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# The Effects of Tact-to-Mand Transfer Procedures and Prompting Procedures for Increasing Independent Mands in a Child with Autism

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The Effects of Tact-to-Mand Transfer Procedures and Prompting Procedures for Increasing  
Independent Mands in a Child with Autism

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EFFECTS OF TACT-TO-MAND TRANSFER AND PROMPTING

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# EFFECTS OF TACT-TO-MAND TRANSFER AND PROMPTING

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**Abstract**

The present study examined tact-to-mand transfer procedures and prompting procedures on a child diagnosed with autism. There was one participant, a 3-year-old Hispanic male, with a limited manding repertoire whom also possessed knowledge of tacting items. A multiple baseline design across settings was implemented in order to increase the number of mands emitted by the participant. Data were collected using paper and pen recording by the researcher and another observer to provide interobserver agreement. Mastery probes were collected at one week, two weeks, and four weeks. Results indicated that transfer procedures may be helpful in generalizing manding for a child with a limited manding repertoire. The implications of these findings are discussed in order to enhance manding repertoires in children with autism. Further research for this study would be to expand vocalizations and knowledge in order to use a pure mand instead of a prompt.

## EFFECTS OF TACT-TO-MAND TRANSFER AND PROMPTING

### The Effects of Tact-to-mand Transfer Procedures and Prompting Procedures for Increasing Independent Mands in a Child with Autism

Autism Spectrum Disorder, or ASD, is a complex and lifelong developmental disability in which certain characteristics are displayed usually appearing in the first three years of life. Individuals diagnosed with ASD display delayed and atypical behaviors such as a lack of social interactions and relationships, a lack of communication and language skills, a lack or unusual responses to sensory stimuli, and repetitive and stereotypical behaviors (American Autism Association, 2015; Centers for Disease Control and Prevention [CDC], 2015). There is no one cause for ASD; research shows that it can be related to several genetic and environmental factors (American Autism Association, 2015; Autism Speaks, 2016; CDC, 2015). Due to the fact that ASD is a spectrum disorder, the severity of these characteristics depends on the individual with each case being unique (American Autism Association, 2015; Autism Speaks, 2016; CDC, 2015).

Over the years, ASD has become more prevalent in society making it an important issue to study. The Centers for Disease Control and Prevention (2015) have reported increases in the occurrence of children diagnosed with ASD, reporting one in 150 children with ASD in 2002 and one in 68 children with ASD in 2012. Reasons for the rising prevalence today include increased awareness, misdiagnosis or diagnostic substitution, linking of services to diagnosis, inclusion of specific genetic syndromes among a few others (Graf, Miller, Epstein, & Rapin, 2017). Because of these increases, finding interventions, both early and lifelong, are important for improving and maintaining social, cognitive, and functional skills in the life of the child (Lindgren & Doobay, 2011). Early intervention is especially important because research suggests that early intervention leads to better outcomes in different areas of adaptive functioning as well as less



engagement in maladaptive behaviors; which may be due to the availability of language for communication (Corsello, 2005).

Children with ASD and typically developing children differ in several ways including their behaviors, their communication skills, their ability to relate to others, and their ability to learn. Research shows that children with ASD are often relatively delayed relative to their peers and that there is a gap in their development (Willis, 2006). When typical children learn language, they can apply those skills to control the environment around them for their own benefit and they do not need further training when requesting or labeling items of importance across the verbal operants. However, for children with ASD who lack a language repertoire and cannot make the leap from items they want or need to the reinforcement they will receive by requesting or labeling those items have a harder time learning language (Sundberg & Michael, 2001). Therefore, due to these differences, children with ASD must explicitly be taught language in order for them to be successful.

Many children diagnosed with ASD do not acquire vocal verbal behavior as their primary form of communication and produce fewer sounds and words than produced by those without a diagnosis (Carbone, 2012). Due to the lack of vocal verbal behavior and lack of sounds, the child may become frustrated and this may cause the child to resort to any means necessary to acquire the desired item. Any means necessary may range from simply grabbing the hand of the caregiver and leading them to the object they desire to engaging in more severe behaviors such as tantrum like behaviors or self-injurious behaviors (National Institute of Deafness and Other Communications Disorders, 2015). Caregivers are typically the person who provides the item to the child and if there is little to no communication between them, then it makes it more difficult to determine what the child is requesting. Not only does the child become frustrated, due to the inability to understand one another, but the parent does as well (American Speech-Language-

Hearing Association, 2016; National Institute on Deafness and Other Communication Disorders, 2015). Given how important language is in our daily lives, it is essential to teach communication to children diagnosed with ASD who lack communication skills and are unable to express wants and needs (Willis, 2006).

As such, it is essential that important people in the child with ASD's life know what they can do to help them learn to communicate and engage in verbal behavior. It is also essential to teach verbal skills early on in order for children diagnosed with ASD to have a chance to catch up to their peers. By providing early intervention that includes a plethora of skills in areas such as communication, social, play and academics; significant improvements in development can occur. Research has shown that providing intervention in the early years is effective and can make a critical difference in the life of the child (Lindgren & Doobay, 2011). Teaching these pivotal skills may be possible with the aid of evidence-based interventions and strategies available such as discrete trial training, functional communication training, and transfer procedure training (further explained in procedures) among many others (Carbone, 2014). Additionally, research suggests that repeated practice with these skills makes it more likely the child will engage in the practiced skills and reach communication goals (Autism Speaks, 2016; Carbone, 2012; Macduff, Krantz & McClannahan, 2001). Consequently, for many children with ASD, verbal behavior has to be explicitly taught and practiced.

### **Verbal Behavior**

Verbal behavior is language; an interaction between a speaker and a listener with both participants engaging in an exchange (Skinner, 1957; Sundberg & Michael, 2001). Verbal operants, or functional units of language with specific functions that we use to communicate, are part of the behavioral approach to teaching language (Skinner, 1957). Language is comprised of various verbal operants that, when combined together, allow the person to engage in effective

verbal communication (Skinner, 1957). Verbal operants are necessary to advance in the learning of verbal behavior and to completely understand and master language (Skinner, 1957). The primary verbal operants of interest in this study are the tact and the mand.

The tact is a type of vocal response which allows a person to label items once they have had contact with the item through any of the senses. The response is evoked by a nonverbal discriminative stimulus and followed by generalized conditioned reinforcement; the verbal response is brought under the control of a nonverbal stimulus because the environment is simply being described. Skinner (1957) developed the word tact to suggest coming into contact with, meaning the item must be present for a tact to occur. For instance, someone tacts when they say “It’s ten o’clock” after looking at a clock (Lowenkron, 2004). Tacts are emitted when we describe our environment; allowing people to converse about what is presently around us. Since our environments are so vast, tacts are an important part of language instruction that enable the speaker to communicate about what is going on in our surroundings (Cooper, Heron, & Heward, 2007).

Tacts involve an individual giving a label to items and actions in which they come into direct contact with through any of the senses and are thought to be the foundational skill necessary for expressing wants and needs (Cooper, Heron, & Heward, 2007). If a child is unable to label items in their environment, then tacting can be taught. First, a nonverbal stimulus is presented with an echoic prompt (the instructor labeling the item for the learner to repeat), then a correct response is differentially reinforced, and finally, the echoic prompt is faded (Cooper, Heron, & Heward, 2007). In other words, tact training begins by transferring stimulus control from an echoic to a tact. A correct response is reinforced with a generalized conditioned reinforcer such as social praise; while an incorrect response or no response at all is prompted with either an echoic prompt or some other type of prompt in order to emit a correct response.

Tact prompt questions like “What is it?” can also be use in order for the child to emit a correct response. Last, the echoic prompt is gradually faded in order for the child to tact independently. More specifically, this can be done by starting with the full word and then moving to the initial sound of the word and then having no prompt at all. Tact training is completed when the child tacts the items independently (Sundberg, San Juan, Dawdy, Argüelles, 1990).

The mand, on the other hand, is a type of vocal response which allows a person to request a want or a need. The response is evoked by a motivation for a want or a need and followed by specific reinforcement. In other words, the person receives the want or need they are requesting (Cooper, Heron, & Heward, 2007; Skinner, 1957). Deriving from the word command and demand, a mand is controlled by a specific consequence. For example, if someone mands for water, the consequence is receiving water. Mands are the only verbal operants that are evoked by a motivation and then followed by specific reinforcement. Therefore, by having this controlling factor, a mand produces access to the desired reinforcer. Mands are important for early language learners due to the control over the delivery of reinforcers that mands may have (Sundberg & Michael, 2001; Skinner, 1957). Furthermore, due to the outcome produced by requesting an item; benefits of the mand include the increase of independent mands in children with autism which may aid in generalization and spontaneity of manding and overall use of verbal vocabulary (Sundberg & Michael, 2001). In addition, proper generalization of mands is important so that the person understands that what they ask for is what they’ll receive. Generalization for mands can be observed when a mand occurs in the presence of a new motivation and still has a similar outcome, in addition to occurring across different people and different settings (Miguel, 2017).

As such, it is often common to introduce manding early in teaching a vocal response repertoire. It is extremely important to identify the correct reinforcers to be used in mand

training. Conducting preference assessments can help to identify appropriate reinforcers and mand training should begin with reinforcers that are highly preferred (Carbone, 2014; Albert, Carbone, Murray, Hagerty & Sweeny-Kerwin, 2012). This is due to the fact that the child may have a higher motivation to obtain the item, thus, the mand is under the control of the motivation (Sundberg, 2004). In addition, the best reinforcers should be items that can be delivered quickly, can be controlled, can be strongly motivating, can be spoken easily, can be consumed for brief periods, can be controlled by the adult, and can be changed sparingly (Hozella & Ampuero, 2014). These examples for choosing the best reinforcers are all important and will be further explained in order to have a further understanding of their importance.

Cooper, Heron, and Heward (2007) describe the circumstances under which reinforcers are effective. First, reinforcers should be delivered quickly because immediacy is crucial, making sure the correct behavior is reinforced and no other behavior occurs in between. Secondly, reinforcers should be controlled so that the researcher can have more control over the outcome of the occurrence of the behavior. For instance, if the child has not had access to a specific item all day, then that child is more likely to want that item after not being able to play with it for an extended period of time. This can be controlled in order to build the desire or motivation for gaining access to the item and therefore having a higher chance for requesting the item. Next, reinforcers should be highly preferred items, so the child is more likely to want to ask for the item. Reinforcers should be easily spoken so the child can request the item without difficulty. The goal is for the child to learn and understand that language is powerful and through language they will acquire what they are asking for. Also, reinforcers should be consumed for brief periods of time so that the child doesn't become fully satiated with the item and then will not want to request it. Last, reinforcers should be controlled by the adult so the adult can determine what may work best in a certain setting or with a certain person and can reinforce accordingly in

order to get as many mand requests and labels as possible. Moreover, several mands should be kept active at once, meaning there should be variety of reinforcers that the child can choose from at once (Cooper, Heron, & Heward, 2007; Hozella & Ampuero, 2014).

Several strategies can be implemented for teaching mands. These include assessing motivational operations, manipulating motivational operations, and prompting (Albert, Carbone, Murray, Hagerty & Sweeny-Kerwin, 2012). First, when teaching to mand, assessing motivational operations can be established by conducting a preference assessment in order to identify highly preferred items. This should be completed in order to verify that there is a strong motivation to obtain an item. Secondly, manipulating motivational operations can be implemented by withholding the reinforcers before mand training is conducted in order to keep motivation high. This can either be contrived or captured in the natural environment in order for the individual to want to obtain the item. It is important to keep motivation high by utilizing different reinforcers and withholding reinforcers when possible. Lastly, prompting can be used in order for the child to emit a correct response when an incorrect response or no response at all is emitted. When interest is shown, prompt the response and then give the item to the child if a correct response is emitted. If there is no response, then prompt again using the next level prompt in the hierarchy. Prompts should be faded so that the child does not become dependent on the prompt and can engage in the mand independently which is the ultimate goal (Albert, Carbone, Murray, Hagerty & Sweeny-Kerwin, 2012). These procedures will help an individual in acquiring the knowledge to be able to request items when motivation is high to obtain the item. Important aspects of mand training include how and when to reinforce, what approximations to accept, what level of prompting to provide, and how to fade prompts quickly (Carbone, 2014). In addition, all of these strategies have been implemented in the present study.

In summary, in addition to being able to mand, a child must also be able to tact, or label. Without knowing the names or labels of objects, children are left without words to use to be able to request (Sundberg & Partington, 1998). According to Sundberg and Partington (1998), in order to mand an item, first one must know how to tact that item. Therefore, transfer procedures may be used to bridge the gap between an already learned behavior to a new behavior.

### **Tact-to-mand Transfer Procedures**

Given that manding and tacting are often pivotal language skills, they are often taught early in language interventions (Carbone, 2014). Transfer procedures may be implemented in these cases to help children diagnosed with ASD in order to equip them with the necessary skills to mand independently. Power and Hughes (2011) demonstrated that reinforcer strength plays a role among tacting and manding. Results of their study showed that transfer of stimulus control from tacts to mands occurred for highly preferred items; in addition to an increase in manding for highly preferred items. This is similar to the findings of Kooistra, Buchmeier, and Klatt (2012) which demonstrated that when there is a highly preferred item which the participant has been deprived of, then there is a higher chance for that item to be requested when motivation to obtain it is high. In addition, generalization needs to occur in order for the transfer to be used in different settings and Hall & Sundberg found this by demonstrating that when mand training is established and mands are acquired, then it is possible to show the ability to generalize mands to an item that can be tacted. These findings have been taken into consideration and applied in the present study for optimal results.

An additional consideration for transferring between the tact and the mand is that there has to be a similarity between the stimulus that evokes a tact and the stimulus that reinforces a mand (Petursdottir, Carr, & Michael, 2005). At first, the operants should be reinforced as if they were the same in order to generalize verbal skills to efficiently acquire both the tact and the

mand (Skinner, 1957; Petursdottir, Carr, & Michael, 2005). This is accomplished through a transfer of stimulus control from one verbal operant to another (Skinner, 1957; Petursdottir, Carr, & Michael, 2005). Also, when two verbal operants are taught simultaneously, it may produce stronger stimulus control and results have indicated that there is a faster acquisition as compared to only one verbal operant being taught at a time (Sidener et al., 2010). In order to complete the transfer procedures from one verbal operant to the other, first, start with a response the child can already produce in one situation, in this case, the tact. Next, teach the child to produce the same response in a different situation, the mand. Then gradually add distance between the responses until the child can respond to the new stimulus alone which will result with the correct response being reinforced and most likely repeated in the future (Sundberg, 2015; Vail & Trapenberg, n.d.).

When teaching a new skill, determine the conditions under which the child produces the same or similar response (Vail & Trapenburg, n.d.). This will make it more likely for the child to repeat the same behavior if he or she just did so previously and has been reinforced (Vail & Trapenburg, n.d.). Furthermore, this may ensure that manding is strengthened through tacts because the conditions are set up to do so and the motivation to obtain the item is established (Vail & Trapenburg, n.d.). Thus, setting up the antecedent conditions and contriving the opportunities to specifically arrange for the child to mand and receive reinforcement as it occurs naturally in the environment will be helpful to teach how to mand using highly preferred items (LaFrance & Miguel, 2014).

Overall, transfer procedures are used to make learning easier (Sundberg, 2015). Tact-to-mand transfer procedures are a transfer across the verbal operants: the ability to name an item (i.e., tact) and successfully request the item (i.e., mand). If a child can tact an item when the item is present, then the child can be taught to mand for the item when there is motivation to obtain



the item. In other words, if a child can label a doll when he or she sees a doll, then the child will learn to request a doll when he or she wants to play with a doll.

Finally, when implementing verbal behavior strategies, multiple behavior analytic procedures should be implemented to overcome this deficit and aid in the development of verbal behavior. Verbal behavior programs do not only include verbal behavior itself, but other basic behavioral principles that are effective for teaching mands to children with autism including reinforcement, prompting, and prompt fading (Ingvarsson, 2016; Sundberg, Loeb, Hail, & Eigenheer, 2002). In the present study, all of these procedures were implemented.

### **Prompting Procedures**

Prompts, or cues, are antecedent stimuli used to control a specific response (MacDuff, Krantz & McClannahn, 2001). In other words, prompts can be used in order to assist a learner in acquiring or using a new skill. When the naturally occurring stimulus does not evoke the response, a prompt is used in order to evoke the targeted response either before or during the attempt of the learner to use the new skill (MacDuff, Krantz & McClannahn, 2001; Neitzel & Wolery, 2009). Prompting procedures are often combined with other interventions and are used in a systematic approach to help children with ASD acquire new target skills (Neitzel & Wolery, 2009).

There exists a variety of prompting procedures, often delivered based on a hierarchy guiding prompt delivery; one of which is least-to-most prompting. Least-to-most prompting begins with the least intrusive prompt moving to more intrusive prompts until the learner achieves the target skill. Different types of prompts that may be involved in this type of hierarchy, moving from least to most intrusive, include gestural prompts, verbal prompts, model prompts, and physical prompts (Neitzel & Wolery, 2009; Owens, 2005). Gestural prompts use pointing to cue the learner to emit the correct response while verbal prompts use words to cue the

learner to emit the correct response. Model prompts use modeling to show the child what he or she should do; a model performs the action that is wanted to be performed by the child with Autism Spectrum Disorder. Physical prompts use touching or physical guidance to guide the child to complete a task (Neitzel & Wolery, 2009; Owens, 2005). The former two examples, gestural prompts and verbal prompts, will be used in this study to evoke a verbal response from the participant.

An advantage of using least-to-most prompting is that every trial provides an opportunity for the learner to be independent and make unprompted responses to the natural occurring stimuli. Prompts are important to fade so that the learner does not become dependent on the prompt. Also, providing the least intrusive prompt is important so that the child can become successful (MacDuff, Krantz & McClannhan, 2001; Vail & Trapenberg, n.d.). This leads to the overall goal of prompting procedures which is for the learner to independently engage in the skill. As the correct response is given using the prompt, reinforcement is provided and over time the prompt is gradually delayed and eventually eliminated with the continuation of reinforcing the correct response without the prompt. This will allow for the response to occur only in the presence of the antecedent stimulus and for stimulus control to be transferred from the prompt to the desired response. The learner should be able to correctly respond under the control of the stimulus which naturally evokes the response. Fading the prompt completely will result in the response occurring in the natural environment (LaFrance & Miguel, 2014; MacDuff, Krantz & McClannhan, 2001).

### **Background Studies**

Recent literature regarding tact-to-mand transfer procedures has not combined these two interventions together in order to understand strategies to increase manding. Other studies have reported increases in manding, but none have examined a tact-to-mand transfer procedure

combined with prompting procedures in a 3-year-old Hispanic child (Kelley, Shillingsburg, Castro, Addison & LaRue, 2007; Wallace, Iwata & Hanley, 2006). The benefits of this study include further clarifying the effectiveness of these procedures in increasing independent manding and tacting behaviors in a child with autism.

Kelley and colleagues (2007) conducted a study with three boys using discrete trial instruction to improve adaptive and communication skill deficits. Highly preferred items were selected based on time spent playing with the item or by a paired choice preference assessment in order for the vocal response to be emitted as both a tact and a mand. For mand training sessions, the item was shown to the participant while asking “What do you want?” If a correct response was emitted then the participant received the item, but if an incorrect response was emitted then the next trial was initiated with a vocal prompt. During the course of tact training, the participant was asked “What do you want?” when being handed an item. If a correct response was emitted then the participant received praise, but if an incorrect response was emitted then the next trial was initiated with a full vocal prompt. For both mand training and tact training, the process of asking the question and either waiting for a response or interjecting with a vocal prompt was repeated until there was either three consecutive independent occurrences of the target response, a prompted trial following one incorrect independent trial, or ten total trials had been presented. Findings indicated that after training, mastery levels were attained for eighteen of nineteen training opportunities and that generalization across the verbal operants occurred on nine of fifteen opportunities. Finally, this study highlights the importance of assessing an individual’s vocal repertoire before language training is begun in order to evaluate the mastery of the functions of vocal responses.

Wallace and colleagues (2006) conducted a study with three adults with mental retardation, whom all had goals of language development. During baseline, none of the

participants emitted any signs for the mand tests of highly preferred items. A mand test was done before and after tact training to determine if the participants emitted target responses and mands. The sessions were about ten minutes long consisting of placing a high preference item and a low preference item in front of the participant to determine if the participant correctly signed for either item. During the tact training, the participants were taught to tact for the items from their preference assessment. Every thirty seconds a new trial began with the participant being shown the items one by one and being asked "What is it?" If a correct response was emitted then the participant received the item, but if an incorrect response was emitted then there was a model for the correct sign or a physical guide to emit the correct sign. The mand test was completed again at the end, after participants correctly tacted the items on 100% of the trials over two consecutive sessions. All participants acquired the signs for the high preference items and the low preference items within twelve sessions and signs for highly preferred items increased across sessions with low preference item signs decreasing. The participants acquired the signs for the highly preferred items when the signs were taught as tacts and then that information was transferred to mands.

### **Present Study**

The purpose of the present study is to determine if tact-to-mand transfer procedures and prompting procedures taught in the natural environment will increase independent mands by a child diagnosed with autism. In an effort to increase independent mands, it is important to identify interventions that will aid children diagnosed with ASD to express their wants and needs. Tact-to-mand transfer procedures were chosen due to the ability of the participant to tact for items prior to baseline but not mand for those same items. This study should provide additional support for the efficacy of tact-to-mand transfer procedures as initially introduced by Kelley, Shillingsburg, Castro, Addison & LaRue, Jr. (2007) and Wallace, Iwata & Hanley,

(2006).

### **Methods**

These procedures are based on the work of Kelley et al. (2007) and Wallace et al. (2006). More specifically, the methods and procedures of these two studies were combined to create a new study that used different interventions but overall had similar procedures.

### **Participant and Setting**

The participant was a three-year-old Hispanic male diagnosed with autism who lives in a traditional two-parent household. Both English and Spanish are spoken in the home; however, only English is spoken at the school. Parents were given a parental consent in order for the child to participate in this study (Appendix A). The participant was chosen for this study based on a manding repertoire limited to several highly preferred items such as crackers, play, and iPad which he is able to mand for vocally. Despite a limited manding repertoire, the student possessed a sizable vocabulary with regards to tacting items including the ability to tact over one hundred nouns, seventy-five verbs, and fifty adjectives. Although the child clearly was able to vocally label items with proficiency, his ability to mand for a variety of items remained quite limited. Given the child's skill levels at baseline, the aim of this study was to increase the child's mand repertoire in order for the participant to communicate his wants and needs and progress in other areas of language acquisition.

The participant attended a private preschool in which he received a total of two hours of behavior therapy five days a week. Half of this time was dedicated to the present study; the first hour dealing with tact-to-mand transfer procedures and prompting procedures (the procedures outlined for this study). The second hour was dedicated to working on other objectives such as tacting verbs and adjectives as well as matching.

Sessions occurred in three different settings; the participant's classroom, in the

playground at the school, and in the participant's home. The school classroom included a preschool sized table and chairs, toy shelves, toys and other stimuli typical of a preschool classroom. In addition, nine other children and two teachers were present in the classroom but there were no interactions with the participant during the teaching sessions. The playground at the school included slides, climbers, and a sand box; typical of a preschool playground. The participant's home included a small table and two small chairs in the living room and there were toys similar to those found in the classroom in this setting. Sessions were conducted every day from approximately ten minutes to one hour in one of the three settings. The target items were moved to each location that data took place.

### **Response Measurement and Interobserver Agreement**

The target behavior in this study was the occurrence of independent mands. An independent mand was defined as the appropriate corresponding vocal response emitted within three seconds of being asked "What do you want?" Correct responding was defined as the correct emission of the target vocalizations without any use of approximations (Kelley et al., 2007). In this case, approximations were any vocalizations similar to the target word, therefore, the participant had to say the exact name of the item and not a word close to the exact name of the item. This was due to the ability of the participant to say words without using any utterances, although, the vocalizations were not one hundred percent clear. Data was collected by recording the frequency of vocal responses depicting whether the response was a prompted or independent mand. Data were collected using paper-and-pencil recording by a therapist who conducted the session. The researcher recorded the data on a paper chart (Appendix B).

A second independent observer also collected data simultaneously in order to provide interobserver agreement (IOA) for 50% of sessions. The additional observer was trained to record the independent mands completed by the participant. The observer was another behavior

therapist working with other children at the school. She had previous knowledge about the procedures of this study and a 30-minute meeting took place to go over the procedures in detail for observation recording. Data was recorded through a video feed in another room while the therapy session was being conducted in order for the participant not to be disrupted by another observer. Agreement was calculated by dividing the number of agreements by the number of agreements and disagreements and multiplying by 100%. Along with IOA, fidelity checks were completed throughout the study. A checklist (Appendix C) was created outlining the procedures of the study. The trained observer was instructed in using the fidelity checklist and fidelity data was collected for 50% of all sessions.

### **Experimental Sequence and Design**

A multiple baseline design across settings was implemented in this study to demonstrate the effects of tact-to-mand transfer procedures and prompting procedures on the acquisition of independent mands. Training was first conducted in the classroom and then conducted on the playground and in the home to ensure generalization of manding skills across settings.

Multiple baseline designs evaluate treatment effects and establish experimental control and a functional relationship. In a multiple baseline design, the effects of the intervention can be replicated across subjects, behaviors, or settings and each baseline must only change when the intervention is applied to it (Cooper, Heron, & Heward, 2007). A multiple baseline design also tracks baseline data across multiple subjects, behaviors, or settings simultaneously. In this study, the multiple baseline design across settings tracked one behavior for one subject across three different settings. The target behavior, manding, was tracked in each setting; the classroom, the playground, and the home.

First, baseline data was collected in each setting until steady responding was observed. Then, the intervention was introduced to the baseline in the first setting while the other baselines

continued as is. Again, steady responding needed to be observed for the behavior in the first setting once the intervention was introduced, and no changes were noticed in the other settings; then the intervention was introduced to the second setting. Again, the third setting was left unchanged, until steady responding was observed for the behavior in the second setting. This process repeats at different time points until the intervention has been applied to all baselines, in this case, to all settings. Essentially, the baselines and intervention data of each setting overlaps with one another, so that each baseline is longer than the previous one. This overlap between the baselines and the interventions of the different settings are staggered in order to see how effective the intervention is based on how the behavior changes when the intervention starts (Cooper, Heron, & Heward, 2007). In addition, due to the fact that data was collected in three different settings, inferences can be made about the generalization to even more settings. Moreover, in a multiple baseline design, each baseline represents a replication of the intervention effect.

This study consisted of only one participant making it a single subject design. Single subject research is widely accepted in the field of ABA and special education and has many advantages and benefits. First, single subject research provides experimental control for threats to internal validity by confirming a functional relationship between the independent variable and the dependent variable. Secondly, single subject research provides high external validity of results through the replication of effects across different subjects, different conditions, or different measures of the dependent variable. For example, the participant himself can be his own control; demonstrating that the changes in behavior after the intervention was introduced are attributed to the intervention itself and not to natural growth. Next, single subject research provides prompt feedback, making it clear whether or not the intended procedures are working or not. Last, single subject research provides high ecological validity by examining how the results



of the study generalize to different experimental measures. In other words, it examines how the findings can be applied to real world situations by occurring in the natural environment or as close to it as possible (Horner et al, 2005).

### **Procedures**

***Preference Assessment.*** The target items for this study were chosen by conducting a preference assessment. It is critical to use items that function as reinforcers from the participants social environment to increase the social use of language and independence (Albert, Carbone, Murray, Hagerty & Sweeny-Kerwin, 2012; Wallace, et al., 2006). Therefore, the items included in the preference assessment were items from around the classroom that the participant showed interest in based on the amount of time the participant spent engaged with the item. Specifically, a multiple-stimulus assessment was conducted using five items of potential preference, each item was presented to the participant at a time and a record was kept of which items were approached most often. This was done several times to determine which item was selected most often. After the participant chose an item, that item was removed, and the remaining items were rearranged and presented again to the participant. This was repeated until all items were selected or until the participant made no selection within 30-seconds from the beginning of the trial (see DeLeon & Iwata, 1996). The items were also chosen due to the fact that the participant was, at baseline, able to tact but not mand these items. The items included a hammer, a toaster, a cup and spoon, a train and tracks, and foam blocks. When moving locations, items were placed in a small basket for ease of transferring to each setting. To maximize motivation, the items were withheld from the participant outside of the research sessions. After the preference assessment was completed, three of the five items were chosen for training using study procedures.

***Mand Test.*** Prior to tact training, sessions were conducted in order to determine whether the participant exhibited the target items as mands. Each session lasted for about 10 minutes. The

researcher placed the target items on a table in front of the participant (as in the multiple-stimulus assessment) but did not deliver any prompts or instructions. If the participant correctly manded one of the items, the researcher gave that item to the participant for 30-seconds, after which it was removed from the table and the remaining items were reorganized and left to choose from (see Wallace et al., 2006). Any independent vocal mand emitted by the participant was recorded. This mand test was conducted in order to establish a baseline level of mand performance.

***Phase I: Tact Training.*** During tact training, the target item was handed to the participant while the researcher simultaneously provided the tact question prompt, “What is it?” Target responses emitted within three seconds of the prompt question were followed by praise, removal of the target item, and access to an alternative preferred item until it was consumed for 20-seconds. Vocal prompts were provided during the tact training sessions only when the participant did not respond to the tact question prompt. If the participant emitted an incorrect response or no response, the researcher immediately presented the next trial with the same object with an immediate vocal prompt. Sessions were terminated following three consecutive independent occurrences of the target response. No more than 10 trials were conducted per session. The percentage of correct independent responses per session was calculated by dividing the number of correct responses during the independent trials by the number of independent opportunities and multiplied by 100 (see Kelly et al., 2007). Tact training verified that the participant was able to tact the target items.

***Phase II: Tact-to-Mand Transfer Procedure Training.*** The next phase of this study consisted of using a tact-to-mand transfer procedure in order for the participant to mand for the target items. For each trial, the target item was held up in front of the participant and a tact question prompt was used, “What is it?” Contingent upon the participant correctly labeling the

item, a mand prompt was given, “What do you want?” with the item out of sight. These prompts were used because research suggests that there is a higher chance of emitting correct responses when presenting specific antecedent stimulus (Egan & Barnes-Holmes, 2011). If the participant emitted the correct vocal response within three seconds, the item was immediately given to him and praise was delivered. If the participant emitted an incorrect vocal response or no response within three seconds, then the previously described least-to-most prompting procedures were utilized beginning with a gestural prompt and if necessary a vocal prompt. This prompt hierarchy was chosen to maximize the likelihood of the participant responding to the mand question prompt, “What do you want?” independently without any assistance or as little assistance as possible (Bourret, Vollmer, & Rapp, 2004). Upon correctly manding for the target item for ten consecutive trials, the third phase was introduced. The percentage of correct independent responses per session was calculated by dividing the number of correct responses during the independent trials by the number of independent opportunities and multiplied by 100 (see Kelly et al., 2007).

***Phase III: Mand Training.*** Following tact-to-mand-transfer procedure training, the mand test was repeated to test for independent manding of items following the mand prompt question. If the participant emitted the correct vocal response within three seconds, the item was immediately given to him and praise was delivered. If the participant emitted an incorrect vocal response or no response within three seconds, then a vocal prompt was provided in order to emit a correct response. The mand prompt question was then asked again. This was repeated until a correct response was emitted. Once the participant correctly manded the item, an imitation distractor task was presented. The item was then reintroduced in order to emit a spontaneous mand. Upon correctly manding for the item for ten consecutive trials, the fourth phase was

introduced. After the participant responded each item correctly for ten consecutive trials, then the mastery and generalization phase (Phase IV) began in the next setting.

*Phase IV: Mastery and Generalization.* Mastery probes were conducted in sessions one week, two weeks, and four weeks following training sessions. This consisted of asking the mand prompt question, “What do you want?” in order to determine if mastery levels were attained after a period of time (1, 2, 4 weeks) once the study had been completed. Mastery levels refer to the number of independent correct responses over a period of time in which the target behavior is mastered (Cooper, Heron, & Heward, 2007). Generalization was assessed to determine if the participant was able to mand items across settings. All procedures, as described above, were initiated in the playground and home after they had first been conducted in the classroom.

### **Results**

Results of the participant’s preference assessment are depicted in Table 1 (Appendix D). The participant’s highly preferred items were: foam blocks (50%), hammer (20%), and train and tracks (15%). These items were determined using a preference assessment. The items included in the preference assessment were items that the participant showed interest in based on the amount of time spent engaged with the item. The participant was left to wander the classroom freely and was observed to determine which items were approached. After several items were chosen, a multiple-stimulus assessment was conducted in order to narrow the items even further. In addition, the items had to be items that the participant was able to tact for the purpose of the study. These items were also used as reinforcers during the training.

Figure 1 (Appendix D) shows the results of the study, including the mand test and Phases I through IV. During baseline (mand test), the participant engaged in no manding (0%). In fact, he did not emit any vocalizations pertaining to the items on the table. Instead, the participant attempted to grab the items in front of him on the table. When this occurred, the item was

blocked from the participant so that he did not have access to the item. The participant sat at the table quietly while looking around the room, specifically at the lights, and engaging in self-stimulatory behaviors with his hands. He did not request any items at any time during the mand test. This occurred across all three settings.

During the tact training session (Phase I), the participant was presented with probes in order to make sure he could tact the items for transfer training. In other words, before transfer procedures were initiated, proficiency with tacting skills were established prior to moving on to the next phase. Hence, manding would be taught with transfer procedures in the following phase and the probes were completed to ensure moving on to the next phase was possible. The participant was able to vocally tact the items correctly at 100% after a few sessions indicating that the words were in fact, in his repertoire. In the classroom, 3 sessions were needed to reach 100%; in the playground, 2 sessions were needed to reach 100%; and in the home, only 1 session was needed to reach 100%. During the first several sessions, the participant relied on vocal prompts in order to emit the correct response. Following a total of three prompted trials over two sessions, the participant was able to correctly emit tacts for the items presented with the question "What is it?" The participant consistently did this for the items for 10 trials until 100% was reached in all three settings. During tact-to-mand transfer procedure training (Phase II), the participant acquired the mands for the highly preferred items. The results for the classroom were 95% over 11 sessions to complete the transfer procedures. The results for the playground were 93% over 8 sessions to complete transfer procedures. The results for the home were 100% over 7 sessions to complete transfer procedures. When mand training was resumed (Phase III), the participant emitted vocalizations to request items. The participant engaged in mastery levels of manding once the transfer procedures were completed and mand training was resumed. Again, mastery probes were completed in order to determine if the participant was able to emit an

independent correct response over a period of time (one, two and four weeks) to demonstrate that the target behavior was mastered. For example, the participant was required to demonstrate manding for items that were not present when asked “What do you want?” for consecutive trials. During the mastery and generalization phase (Phase IV), the participant maintained the skill of manding over 90% across all three settings. IOA was obtained for 50% of sessions and was 98%. Fidelity checks were obtained for 50% of sessions and was 100%.

### **Discussion**

In this study, transfer procedures were used in order to transfer tacts to mands. The participant’s proficiency with tacting was used to shape tacts to mands, a skill the participant was not yet proficient in with these particular items. While the participant’s proficiency with manding started low, tact-to-mand transfer procedures demonstrated effectiveness in skill acquisition. A mand test was conducted at the beginning of the study and then once again at the end, once the transfer procedures were completed. The results from the post-test probe demonstrated increases in manding across settings. Mastery and generalization probes demonstrated that, even in other settings, the participant maintained manding skill acquisition. Mastery and generalization probes were conducted at one, two and four weeks. At each probe point, mastery of manding skills were maintained.

Mastery, maintenance, and generalization were an important outcome of this study because of the goal to have the participant manding items in new settings with new teachers as he progressed in school. With his ability to maintain the skill over time, the participant would be able to respond to the question “What do you want?” and give a response to an item that did not have to be present. The participant was able to do this with his repertoire of labeling, as he has a wide variety of items he can request. In addition, the participant was also able to generalize manding across three different settings and with other adults. This was anecdotal evidence

observed by the parents, the teachers, and the researcher. It should be noted that the parents and the teacher were interested and involved in participating to ensure the participant was responding to them as well, in the absence of the researcher once the study was completed.

Using a multiple baseline design across settings has aided with generalization because the skill was assessed in different settings at different times. One example of this is the fact that training was conducted in different settings; hence, generalization was practiced throughout the study. This made it easier for the participant to grasp the concept and excel. And although it was challenging to control all extraneous variables since the research was being conducted in the classroom and other scenarios were taking place in close proximity; this was beneficial for the study due to the fact that the participant would be able to generalize to other settings. The practical nature of conducting research in applied settings has its advantages and disadvantages but overall the ecological validity was important because the goal was for the participant to generalize these skills to his everyday life. There were moments when the teacher was working with another group of students and their voices may have been distracting to the participant or have had some kind of influence on his responses, however, because the classroom is the natural environment for students, it is important to teach in these settings, especially for children with disabilities to understand the reality of learning situations and to be able to generalize what they have learned and apply it in real life situations (Brown, 1992).

Tacting and manding responses are pivotal skills that must be taught early in language training for children who are nonvocal or who have limited vocal abilities (Carbone, 2014). Benefits realized as a result of this study include the participant having an increased capacity for accessing desired items as well as the participant requesting preferred items following a setting change. These findings have implications for training verbal behavior for individuals with language and communication deficits; as finding and implementing new strategies that work

based on individual learning needs is of the utmost importance. Implications for practice include using these new findings and applying this technique in groups or with other children with similar challenges. Learning strategies and experiences need to be created in order to gain a broader scope of ways to meet the needs of children with disabilities.

With ASD, cases vary based on the individual and although mands are usually taught first when teaching verbal behavior, this is not always the case. Sometimes children can have an increased tacting repertoire prior to establishing a mand repertoire, as in this particular study. These findings can be used for those individuals who are in this category and have trouble with manding but have a high repertoire for tacts. As a field, we need to take advantage of the tools available to ensure that children are receiving personalized care and treatment for their individual needs versus a treatment plan that was created for many and may not work for a particular child (Ertmer & Newby, 2013). More research needs to be conducted in order to gain more understanding in the transfer between the verbal operants. Other implications include the importance of social validity (Horner et al., 2005) and increasing the quality of life for the child to be able to freely express wants and needs independently.

Again, more and more research in this field is so important because changes in the DSM are based on new research, analysis, and expert opinion. The revisions in the DSM-V have been made with the intention of making the diagnosis of ASD more precise and reliable so that different clinicians will be able to diagnose the same person with the same diagnosis based on the same symptoms over time. The new criteria are more thorough and strict compared to the old criteria and these changes may influence individuals with ASD because the changes may impact services based on the stricter diagnosis criteria (Autism Speaks, 2016). This may include state and educational services received based on levels of support needed and different interventions as the individual ages; and insurance companies will have to adapt to the changes too (Johnson



Center for Child Health and Development, 2012; Autism Speaks, 2016). As more research is added to the field, there will be a need for ongoing monitoring of how the DSM-V criteria affect diagnosis (Autism Speaks, 2016).

One significant limitation to the present study was that the participant was only responding to the prompt “What do you want?” to ask for items. Although, for this participant the intervention was a success, ideally, we would want him to request items without any prompts. This will be beneficial for him in the future, in order for him to communicate with others without having to be asked any questions. Another limitation of the study dealt with the procedures. While the procedures of this study were well delineated and fidelity and IOA data were more than acceptable, there were challenges in implementing these procedures. For example, Phase I was the only phase in which the participant did not have to reach 10 consecutive trials to move on to the next phase while the next two phases did. For Phase I, sessions were to be terminated following three consecutive independent occurrences of the target response. However, for Phases II and III, the participant had to correctly mand for ten consecutive trials in order for the following phase to be introduced. In other words, the participant had to get ten out of ten trials correct with a total of 100% responding in order to move on to the next phase, but only for Phase II and III nor for Phase I. In retrospect, when writing the procedures, all phases should likely have had ten consecutive correct trials in order to move forward and to remain consistent throughout.

Future research should examine shaping mands to be independently emitted. In other words, having the participant express wants and needs without the researcher having to ask, “What do you want?” The ideal goal would be for the participant to independently request the item they want by saying “I want —.” Also, responses during mand and tact training should consist of mand and tact frames versus single word responses, meaning that the participant

should respond using the tact frame “It is a ---” and respond using the mand frame “I want ---”. This may promote transfer among the verbal operants and may result in the emergence of new mands, in addition to promoting generalization (Hernandez, Hanley, Ingvarsson, & Tiger, 2007; Skinner, 1957; Wallace, 2007). Furthermore, different prompts can be used to emit a response from the participant such as an expectant look in order to be able to fade the prompt question. In the future, the study can be dissected even further and determine which specific items the participant requested more often. This can be tracked along with the data collection chart and can be added to the graph by using different symbols for each item in order to determine if one item transfers easier than another item. Other future research could include more than just one participant, maybe three to five, with similar characteristics. This may have been more useful to identify if the findings generalize to more children. Moreover, a future study can expand this study using this same participant and determine if the transfer procedures can be used as a stepping stone to teach independent mands.

Within the field of special education and applied behavior analysis, single subject research has been used to examine strategies for building academic achievement and improving social behavior and enhancing the skills of teachers and parents whom carry out these interventions (Horner et al., 2005). Thus, benefiting the group of those involved in order to help the child maintain these skills in the long-term. This study allowed for the close examination of this child’s specific and educational needs. His lack of communication skills was of primary interest and this study allowed for the intense focus of improving the social quality of the child in the everyday environment. In conclusion, this study found that following tact-to-mand transfer procedures for highly preferred items, a 3-year-old child with autism and a limited manding repertoire, was able to mand items in his tact repertoire after using the procedures and prompting when necessary. This study demonstrates a strategy for promoting transfer procedures from a tact

to a mand in children diagnosed with autism indicating that verbal operants can, in fact, be transferred.

## Appendix A

## Parental Consent

University of North Florida *Department of General Psychology*

**Parental Informed Consent for****The Effects of Tact-to-mand Transfer Procedures and Prompting Procedures for Increasing Independent Mands in a Child with Autism**

You are invited to participate in a single subject research study conducted by Melissa Perdomo as part of the requirements for a master's degree in General Psychology at the University of North Florida. Your participation is voluntary. Please take as much time as you need to read this form. You may also decide to discuss this with your family and friends. You will be given a copy of this form.

Purpose of the Study:

Your child is invited to participate in a research study entitled *The Effects of Tact-to-mand Transfer Procedures and Prompting Procedures for Increasing Independent Mands in a Child with Autism* in order to obtain more information regarding the ability of requesting items and actions independently. This research study will help update research involving mands in children diagnosed with Autism Spectrum Disorder. Your child will be observed for one hour at school. During this time, the frequency of independent mands will be recorded. The purpose is to use tact-to-mand transfer procedures and least-to-most prompting procedures in order to increase independent mands in your child.

Description of Participation:

Your child will continue therapy as usual with special attention given to requesting items and actions independently. Data will be collected by the therapist and kept confidential. Your child's participation in this study will take place during the month of November while seeking ABA services. Participation will occur for about one hour during the two-hour period in which therapy is conducted.

Risks and Benefits of Participation:

In an effort to increase independent mands, it is important to identify interventions that will aid children with autism to express their needs and wants. The benefits of participation in this study include being able to request items or actions in order to communicate what the child may need or want. There is no risk associated with this study.

Confidentiality:

The data collected by the investigator will be kept confidential to the extent possible and will be disclosed only with your permission or as required by law. All data as well as you and your child's participation will be kept confidential. You and your child will not be mentioned by name in the reported results. You and your child can end participation at any time. The particular steps to ensure this confidentiality include maintaining all collected data in a locked file cabinet which is only accessible by the investigator. All gathered data will be stored in a locked cabinet and on a password protected computer. The data will be stored for approximately seven years after the study has been completed and then destroyed.

Participation and Withdrawal:

You can choose whether to be a part of this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. The decision to participate in this study is completely up to you and your child. If you and your child decide to be in the study, your child may stop at any time. Your child will not be treated any differently if you and your child decide not to participate, or if your child stops once your child has started.

Rights of Research Participants:

You may withdraw your consent at any time and discontinue participation without penalty. If you have any questions about your rights as a study participant or you would like to speak with someone independent of the research team to obtain answers to questions about the research, or in the event the research staff cannot be reached, please contact the University of North Florida’s IRB Office at (904) 620-2498 or email [irb@unf.edu](mailto:irb@unf.edu).

Identification of Investigators:

If you have any questions or concerns about the project, please feel free to contact Melissa Perdomo at \_\_\_\_\_, or Dr. Angela Mann at (904) 620-1633.

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University of North Florida  
General Psychology  
1 UNF Drive  
Jacksonville, FL 32224

Dr. Angela Mann  
University of North Florida  
Department of Psychology  
1 UNF Drive  
Jacksonville, FL 32224  
904-620-1633

Participant Consent:

I have read the information in this consent form. I have had the chance to ask questions about this study, and those questions have been answered to my satisfaction. I am at least 18 years of age, and I agree for my child to participate in this research project. I understand that I will receive a copy of this form after it has been signed by me and the Principal Investigator.

\_\_\_\_\_  
Parent Name (print)

\_\_\_\_\_  
Parent Signature

\_\_\_\_\_  
DATE

\_\_\_\_\_  
Investigator Signature

\_\_\_\_\_  
DATE



## Appendix C

## Procedural Fidelity Checklist

## Procedural Fidelity Checklist

Insert ✓ if the step was completed by the investigator. Insert ✗ if the step was not completed by the investigator or was completed incorrectly by the investigator.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Mand Test**

\_\_\_\_\_ 1. The researcher will place the target items on a table in front of the participant but will not deliver any prompts or instructions. Any independent vocal mand emitted by the participant will be recorded.

***Phase I: Tact Training***

\_\_\_\_\_ 1. Ask participant “What is it?” The researcher will record the participant’s response.

\_\_\_\_\_ 2. The participant will respond within three seconds and the researcher will take data on the response. If the participant responds within three seconds, the researcher provides the item to the participant. If the incorrect response or no response is given, then the researcher begins a new trial with an immediate vocal prompt.

***Phase II: Tact-to-mand Transfer Procedure Training***

\_\_\_\_\_ 1. Ask participant “What is it?” If the correct response is given within three seconds, provide praise. If the incorrect response or no response is given, then continue to a vocal prompt.

\_\_\_\_\_ 2. Ask participant “What do you want?” If the correct response is given within three seconds, provide the item and praise. If the incorrect response is given, then continue to a gestural prompt. Provide a gestural prompt by pointing to the item to cue the participant to say the name of that item. If the correct response is given within three seconds, then begin a new trial. However, if the incorrect response or no response is given, then provide a vocal prompt by saying the name of the item to cue the participant to say the name of the item.

\_\_\_\_\_ 3. If the correct response is given within three seconds, then begin a new trial. If the incorrect response or no response is given, then provide another vocal prompt until the correct response is emitted and then proceed to begin a new trial.

***Phase III: Mand Training***

\_\_\_\_\_ 1. Ask participant “What do you want?” If response is given within three seconds, provide the item and praise. If the incorrect response is given or no response is given, then give a vocal prompt and repeat the trial until a correct answer is emitted.

## Appendix D

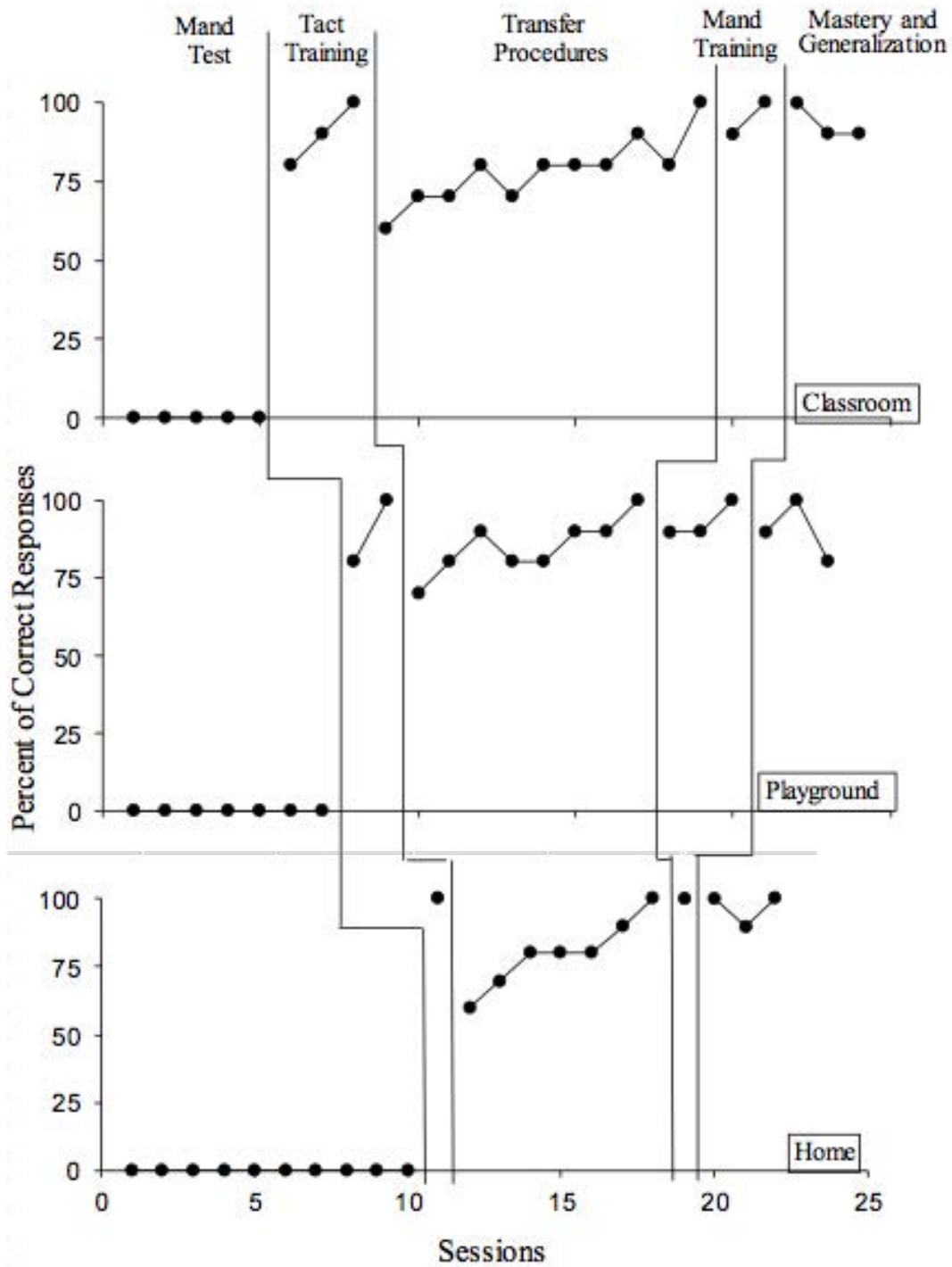
## Tables and Figures

*Table 1.* Preference assessment results for highly preferred items. Out of the five items, the top three were chosen for the study.

Item	Percentage Chosen
Foam blocks	50%
Hammer	20%
Train and tracks	15%
Cup and spoon	10%
Toaster	5%



Figure 1. Percentage of correct responses during baseline, tact training, transfer procedures, mand training, and mastery and generalization probes.



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Willis, C. (2006). *Teaching young children with autism spectrum disorder*. Beltsville, MD: Gryphon House, Inc.

# Melissa Perdomo

## EDUCATION

Master of Arts in General Psychology, Present  
University of North Florida; Jacksonville, FL

Bachelor of Arts in Psychology, 2011  
Florida International University; Miami, FL  
Minor in Education

## EXPERIENCE

**Academic Tutor**, Self-Employed; Miami, FL - 2016-Present

- Apply behavior skills to aid students whom are below grade level
- Work with students and parents to develop realistic goals and improvement plans
- Identified the needs of learners and adapted course content and delivery style to meet their needs, including children with learning disabilities, children on the autism spectrum and children with ADD/ADHD
- Monitor behaviors and interventions outlined in IEP's
- Create individual student records and manage documentation on each student

**Behavior Therapist**, New Way Day Services; Miami, FL - 2014-2016

- Executed treatment plans for clients
- Maintained progress notes for every client contact and submitted all documents in a timely manner
- Provided direct therapeutic interventions to clients, using ABA techniques directed to increase language and communication skills, social skills, appropriate play skills, cooperation skills, and daily living skills

**Fourth Grade Teacher**, Doral Academy Charter Elementary School; Doral, FL - 2010-2012

- Florida Teacher Certification K-6
- Conducted classroom instruction and prepared daily lesson plans
- Provided feedback on learning achievements and needs for improvement
- Increased parental involvement
- Mentored and coached students to help boost their confidence and competence
- Used innovative methods and materials to produce effective learning experiences
- Utilized multiple assessments in compliance with district and state requirements

## SKILLS

Proficient in Spanish  
CPR and First Aid Certified