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An Evaluation of Parent Preference for Prompting Procedures

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Abstract

Parent participation in intervention can enhance intervention efficacy and promote generalization of skills across settings. Thus, parents should be trained to implement behavioral interventions. The purpose of the current investigation was to evaluate parent preference for and acceptability of 3 commonly used prompting procedures. We trained parents of children with disabilities to use 3 empirically validated prompting strategies (i.e., least-to-most, most-to-least, and a progressive-prompt delay). Once the parent reached the mastery criteria with each prompting procedure, we evaluated his/her preference for each of the procedures using a concurrent-chains arrangement. We

also measured treatment acceptability of all procedures throughout the study. All participants met the mastery criteria for each of the prompting procedures and showed a preference for least-to-most prompting. Results suggest parents' acceptability of procedures prior to training were different than posttraining/post-child practice. In addition, acceptability rating scores obtained at the end of the investigation corresponded to preference of intervention during the concurrent-chains arrangement. The results demonstrate the benefits of objective measures for studying preference for behavioral, skill-acquisition procedures.

A prompt is defined as an antecedent stimulus that controls a response (MacDuff, Krantz, & McClannahan, **2001**). Prompts are often used to teach skills to individuals with and without disabilities. Prompts occasion a correct response in the presence of relevant antecedent stimuli so that the response can produce reinforcement. For example, a parent might provide a vocal prompt to “use a fork” if a child is reaching for a plate of spaghetti with her hands. Once the child picks up the fork and uses it to eat spaghetti, her parent might provide praise (e.g., “Great job using your fork!”).

Multiple types of prompt-fading procedures have been successful for teaching pre-academic/academic (e.g., Kodak, Clements, & LeBlanc, **2013**; Libby, Weiss, Bancroft, & Ahearn, **2008**) and leisure/vocational (e.g., Seaver & Bourret, **2014**) skills to individuals with developmental disabilities. Common prompt-fading strategies used in skill-acquisition programs include a prompt delay, most-to-least prompting, and least-to-most prompting.

Touchette (**1971**) described a prompt-delay procedure (which he referred to as time delay) in which stimulus control is transferred from the controlling prompt to the discriminative stimulus (S^D) during a delay interval. A progressive-prompt delay (PPD) consists of the delay being systematically increased across sessions or trials (Schuster, Gast, Wolery, & Guiltinan, **1988**). For example, the instructor may initially wait 1 s for a response before providing a prompt and increase the delay to 2 s contingent on several trials in which the individual does not respond prior to the prompt. There is considerable empirical support for the efficacy of PPD (e.g., Cariveau, Kodak, & Campbell, **2016**; O'Neill, McDowell, & Leslie, **2018**; Walker, **2008**). For example, Cariveau et al. (**2016**) used a PPD to teach 24 novel responses to two participants with autism spectrum disorder (ASD). The PPD was an efficacious training procedure that produced mastery of all targeted skills regardless of the format of training (massed- or varied-trial instruction) and amount of time between instructional trials.

Another prompting procedure for skill acquisition is most-to-least prompting (MTL; Striefel & Wetherby, **1973**), which consists of more intrusive prompts at the onset of instruction. More intrusive prompts are faded to less intrusive prompts to provide opportunities for independent correct responses. Fentress and Lerman (**2012**) used MTL prompting with four prompting levels to teach skills to children diagnosed with ASD. The authors began the first trial with an instruction paired with a full physical prompt. Each correct response resulted in a less intrusive prompt provided at the beginning of the trial. If the participant was not successful with a less intrusive prompt, the therapist returned to the previous prompt at which the participant was successful (i.e., one level more intrusive). The same procedure was continued until the participant engaged in correct independent responses that met the mastery criterion. The MTL prompting condition resulted in the fewest errors and higher performance during maintenance probes in comparison to a different intervention.

Least-to-most (LTM; Cronin & Cuvo, **1979**) is a third prompt-fading procedure that consists of an increasing level of intrusive prompts within a learning opportunity. The trial begins with an instruction (e.g., a vocal S^D; “Touch your nose.”). If the participant does not respond to the vocal instruction within a specified interval, the therapist presents a more intrusive prompt (e.g., a model prompt). If a correct response still does not occur, the therapist provides the most intrusive prompt (e.g., full physical guidance).

Researchers have compared prompt-fading procedures to evaluate potential advantages of commonly used teaching methods (e.g., Cengher, Budd, Farrell, & Fienup, **2018**; Cengher et al., **2015**; Libby et al., **2008**; Seaver & Bourret, **2014**). For example, Libby et al. (**2008**) compared MTL and LTM procedures for teaching children to build block structures. Results showed that LTM led to the most rapid acquisition for most of participants, but all participants mastered the skill with fewer errors during MTL. However, their second experiment found similar acquisition for LTM and MTL when the MTL procedure included a prompt delay. Similarly, Seaver and Bourret (**2014**) conducted a three-experiment study in which they compared response prompts for teaching behavior chains to participants with ASD. The first experiment consisted of a prompt-type assessment in which types of prompts (e.g., verbal, gestural, physical) were compared using a PPD with a structure-building task. The results of the first experiment were applied to a comparison of the most efficient type of prompt-fading procedure in the second experiment. The prompt-fading procedures included in the comparison were PPD, MTL, and LTM. The authors found that the fastest acquisition occurred with LTM prompting for three participants and PPD for four participants. The results of Seaver and Bourret and Libby et al. showed that the efficiency of prompting procedures may be idiosyncratic across individuals.

When prompting procedures produce discrepant results across participants, it is important to consider other variables that may influence the decision to select and use specific prompting strategies with learners (Hanley, **2010**; Kodak et al., **2016**). For example, the feasibility of a prompting procedure may influence whether it is selected for use. If a prompting procedure is difficult to implement or results in reduced treatment integrity, it may not be ideal to use this intervention despite the level of efficacy and efficiency. In addition, the social validity of intervention procedures is important to consider. Procedures that are not considered socially valid by parents or participants may not be ideal to use.

According to Wolf (**1978**), social validity includes three specific components: (a) the significance of the goals, (b) the appropriateness and acceptability of the procedures, and (c) the importance of the effects to members of society. Social validity is often assessed using indirect measures (e.g., rating scales). Of interest to the present investigation is treatment acceptability. Treatment acceptability is a specific component of social validity that relates to the consumers' (e.g., parents, teachers) perceptions and willingness to assist with the treatment (Kazdin, **1977**).

Davis, Reichle, and Southard (**2000**) used both direct and indirect measures of treatment acceptability with two interventions that increased successful transition behavior. During a maintenance probe, a confederate observed transitions in the school and recorded the proportion of transitions in which each of the interventions was used. Although both interventions were efficacious and rated as acceptable by staff members via indirect measures, one of the interventions was implemented during most of the transitions. This allocation of staff responding to one intervention suggests a preference for one of the interventions that was not captured by the indirect measure.

Social validity and treatment acceptability should be further differentiated from preference. A preference is established when an individual's responding is allocated to one option more than the other available options. Preference has been evaluated in a variety of ways such as through preference assessments (e.g., multiple-stimulus without replacement; DeLeon & Iwata, **1996**) and concurrent-chains arrangements (Herrnstein, **1964**). It has been suggested that training parents or teachers on multiple interventions may lead to the selection of a procedure that they will use when an experimenter or clinician is no longer present (e.g., outside the clinical setting; Gabor, Fritz, Roath, Rothe & Gourley, **2016**; Lerman, Vorndran, Addison, & Contrucci Kuhn, 2004).

Gabor et al. (**2016**) evaluated acceptability of and preference for function-based treatments for problem behavior. Parent training consisted of behavioral skills training (BST). Parents also completed a treatment acceptability form multiple times throughout the study. Following mastery of training, experience sessions were

conducted in which the parent practiced the procedures with the child. After parents achieved mastery criteria (> 90%) across all conditions, choice sessions were conducted with a concurrent-chains arrangement. The initial link of the concurrent-chains arrangement consisted of parent selection between the three interventions and a control condition, while the terminal link consisted of the parent using the selected intervention with the child. The results of Gabor et al. indicated that two parents preferred differential reinforcement of alternative behavior, two preferred differential reinforcement (e.g., alternative and other behavior) over noncontingent reinforcement, and one parent did not show a preference for any of the intervention options. The parent that did not show a preference between interventions still showed a preference for the trained interventions over her own strategies. Nevertheless, the treatment acceptability ratings inconsistently corresponded with parent preference for intervention. For example, only one participant preferred the option she had rated as highly preferred in the pre-experience sessions. Additionally, another participant's ratings of acceptability matched the most commonly selected intervention only after experiencing the implementation of all interventions with her child. These results suggest that additional research on parent preference and acceptability ratings is warranted with other interventions for which parents frequently receive training.

Parents have been trained to successfully implement several behavior-analytic procedures including discrete trial instruction (e.g., Lafasakis & Sturmey, **2007**), social skills (e.g., Dogan, King, Fischetti, Lake, Mathews, & Warzak, **2017**) communication training (e.g., Ingvarsson, **2011**), activity schedules (e.g., Gerencser, Higbee, Akers, & Contreras, **2017**), and functional analyses (e.g., Najdowski et al., **2008**). The procedures included in BST (i.e., instruction, modeling, role play or in vivo rehearsal, and feedback) have been used to teach parents many of these interventions. Lafasakis and Sturmey (**2007**) successfully used BST to teach parents discrete trial instruction, and the skills generalized to novel discrete-trial programming. Although the extant literature on parent training has demonstrated the efficacy of BST procedures, relatively few studies have investigated the social validity of interventions for which parents have been trained to implement.

To our knowledge, no previous studies have compared parent preference for and treatment acceptability of prompt-fading procedures, although it has been suggested for many years that parent involvement in treatment plays a role in child treatment gains and maintenance of skills (Lovaas, Koegel, Simmon, & Long, **1973**). Therefore, the purpose of the present investigation was to extend Gabor et al. (**2016**) to conduct an examination of parent preference hierarchies for three prompt-fading procedures commonly used during comprehensive behavioral intervention. Parents received BST to implement all three prompt-fading procedures with high integrity. Thereafter, we conducted a concurrent-chains arrangement to measure parent preference for the prompt-fading procedures. Additionally, treatment acceptability of all procedures was measured multiple times throughout the study.

METHOD

Participants

Four parent–child dyads participated in this evaluation. Each child was receiving comprehensive behavioral intervention from a local service provider and parents had no prior training with the specific prompt-fading procedures used in this comparison. All parents and child participants were assigned pseudonyms. Mr. and Mrs. Roberts were the parents of Henry. At the time of the study, Mrs. Roberts was 33 years old and had a Bachelor of Science degree. Mr. Roberts was 36 years old and had a Master's degree. Their child, Henry, was a 4-year-old diagnosed with ASD. Henry engaged in verbal operants composed of short sentences (i.e., mands, tacts, and intraverbals) and had a generalized imitative repertoire.

Mrs. Davis was the mother of Mark. She was 43 years old with a Master's degree. Her son, Mark, was a 6-year-old diagnosed with ASD. He engaged in verbal operants composed of short sentences (i.e., mands, tacts, and intraverbals) and had a generalized imitative repertoire.

Mrs. Sullivan was the mother of Ethan, a 6-year-old diagnosed with a moderate intellectual disability and global developmental delay. Mrs. Sullivan held a Bachelor of Arts degree at the time of the study. Ethan engaged in partial approximations as vocal mands, but he primarily communicated using Picture Exchange Communication System® (Bondy & Frost, **2001**). Ethan had a generalized imitative repertoire for motor skills.

Each of the child participants had a history of engaging in problem behavior during instruction, although we anticipated low levels of problem behavior based on differential reinforcement for compliance and escape extinction used by parents during sessions. Staff confederates consisted of undergraduate students enrolled as research assistants and graduate students enrolled in a master's or doctoral training program in applied behavior analysis at a local university.

Setting and Materials

Training sessions were conducted in each participant's home in a room typically used for behavior therapy or a quiet room with minimal distractions. Each room included a timer, table, chairs, data sheets, preferred items, and program materials. Only the experimenter(s), parent(s), and data collectors were present during initial training sessions. The child participant was also present during the experience sessions and choice sessions (described below).

Program materials varied, and specific stimulus cards were selected for use in training based on each child's goals. Stimuli included laminated flashcards with pictures. Listener responses for item features (e.g., a stem on an apple, a trunk on an elephant) were selected as targets for Henry and Mark. Listener responses of categories (e.g., sports, insects, art supplies) were selected as targets for Ethan. Tangible and edible items based on a child preference assessment were also used throughout the study. A video camera was used to record sessions for data collection following sessions.

Response Measurement and Interobserver Agreement

Parent behavior

The primary dependent variable was the cumulative frequency of prompting procedure selections by the parent. Observers scored a *selection* if the parent touched the card corresponding to the respective prompting procedure and/or vocally stated his/her selection during choice sessions. Observers collected data on parent implementation of the prompting procedure on a trial-by-trial basis with a checklist. Observers scored implementation for each step in a trial as correct, incorrect or omitted, or no opportunity. Any trial in which one or more steps were scored as incorrect or omitted was considered an incorrectly implemented trial. For each session, the number of trials with all steps implemented correctly was divided by the total number of trials and multiplied by 100. The steps consisted of, (a) secures attention, (b) presents session materials, (c) presents instruction, (d) delivers prompt(s) in correct order, (e) delivers prompt(s) in correct way, (f) provides praise and reinforcer when appropriate, (g) removes stimuli after trial, (h) records data (prompt level necessary to occasion correct response, classification as independent or prompted, and problem behavior), (i) ignores/blocks problem behavior and moves to more intrusive prompt level, (j) presents next trial within 5 s of removing reinforcer, (k) varies order of stimuli in the array (Mrs. Sullivan only). Parents were not responsible for graphing the child's behavior or assigning new targets to conditions.

Child behavior

Data were collected on correct independent responses, errors, the prompt level required to occasion a correct response, and the child's problem behavior during each trial. Correct independent responses were defined as

the child engaging in the target behavior specified in the protocol (e.g., touching the correct feature) or selecting the target stimulus card (e.g., selecting the stimulus that corresponded to the targeted category) within 5 s of the vocal instruction. An error was defined as the child selecting a stimulus card or touching a feature in a picture that was not targeted in the trial. The prompt level required to produce a correct prompted response during each trial was recorded by scoring the type of prompt (e.g., model) that occasioned a correct response. We calculated mean sessions to mastery for each parent–child dyad by dividing the total number of sessions conducted in each procedure by the number of targets mastered with the procedure.

Problem behavior data also were collected on a trial-by-trial basis. Definitions of problem behavior were developed for each participant and included aggression (e.g., hitting, kicking, pinching), self-injurious behavior (e.g., head banging, hand-to-head), disruption (e.g., swiping materials off the table), negative vocalizations (e.g., screaming), vocal noncompliance (e.g., saying no), and elopement. We summarized data on problem behavior for each prompting procedures as percentage of sessions with problem behavior. The percentage of sessions with problem behavior was calculated for each prompting procedure by dividing the number of sessions with one of more occurrences of problem behavior by the total number of sessions of the procedure, multiplied by 100.

Staff behavior

Treatment integrity data were collected on the staff confederate's implementation of BST for a minimum of 80% of training sessions across parents. Checklists were used to measure staff behavior (see Supporting Information). Two checklists were developed; one was for the first training session of each procedure, and the other checklist was used for all remaining training sessions. We divided the number of steps implemented correctly by the total number of steps and converted the quotient to a percentage. Staff treatment integrity was 98% (range, 94% to100%) for Mrs. Roberts, 98% (range, 94% to 100%) for Mr. Roberts, 99% (range, 93% to 100%) for Mrs. Davis, and 93% (range 47% to 100%) for Mrs. Sullivan. The low session with Mrs. Sullivan represents when feedback was provided at the end of the BST session instead of on a trial-by-trial basis (i.e., feedback was still provided, but at the incorrect time for that training session).

Interobserver agreement

Two independent observers collected data on parent behavior during training sessions or from video recordings. Interobserver agreement (IOA) was calculated using the trial-by-trial method. Following all sessions, each trial on the checklist was compared, and an agreement was defined as two observers scoring the same behavior for all of the steps in the trial. A disagreement was defined as two observers scoring a different behavior for one or more of the steps within the same trial. The number of trials with an agreement was divided by the total number of trials and multiplied by 100. Data on IOA were collected for 45% to 69% of sessions for each parent. Mean IOA was 97% (range 90% to 100%) for Mrs. Roberts, 98% (range 80% to 100%) for Mr. Roberts, 96% (range 80% to 100%) for Ms. Davis, and 97% (range 80% to 100%) for Mrs. Sullivan.

A second trained observer collected data for treatment selection during the choice trials for a minimum of 44% of sessions. Mean IOA for treatment selection was 100% for all participants. Finally, a second trained observer collected data on child problem behavior and compared this to the parent's data collection during a minimum of 44% of choice sessions. Following sessions, each trial on the parent data sheet was compared to the observer's data collection on integrity. An agreement occurred when both observers scored the presence or absence of problem behavior in an identical manner in the trial. Mean IOA was 99% (range 90% to 100%), 99% (range 90% to 100%), 96% (range 80% to 100%), and 98% (range 80% to 100%) for Mrs. Roberts, Mr. Roberts, Mrs. Davis, and Mrs. Sullivan, respectively.

Pre-assessments, Tests, and Stimuli

Prompt-type assessment

The experimenter conducted a brief assessment with each child prior to the start of the investigation to evaluate the type of prompt to which each child would consistently respond correctly. The stimuli used within this assessment were related to the child's clinical goals but were not the targets included in other conditions. During 10-trial sessions, the experimenter presented a horizontal array of three stimuli to the child, and the position of the target stimulus was randomized across trials. The experimenter delivered the vocal S^D and immediately provided a model prompt. Praise and a preferred tangible item were provided for correct responses to the model prompt. If the child engaged in an error or no response to the model prompt, the experimenter provided a physical prompt (i.e., hand-over-hand guidance). All three child participants engaged in a correct response to the model prompt during 100% of trials for two consecutive sessions after four or fewer assessment sessions.

Pretests

The stimuli selected for inclusion in the investigation were based on each child's current skill deficits and treatment goals. A pretest was conducted to identify stimuli to which the child participant did not respond correctly. Pretest sessions included 9 to 12 trials, and each potential target was presented three times. The experimenter did not provide prompts or reinforcement during trials, although mastered tasks were interspersed approximately every two trials. Correct independent responses to mastered tasks produced praise and access to a preferred item for 20 to 30 s. Stimuli to which the participant responded correctly during less than 33% of the trials were included in training sessions.

Stimulus sets

The targeted skills varied by child participant. Instruction consisted of presenting the same S^D for each trial during a session, although multiple targets were incorporated into a single session (e.g., categories). During category training, the three-item array included two distracter stimuli that were alternated across sessions and selected from a larger pool of distracter stimuli assigned to each condition. The parent presented the S^D (for example, ″animal”) on all 10 trials, and two different exemplars of animals were targeted within the session and each was presented on 50% of the trials (e.g., monkey, penguin). The location of the target stimulus and the distracters varied during each trial. For feature training, two exemplars of each target were presented within a session (i.e., two pictures of different elephants). On each trial, the instructor presented one of the exemplars and targeted one feature in the picture (e.g., the elephant's trunk). Each exemplar was presented for 50% of the trials in a session. We assigned different stimuli to each prompting procedure and each phase of training (i.e., experience and choice sessions). We also attempted to equate the stimuli assigned to each condition by the number of syllables in the target response.

We considered a stimulus mastered when the child engaged in a correct independent response on at least 90% of trials in a session, with the additional requirement that the first trial of the session must be correct (Grow, Carr, Kodak, Jostad, & Kisamore, **2011**). Following mastery of each set of stimuli, training on a new stimulus was introduced. New targets were also introduced following three consecutive sessions with a stable or decreasing trend. Training of stimuli continued until completion of the current-chains arrangement. The purpose of instruction with only two exemplars per session and requiring only one session with high levels of correct responding to reach the mastery criterion was to introduce novel stimuli frequently, which provided ample opportunities for each parent to practice implementing all prompts within each of the prompting procedures.

Preference Assessment

At the start of each appointment, an experimenter conducted a brief multiple stimulus without replacement preference assessment (Carr, Nicolson, & Higbee, **2000**). We included the top two items as reinforcers

throughout the training session. If at any point the child did not accept or consume the item, the child's parent offered a choice of another item prior to the next trial. If the child vocally requested an alternative item, the parent provided the requested item (if available).

Prompting Procedures

Three different prompt-fading procedures were taught to each parent. The procedures were taught to all parents in the same order, and each procedure was taught to mastery before introducing the next one. This order included LTM, PPD, and MTL. During all procedures, if the child engaged in problem behavior, the parent immediately (within 2 s) moved to the next most intrusive prompt level within the current trial (e.g., Giannakakos, Vladescu, Kisamore, & Reeve, **2016**). Parents reinforced compliance and correct responding (independent and prompted responses) with a break and tangible items and did not permit breaks from work contingent on problem behavior in all procedures.

LTM prompts

The prompting hierarchy consisted of providing the least intrusive prompt needed for a correct response at the onset of every trial. That is, the prompting hierarchy consisted of a (a) vocal instruction (discriminative stimulus), (b) model prompt, and (c) physical prompt. A vocal instruction was provided for the first trial presentation of a stimulus. If the child participant made an error or did not respond within 5 s, the parent provided the next intrusive prompt. The parent moved up the prompting hierarchy with 5-s response intervals between prompts until the child engaged in a correct response. If the child did not comply with the physical prompt (e.g., the child resisted guidance to touch a stimulus in the array), the parent discontinued the physical prompt after 5 s, did not provide reinforcement, and initiated the next trial. All correct responses, regardless of the prompt level, produced praise and a tangible item for 30 s on a fixed-ratio 1 (FR1) schedule.

PPD

The prompting hierarchy included a prompt provided at a (a) 0-s delay, (b) 2-s delay, and (c) 5-s delay. A model prompt was used at each prompt delay interval. The first trial began with an immediate model prompt (i.e., 0-s delay). Following one trial with a 0-s delay and a correct prompted response, the time between the onset of the trial and a prompt was faded to 2 s. If the participant responded correctly prior to a prompt at the 2-s delay, the prompt was faded to a 5-s delay. Criteria to advance and decrease a prompt level was based on a response in each trial; prompts were faded following an independent correct response. If a correct prompted response occurred, the prompt delay moved back to the previous delay level (e.g., decrease from a 5-s delay to a 2-s delay). Similarly, if the child was not successful with a model prompt, the trial ended, and the next trial began with the previous delay level. All correct responses were reinforced with praise and a tangible on a FR1 schedule.

MTL prompts

This prompting hierarchy consisted of a (a) physical prompt (i.e., hand-over-hand guidance), (b) model prompt (i.e., pointing to the correct stimulus), and (c) vocal instruction. The first presentation of a stimulus included a physical prompt; thereafter, prompt-fading began. Prompts were faded based on the child's response. That is, prompt-fading consisted of a reduction in the level of intrusiveness of a prompt following each correct response (Severtson & Carr, **2012**). If the child did not engage in a correct response with the first prompt utilized for a trial within 5 s, the instruction was repeated and a prompt one level higher was provided until the child reached the most intrusive prompt or a correct prompted response occurred. For example, if the parent began a trial with a vocal instruction but the child made an error, a model prompt was utilized. If the child made another error following the model prompt, a physical prompt was provided. If multiple prompts were used within a trial, the following trial still began with the prompt type that was one level less intrusive than the prompt necessary to occasion a correct response. As in LTM, if the child resisted the physical prompt the parent attempted to provide

the prompt for a total of 5 s. If the physical prompt did not produce a correct response, the parent did not provide reinforcement and initiated the next trial. All correct responses produced praise and a preferred item on a FR1 schedule.

Parent Training

Sessions occurred 1 to 4 days per week, depending on the parent's schedule. All appointments were approximately 1 to 1.5 hours. The sequence of training procedures consisted of BST sessions, experience sessions, and choice sessions. Behavioral skills training occurred within a multiple probe design across prompting procedures. The criterion to advance from BST consisted of all trials in the role-play with 100% accuracy for one session. Additionally, we required parents to maintain 90% integrity during baseline probes following training; otherwise we implemented additional BST sessions for that procedure. The criterion to advance to choice sessions consisted of three consecutive experience sessions with at least 90% integrity (i.e., one of each prompting procedure). We used a concurrent-chains arrangement for the choice sessions. The initial link consisted of the parent's selection of one prompting procedure. The terminal link consisted of the parent conducting a session with his/her child using the selected prompting procedure.

Pretraining

Prior to baseline sessions, the parent viewed three videos (i.e., one of each prompt-fading procedure) of an experimenter implementing a session of each prompting procedure with a staff confederate. Each video showed a six-trial session with examples of all prompt types, responding to problem behavior, and securing the child's attention to materials. The staff confederate followed a simulated child script for each prompt-fading procedure. Immediately after viewing each video, each parent completed the treatment acceptability forms for the prompting procedure shown in the video.

BST

The experimenter taught the parents to implement all three prompt-fading procedures using BST. The order of training for each prompting procedure remained consistent across parent–child dyads (i.e., LTM, PPD, MTL). All baseline sessions occurred after the completion of the treatment acceptability forms from pretraining. Baseline sessions were conducted with the staff confederate. These sessions consisted of providing written instructions to parents (Mueller et al., **2003**) which included of a brief description of the prompting procedures and how to implement them (see Supporting Information). At the start of baseline sessions, parents were informed that the experimenter could not provide any feedback during the session but to follow the instructions listed on the card. Similarly, questions about the procedures were not directly responded to, and parents were briefly told to keep trying their best. Parents reviewed the written instructions and attempted to implement the procedures with the confederate.

Training sessions were conducted without the child present. Parents received vocal instructions on how to respond to problem behavior, which included keeping a neutral facial expression, not attending to problem behavior unless the child's safety was at risk, and increasing the intrusiveness of the prompt by one level immediately following problem behavior.

At the start of each training session, the parent received the written instructions card also included in baseline. Next, the experimenter described the steps of the procedure and showed a video model of each step of the prompting procedure while the parent observed. The same video models from pretraining sessions were used for each condition. Parents received opportunities to ask questions throughout the video. Following the video model, a staff confederate role-played the procedures with the parent; the confederate served as the child, and the parent served as the instructor. During role-play, the parent implemented a 10-trial session using the prompting procedure shown in the video model. The staff confederate followed a script that specified how to respond during each trial, trials in which the confederate engaged in problem behavior, and trials in which the

confederate did not attend to stimuli. Three different scripts were developed for each of the prompt procedures and were conducted in a randomized order during training sessions. The number of trials in which the confederate engaged in problem behavior and did not attend to stimuli was consistent across prompt types. Additionally, the number of exposures with each prompt level was approximately consistent across prompt types.

During the first role-play session, the experimenter provided positive and corrective feedback to parents following each trial. This feedback consisted of two praise statements and one corrective comment (if relevant). If more than one error occurred within a trial, corrective feedback was provided on one error only, unless the parent specifically asked for feedback on other aspects of the procedure. Thereafter, positive and corrective feedback occurred at the end of each 10-trial session. The parent completed training for a prompting procedure when he/she implemented all trials in the role-play with 100% accuracy for one session (guidelines for providing feedback to parents are available from the first author).

Experience Sessions

Parents practiced each of the prompting procedures in a quasirandom and counterbalanced order with his/her child. These experience sessions served as a variation of forced-choice exposure trials, as they were additional practice opportunities with the child prior to the concurrent-chains arrangement. Consistent with Gabor et al. (**2016**), prior to and during sessions, parents continued to have access to instruction cards that described the prompting procedure. The experimenter did not interact with the parent or child during experience sessions except to observe and collect data. For example, the experimenters did not provide comments on incorrect responses to avoid creating a bias for the prompting type that the parent implemented with the highest accuracy. Vocal feedback only occurred contingent on parent request (e.g., asking a question).

The mastery criterion to move from experience sessions to the choice sessions was three consecutive sessions (i.e., one of each condition) with at least 90% integrity (9 out of 10 trials with all steps correct). If treatment integrity fell below 90% for any of the prompting procedures, the experimenter re-implemented training for all three procedures (i.e., until each prompt procedure reached 90%). Parents completed a session of all three prompting procedures prior to moving back into retraining, and they were not told which intervention condition resulted in the necessity for retraining. Retraining consisted of additional exposures to the instruction cards paired with BST.

Choice Sessions

We used a concurrent-chains arrangement to assess parents' preference for the prompting procedures using the method described by Gabor et al. (**2016**). The experimenter presented the written instruction cards of the three prompting procedures in an array. Following a selection, the card remained on the table, and we initiated the terminal link. The terminal link consisted of the parent implementing the selected prompt-fading procedure with the child for a 10-trial session.

The parent's high-preference (HP) prompting procedure was identified once the parent selected one procedure six more times than any other procedure (Slocum & Tiger, **2011**). Sessions continued until we identified the HP procedure, or the parent completed 20 choice sessions with no preference (Luczynski & Hanley, **2009**). Following identification of the HP prompting procedure, we removed the card corresponding to the HP procedure from the array and conducted the concurrent-chains procedure with the two remaining cards to identify the moderately preferred procedure (MP). The second concurrent-chains arrangement ended based on the same criteria specified for the HP.

Treatment Acceptability

A modified TEI-SF (Kelley, Heffer, Gresham, & Elliot, **1989**) measured parent treatment acceptability (see Supporting Information). The form consisted of eight questions that parents scored on a 5-point Likert-type scale, ranging from strongly disagree to strongly agree. From the original TEI-SF, the experimenters omitted two questions because they were not specifically related to the prompting procedures. The experimenters also included an additional item to measure whether the parent would recommend the procedure to others. Parents completed the TEI-SF for all prompt procedures prior to the start of training (e.g., following pretraining videos), immediately after mastery of training with the staff confederate for each prompt type (i.e., BST), and following the choice sessions. We measured treatment acceptability scores throughout the study to evaluate whether a specific amount of exposure to procedures altered acceptability scores and to determine the similarity in procedure scores between the TEI-SF and the concurrent-chains procedure.

Parents also completed an acceptability criterion rating scale at the same three times throughout the study (see Supporting Information). On this form, parents rated each prompt procedure, individually, on a scale of 0-100. It also asked parents to identify a point at which they do not consider an intervention to be acceptable (i.e., they would not want to implement the intervention or would not want others to implement it with their child).

RESULTS

All parents met the mastery criteria for all prompting procedures in five or fewer BST sessions. The first row in Table **1** shows the number of BST sessions conducted for each condition with each parent. Three parents (i.e., Mrs. Roberts, Mr. Roberts, and Mrs. Sullivan) conducted one experience session with their child for each condition, prior to meeting the criterion to move into choice sessions. One parent, Mrs. Davis, required brief retraining for the experience sessions, and she completed three experience sessions with her child for each condition prior to moving into choice sessions. Similar to Gabor et al. (**2016**), parent choice of prompting procedures was the primary dependent variable. Therefore, we omitted data on BST and experience sessions; these data are available from the first author, upon request.

Table 1. Summary of Session Data for Each Parent–Child Dyad

	LTM	PPD	MTL
Mrs. Roberts			
Number of BST sessions (P)	1	2	1
Mean sessions to mastery (C)	1.25	2	1.33
Number of targets mastered (C)	8	2	6
Percentage of sessions with PB (C)	50	75	25
Mr. Roberts			
Number of BST sessions (P)	3	5	2
Mean sessions to mastery (C)	1.67	4	1.5
Number of targets mastered (C)	6	2	10
Percentage of sessions with PB (C)	30	50	20
Mrs. Davis			
Number of BST sessions (P)	3	5	2
Mean sessions to mastery (C)	1.33	1	1
Number of targets mastered (C)	6	2	8
Percentage of sessions with PB (C)	62	100	75
Mrs. Sullivan			
Number of BST sessions (P)	4	4	1
Mean sessions to mastery (C)	1.5	N/A	6.5
Number of targets mastered (C)	8	0	2
Percentage of sessions with PB (C)	25	0	8

Note. P = parent, C = child, PB = problem behavior, LTM = least-to-most, PPD = progressive-prompt delay, MTL = most-to-least

Results of all parents' choice sessions are shown in Figure **1**. Initially, Mrs. Roberts selected each of the interventions a minimum of two times prior to consistently selecting one procedure (top panel). The LTM procedure met the criteria for the HP intervention. Once LTM was removed from the array, she allocated her responding to MTL and did not select PPD again. MTL met the criteria for the MP intervention. Mr. Roberts also selected each intervention a minimum of three times prior to allocating his selections to LTM, which was identified as the HP intervention (second panel). After LTM was removed, he alternated selections of MTL and PPD for the first 10 choice sessions, after which he selected MTL only. His responding showed MTL was his MP intervention. Mrs. Davis selected LTM as the HP intervention (third panel). She rapidly demonstrated preference for LTM after sampling each of the other procedures only twice. Mrs. Davis allocated her responding to MTL within the second concurrent-chains arrangement, which was identified as her MP intervention. Similar to other participants, Mrs. Sullivan engaged in some initial sampling of each procedure (bottom panel). Nevertheless, her selections followed the same hierarchy as other parents in which she selected LTM as the HP intervention and MTL as the MP intervention.

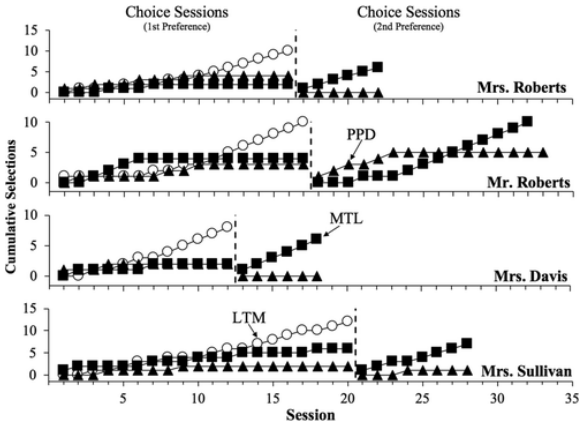

Figure 1 Cumulative treatment selections for Mrs. Roberts (top panel) and Mr. Roberts (second panel), Mrs. Davis (third panel), and Mrs. Sullivan (bottom panel) during choice sessions. PPD = progressive-prompt delay, MTL = most-to-least, LTM = least to most.

Overall, each parent chose LTM as their HP intervention within the concurrent-chains arrangement. The MTL procedure was consistently identified as the MP intervention, and PPD was never identified as a preferred intervention.

Table **1** also shows a summary of the number of BST sessions required for each parent as well as choice-session data on mean sessions to mastery, number of targets mastered, and percentage of sessions with problem behavior for each parent's child. The LTM and MTL procedures were similarly efficacious; LTM and MTL required the fewest mean sessions to mastery for two of four parents. In comparison, PPD had comparable efficiency to MTL for one parent's child (Mrs. Sullivan) but was the least efficient intervention for three parents' children. Three of the four parents' children mastered at least two targets in all of the prompting procedures (Mrs. Roberts, Mr. Roberts, and Mrs. Davis). The percentage of sessions with problem behavior varied across children; the percentage of sessions with problem behavior was highest in the PPD condition for three of the four participants (Henry with Mr. and Mrs. Roberts, and Mark with Mrs. Davis). Overall, the choice-session data suggest that PPD was the least efficient procedure and had the highest percentage of sessions with problem behavior during sessions for three of the four parents' children.

The outcomes of repeated measures of treatment acceptability for the four parents are shown in Figures **2** and **3**. Pretraining scores were obtained before training, post-BST scores were obtained after mastery

with a staff confederate during BST, and postchoice session scores were obtained after completion of choice sessions and implementing instruction with the child.

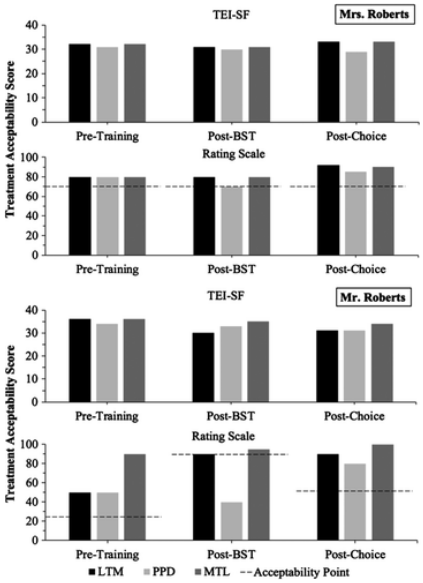

Figure 2 The top two panels represent Mrs. Roberts' scores and the bottom two panels corresponds to Mr. Roberts' scores. The dashed lines indicate the cutoff points at which the parent considered procedures to be unacceptable and would not want to implement. BST = behavioral skills training, LTM = least-to-most, PPD = progressive-prompt delay, MTL = most-to-least.

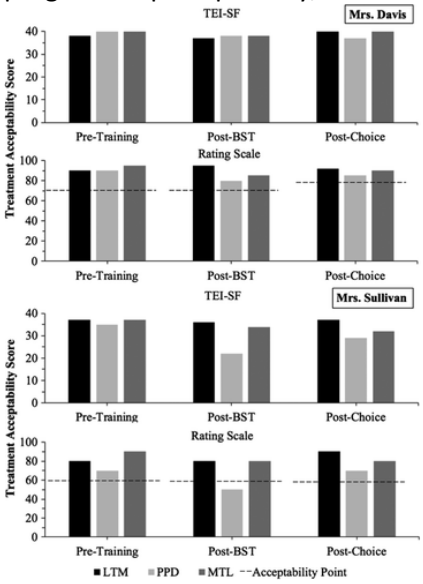

Figure 3 The top two panels represent Mrs. Davis's scores and the bottom two panels correspond to Mrs. Sullivan's scores. The dashed lines indicate the cutoff points at which the parent considered procedures to be unacceptable and would not want to implement. BST = behavioral skills training, LTM = least-to-most, PPD = progressive-prompt delay, MTL = most-to-least.

Figure **2** shows the TEI-SF scores and ratings on the acceptability criterion rating scale for Mrs. Roberts (top two panels) and Mr. Roberts (bottom two panels). Mrs. Roberts had similar TEI scores for all three prompting procedures in the first two measures; the score for PPD was below the other procedures in her final measure. On the acceptability criterion rating scale, Mrs. Roberts initially provided identical ratings for each of the interventions, but her ratings varied across points in time. For example, following BST with the confederate, her

rating of PPD dropped to the threshold of acceptability (i.e., the point at which anything below it would not be considered acceptable). Mr. Roberts consistently provided high scores for MTL on the TEI-SF. Similarly, MTL was rated highest across all points in time (pretraining, post-BST, postchoice sessions) on the acceptability criterion rating scale. However, in the post-BST acceptability criterion rating scale, his score for PPD was below his acceptability threshold, yet PPD had the second highest score in the TEI-SF. In the postchoice rating scale, he rated MTL the highest which was inconsistent with his most preferred intervention identified in the concurrent-chains arrangement. Overall, there were some inconsistencies in how Mr. Roberts rated the same intervention at the same and various points in time, based on the manner in which acceptability was assessed (i.e., TEI-SF or acceptability criterion rating scale).

Figure **3** shows the TEI-SF scores and scores on the acceptability criterion rating scale for Mrs. Davis (top two panels) and Mrs. Sullivan (bottom two panels). Mrs. Davis initially had slightly lower scores for LTM across the TEI-SF and acceptability rating scale. In comparison, she ranked LTM as highest in the postchoice sessions on the TEI-SF. During the post-BST and postchoice acceptability criterion rating scale, her ratings directly corresponded to her preferences from the concurrent-chains arrangement. Mrs. Sullivan's TEI-SF scores and acceptability criterion rating scale followed similar patterns across points in time. She consistently provided the lowest scores for PPD on the TEI-SF and acceptability criterion rating scale. During the postchoice TEI-SF, the order in which she rated procedures was consistent with her preferences from the concurrent-chains arrangement. Consistent with Mr. Roberts, her rating on the post-BST rating scale was below her acceptability threshold, although this rating increased above the threshold during the postchoice rating scale.

Overall, three of the four participants' final postchoice TEI-SF acceptability scores matched (or tied with) his/her selections in the choice sessions. In other words, the last acceptability scores corresponded with the preference hierarchy established in the choice sessions. However, three of the four participants changed their TEI-SF scores and/or acceptability criterion rating scale in some way from the pretraining to the end of the study. Thus, indirect acceptability measures appeared to fluctuate throughout the study, suggesting that subjective ratings of acceptability may not be a reliable predictor of parent preference for intervention.

DISCUSSION

Consistent with Gabor et al. (**2016**), the results of this study support the use of direct and objective measures to evaluate parent preference and acceptability for behavioral interventions. Direct measures of parent preference (i.e., choice sessions in a concurrent-chains arrangement) identified a HP and MP intervention for each participant. Although the same hierarchy of preferences (i.e., LTM, MTL, PPD) in the concurrent-chains arrangement were also shown in three of the four parents' postchoice acceptability criterion rating scales and TEI-SF scores, there was low correspondence in indirect assessment scores (i.e., TEI-SF scores) across points in time. In addition, correspondence between TEI-SF scores and the acceptability criterion rating scale also were variable across points in time. Observed variability in parents' TEI-SF scores across points in time is consistent with Gabor et al.; the results of both studies suggest providing procedural descriptions of interventions, or allowing parents to observe a session of each intervention prior to completing an indirect assessment (i.e., the TEI-SF), does not result in scores that accurately reflect their acceptability of and preference for an intervention. Furthermore, training should include more than just practice with a confederate to promote accurate identification of preference and acceptability for an intervention.

Previous evaluations of child preference for intervention show idiosyncratic differences in preferred intervention procedures (e.g., Kodak et al., **2016**). However, the results of the current investigation showed consistency in parent preference for prompting procedures. All four parents selected LTM as their HP intervention and MTL as their MP intervention. Although the preference order was clear across all parents, the variables responsible for their selection are not fully understood. There are multiple variables that may play a role in acceptability of and

preference for interventions, such as the complexity of procedures or response effort, problem behavior during intervention, efficacy of intervention with the child, and exposure to the procedure (Miltenberger **1990**; Reimers, Wacker, & Koeppl, **1987**). Thus, examination of these and other variables in the current study may provide insight into the variables that influenced parent preference.

It is possible that the complexity or response effort of intervention influenced parent preference and acceptability ratings (e.g., Elliot, **1988**). For example, interventions that have more steps or components or require more effort could be rated differently than less complex or lower-effort interventions. The prompting procedures in the current study included overlapping components. That is, all three procedures had a hierarchy of prompts, scheduled time periods between prompts, and rules related to moving to the next prompt following an error or problem behavior. Nevertheless, there were some important distinctions between the interventions. For example, LTM was the only intervention that began with an opportunity for an independent response on every trial. In comparison, a proportion of trials of MTL and PPD included immediate prompts. Some of the parents' comments on the acceptability forms relate to this point. For example, Mrs. Sullivan said “LTM gave my child the most independent opportunity to achieve a correct response, and if he was unsuccessful, it aided him in learning the correct response without too much frustration.” She similarly remarked that she “didn't like that he wasn't first given an independent opportunity to achieve the correct response” in MTL. Thus, some parents may have considered LTM to be a less complex and less effortful intervention, because they did not have to arrange immediate prompts during a proportion of trials.

Similarly, MTL and PPD involved variations in prompts across trials depending on the child's response in preceding trials. For example, if the child made an error in a trial of PPD, the next trial included a shorter delay to a prompt. In a similar manner, in MTL, a more intrusive prompt was provided to occasion a correct response, and the next trial began with the more intrusive prompt. Comments on the acceptability forms also related to this point. For example, during the postchoice sessions acceptability criterion rating scale, Mrs. Roberts said “LTM is easy to use, you know where you will always start from, and has the least contact/touch with the child.” In regard to PPD, she said the procedure was “way too much to keep track of.” For MTL, she said, “I didn't like the ‘do’ prompt,” which was the term associated with the physical prompt during training. Mrs. Sullivan said that PPD “was frustrating and didn't follow an easy pattern.” These comments suggest that using data to guide changes to the delay to a prompt or type of prompt across trials may be effortful. Thus, it is possible that the effort of implementation of the procedures influenced parent selection of LTM as their most-preferred intervention.

It is also possible that differential levels of problem behavior across procedures may influence parent preference for or acceptability of a procedure (Reimers & Wacker, **1992**). In the present investigation, problem behavior differed across procedures, and parents elected to implement interventions associated with lower levels of problem behavior. There was a higher percentage of sessions with problem behavior during PPD for three of the four parents' choice sessions, and this was the least preferred intervention for all four parents. Nevertheless, problem behavior occurred in all procedures for three of the four parents (Mrs. Roberts, Mr. Roberts, Mrs. Davis) and two of the three procedures for Mrs. Sullivan.

The results of this study are consistent with Gabor et al. (**2016**), because parents did not consistently show a preference for an intervention based on the level of problem behavior. Nevertheless, Mr. Robert's ratings and scores may have been influenced by this dimension. In his postchoice acceptability criterion rating scale, he said, “I think MTL is the most effective and the child will not engage in problem behavior. With more practice, I found the child could learn more without problem behavior.” His comments are consistent with data on MTL, in which his child had the lowest percentage of sessions with problem behavior. Researchers could more fully investigate this variable by calculating the rate of problem behavior rather than reporting the percentage of sessions with

problem behavior for each procedure. Researchers might also consider the magnitude (e.g., severity) as a dimension of problem behavior that could influence preference for interventions.

Efficacy of intervention is another variable that could influence preference for intervention. In the present investigation, all three prompting procedures were efficacious for two of the three children (Henry with both Mr. and Mrs. Roberts, and Mark with Mrs. Davis), and two of the three prompting procedures were efficacious for Ethan with Mrs. Sullivan. Thus, we also calculated measures of efficiency (i.e., sessions to mastery) for each child participant. However, parents did not consistently prefer the most efficient intervention; lowest mean sessions to mastery was only predictive of preference for two of our four parents (Mrs. Roberts and Mrs. Sullivan). Although some parents selected a procedure that was efficacious but had a higher mean session to mastery, multiple anecdotal reports suggest that this variable could be a factor that partially influenced their preference for an intervention. For example, three of the four parents reported that they waited to "identify" their preference in the concurrent-chain arrangement until they saw that each procedure was efficacious and resulted in mastery of some target(s) for their child. Nevertheless, parents' inconsistent selections of prompting procedures during choice sessions could have affected the efficiency measures and decreased the likelihood of detecting differences in parent preference based on the efficiency of instruction.

In the present investigation, we did not vary the order of exposure to training procedures, which is consistent with the procedures of Gabor et al. (**2016**). Results indicated that each of the parents preferred the procedure that they learned first. Due to this potential limitation, future studies could counterbalance the order of training to determine if the order of exposure to interventions influences preference. Nevertheless, it is possible that some aspects of the method minimized the effects of order of training or exposure to intervention on preference for a procedure. To control for differences in exposure to intervention based on the number of training sessions to meet the mastery criterion, we took multiple precautions. For example, if one procedure fell below 90% integrity in an experience session, we returned to training for all procedures. Thus, actual exposure to intervention varied by no more than a few training sessions. To eliminate this variable in future studies, researchers could consider having the same number of training sessions across conditions and conducting additional sessions of training beyond the mastery criterion in order to equate exposure across interventions. Furthermore, researchers could consider training the procedures in a different order or conducting more baseline sessions than we included with the multiple probe experimental design.

The present investigation has other, potential limitations. First, the number of sessions necessary for some parents to demonstrate a preference for a prompting procedure during the choice sessions may be considered a limitation. One reason this may have occurred is that parents sought more practice opportunities with their children prior to identifying their preferences. Practice with a staff confederate may not be sufficient to establish preference if parents' preference is influenced by how their children respond to these procedures. Future researchers could arrange more experience sessions with parents and their child, or include forced-choice sessions for each procedure, prior to conducting the choice sessions. A second limitation is that we did not allow parents to indicate a preference for an alternative procedure not directly taught as part of the study (i.e., selection of a 'none' card). Additional studies could compare parent preference for procedures directly taught in an investigation to the procedures they implemented with their child prior to the study. Another consideration for future research is to compare parent preference for other prompts, such as no-no prompts (e.g., Leaf & McEachin, **1999**), and other skill-acquisition methods (e.g., forward chaining, shaping).

There may be other, unknown variables influencing parent preference for intervention. Further investigation of parent preference is warranted to determine the aspects of LTM (e.g., consistent opportunities for an independent response) that result in a preference. Similar to the results of the present investigation, Lerman et al. (**2004**) found that teachers often reported that conducting prompt-delay procedures (e.g., PPD) was less preferred compared to LTM and MTL. Clinicians and researchers may find it valuable to conduct more research

to evaluate why PPD was the least preferred prompting procedure or whether modifications to some of these procedures may alter preference (e.g., changing the delay to a prompt between sessions instead of on a trial-by-trial basis). Identification of relevant variables that consistently affect parent preference for intervention will help researchers design new interventions and alter current interventions to maximize the likelihood that parents maintain use of the intervention following training. In addition, replications of parent preference for prompting procedures could be conducted to determine the consistency of preference for a specific prompting strategy as shown in our current results.

In summary, the results of the present investigation and previous research (e.g., Gabor et al., **2016**) suggest that clinicians should not rely solely on indirect acceptability measures of interventions. If the terminal goal of identification and use of a prompting procedure with a client is for the parent to implement the intervention, clinicians should use direct measures and collect objective data on preference for and acceptability of procedures after the parent has opportunities to implement the procedure in the natural environment with the learner. Continued research on preference for interventions will assist with providing the most socially valid and efficacious skill-acquisition procedures to the clients that behavior analysts serve.

Supporting Information

Filename	Description
jaba616-sup-0001-Supinfo.docxWord 2007 document , 567 KB	Appendix S1 Supporting Information

Please note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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