Hanley et al. (2005) demonstrated that participants preferred FCT plus punishment to FCT only. The findings of the current study similarly evaluated preference for one aspect of FCT: communication modality. Results indicated that individuals clearly demonstrated a preference, and this finding was robust across individuals. While the long-term treatment implications of this preference were not described in the current study, incorporating individual preferences into treatment development is in line with the notion of allowing individuals to choose effective treatment. Thus, it makes sense that preference be considered as treatments are designed.

Acknowledgments

Funding This study was funded by the National Institutes of Health (NIH; grant number R01 HD069377).

References

- Carr EG, Durand VM. Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis*. 1985; 18:111–126. [PubMed: 2410400]
- Danov SE, Hartman E, McComas JJ, Symons FJ. Evaluation of two communicative response modalities for a child with autism and self-injury. *The Journal of Speech and Language Pathology-Applied Behavior Analysis*. 2010; 5:70–79.
- Falcomata TS, Wacker DP. On the use of strategies for programming generalization during functional communication training: A review of the literature. *Journal of Developmental Disabilities*. 2013; 25:5–15.
- Fisher WW, Piazza CC, Bowman LG, Hagopian LP, Owens JC, Slevin I. A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*. 1992; 25:491–498. [PubMed: 1634435]
- Hagopian LP, Boelter EW, Jarmolowicz DP. Reinforcement schedule thinning following functional communication training: Review and recommendations. *Behavior Analysis in Practice*. 2011; 4:4–16.
- Hanley GP, Piazza CC, Fisher WW, Contrucci SA, Maglieri KA. Evaluation of client preference for function-based treatment packages. *Journal of Applied Behavior Analysis*. 1997; 30:459–473. [PubMed: 9316259]
- Hanley GP, Piazza CC, Fisher WW, Contrucci SA, Maglieri KA. On the effectiveness of and preference for punishment and extinction components of function-based interventions. *Journal of Applied Behavior Analysis*. 2005; 38:51–65. [PubMed: 15898474]
- Horner RH, Day H. The effects of response efficiency on functionally equivalent competing behaviors. *Journal of Applied Behavior Analysis*. 1991; 24:719–732. [PubMed: 1839157]
- Iwata BA, Dorsey MF, Slifer KJ, Bauman KE, Richman GS. Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis*. 1994; 27:197–209. (Reprinted from *Analysis and Intervention in Developmental Disabilities*, 2, 3–20, 1982). [PubMed: 8063622]
- Nevin, JA., Wacker, DP. Response strength and persistence. In: Madden, GJ, Dube, WV, Hackenberg, TD, Hanley, GP, Lattal, KA., editors. *APA handbook of behavior analysis, Vol 2: Translating principles into practice*. American Psychological Association; Washington, DC: 2013.

- Richman DM, Wacker DP, Winborn L. Response efficiency during functional communication training: Effects of effort on response allocation. *Journal of Applied Behavior Analysis*. 2001; 34:73–76. [PubMed: 11317991]
- Ringdahl JE, Falcomata TS, Christensen TJ, Bass-Ringdahl SM, Lentz A, Dutt A, Schuh-Claus J. Evaluation of a pretreatment assessment to select mand topographies for functional communication training. *Research in Developmental Disabilities*. 2009; 30:330–341. [PubMed: 18672344]
- Roane HS, Vollmer TR, Ringdahl JE, Marcus BA. Evaluation of a brief stimulus preference assessment. *Journal of Applied Behavior Analysis*. 1998; 31:605–620. [PubMed: 9891397]
- Tiger JH, Hanley GP, Bruzek J. Functional communication training: A review and practical guide. *Behavior Analysis in Practice*. 2008; 1:16–23. [PubMed: 22477675]
- Wacker DP, Harding JW, Morgan TA, Berg WK, Schieltz K, Lee JF, Padilla YC. An evaluation of resurgence during functional communication training. *The Psychological Record*. 2013; 63:3–20.
- Winborn L, Wacker DP, Richman DM, Asmus J, Geier D. Assessment for mand selection for functional communication training packages. *Journal of Applied Behavior Analysis*. 2002; 35:295–298. [PubMed: 12365744]
- Winborn-Kemmerer L, Ringdahl JE, Wacker DP, Kitsukawa K. A demonstration of individual preference for novel mands during functional communication training. *Journal of Applied Behavior Analysis*. 2009; 42:185–189. [PubMed: 19721740]

Fig. 1. Responses per minute of Lawrence's problem behavior during functional analysis (top panel); Percent of trials with guided, model, or vocal prompts or independent responding (middle panel); Responses per minute of problem behavior and communication during baseline (FA), FCTA, and FCTC (bottom panel)

Fig. 2.

Seth's percent of trials with guided, model, or vocal prompts or independent responding (top panel); Responses per minute of problem behavior and communication during baseline (FA), FCTA, and FCTC (bottom panel)

Fig. 3. Responses per minute of Boji's problem behavior during functional analysis (top panel); Percent of trials with guided, model, or vocal prompts or independent responding (middle panel); Responses per minute of problem behavior and communication during baseline (FA), FCTA, and FCTC (bottom panel)

Table 1

Participant description

Participant	Age	Gender	Diagnoses
Quinn	4	Male	ASD, Severe ID
Cora	49	Female	Down Syndrome, Severe ID
Frank	4	Male	ASD, Moderate ID
Sheldon	8	Male	ASD, Moderate ID
Horatio	4	Male	ASD, Severe ID
Milo	68	Male	Severe ID
Seth	34	Male	Mild ID
Wilma	5	Female	ASD, Mild ID
Katelynn	8	Female	ASD, Mild ID
Lawrence	3	Male	ASD, Severe ID
Kloee	5	Female	ASD, Mild ID
Samuel	5	Male	ASD, TBI, Mild ID
Boji	5	Male	ASD, Mild ID
Drake	13	Male	Down Syndrome, Moderate ID
Ernie	2	Male	Developmental Delay
Kami	7	Female	Mild ID
Cyrus	3	Male	Mild ID
Randall	3	Male	Mixed receptive-expressive language disorder

Table 2

Target Responses

Participant	Problem behavior	Communication modalities
Quinn	N/A	Microswitch activation, picture card touch
Cora	N/A	Microswitch activation, picture card touch
Frank	Screaming, SIB, Aggression	Microswitch activation, picture card touch
Sheldon	Elopement, Disruptive behavior	Microswitch activation, picture card touch
Horatio	Disruptive behavior	Microswitch activation, picture card touch
Milo	N/A	Microswitch activation, picture card touch
Seth	N/A	Manual sign, Picture card touch
Wilma	Aggression	Microswitch activation, Picture card touch
Katelynn	SIB, Aggression, Property destruction	Picture card touch, Vocal
Lawrence	Aggression, SIB	Microswitch activation, Picture card touch
Kloee	Aggression, Property Destruction, Screaming	Microswitch Activation, Picture Card Touch
Samuel	Disruptive Behavior, Aggression	Vocal, Picture card touch
Boji	Aggression, Property destruction, SIB, Elopement	Manual Sign, PDD
Drake	Aggression, Property destruction, SIB	Vocal/manual sign, Picture card touch
Ernie	Property Destruction, SIB	Vocal/manual sign, Picture card touch
Kami	Aggression, Property Destruction, Elopement	Vocal, Picture card touch
Cyrus	Aggression, Property destruction	Manual sign, Picture card touch
Randall	Aggression, Property destruction, Elopement	Manual sign, Picture card touch