THE EFFECT OF MAGNITUDE ON THE DISPLACEMENT OF LEISURE ITEMS BY EDIBLE ITEMS

by

SYDNEY B. MILLER

(Under the Direction of Kevin Ayres)

ABSTRACT

Studies have shown that when edible items and leisure items are both presented in preference assessments, edible items tend to displace leisure items. While prior studies have established this trend, the underlying mechanisms behind this displacement remain unclear. One potential explanation is the relatively brief period of access typically granted to leisure items during preference assessments does not have a reinforcing value greater than the food item. The purpose of the present study sought to evaluate the impact of increasing access to leisure items on preference. Participants were presented with both highly preferred edible and leisure items, and the duration of access to the leisure was systematically increased across series to measure the point at which the leisure item became more preferred than the edible item. The findings suggest that as access to leisure items increases, displacement is likely to occur.

INDEX WORDS: displacement, preference assessments, edible, leisure

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CHAPTER 1

Introduction

In any behavior change program, there is value in determining effective reinforcers that can be delivered contingent on a targeted response for the behavior change program to be successful. In clinical settings, potential reinforcers are most commonly identified using preference assessments. Identifying an individual's preferences is important for predicting the reinforcing effectiveness of an item and in turn, the effectiveness of treatment (DeLeon et al., 2009). Clinicians conduct preference assessments to identify top-ranked items, which can be edible items or leisure items, such as toys and technology. Research has shown that items that prevail as top ranked items in preference assessments, function as reinforcers for individuals with intellectual and developmental disabilities and autism spectrum disorder. There are varieties of preference assessments that can be used depending on characteristics of the individual with whom the preference assessment is being conducted. The multiple stimulus without replacement is one assessment that can be conducted quickly and ranks the order of the stimuli by preference (Fisher et al., 1992). The paired stimulus preference assessment is another assessment that ranks the stimuli, but it takes longer to conduct than a multiple-stimulus without replacement preference assessment. Both of these assessments provide valuable information that can be used to select the most effective reinforcers for behavior change programs.

DeLeon et al. (1997) investigated the extent to which individuals with developmental disabilities preferred edible items over leisure items by comparing the highest preferred edible items and leisure items of participants in a combined multiple-stimulus without replacement

preference assessment. They conducted separate MSWO assessments for edible items and leisure items. The highest ranked stimuli from each assessment were then combined into another MSWO assessment. They found that eight out of the 14 participants chose their lowest-ranked edible items over their highest-preferred leisure items when both stimuli were presented together. Additionally, 12 out of the 14 participants had an edible item as their highest-ranked item in the combined multiple-stimulus without replacement assessment. The results of the study revealed that when leisure items and edible items are combined in the same assessment, edible items take precedence over leisure items, despite the fact that leisure items are preferred when they are not presented alongside edible items. They suggested the reason for these results was due to the response effort required to consume an edible item, or participants were deprived of food at the time of the assessment, which made the edible item a more salient stimulus.

Bojak and Carr (1999) further investigated this phenomenon to determine if the results were the same if the preference assessment combining edible and leisure items were conducted after mealtimes. They replicated the procedures from DeLeon et al. (1997), but added a phase in which a combined multiple-stimulus without replacement assessment was conducted immediately before and after meal times. Their results were consistent with the findings of DeLeon et al. (1997) in that, even after meal consumption, there was total displacement of leisure items by edible items for all participants. The results of this study show that the time of the assessment, or satiation effects, did not influence the selection of edible items over leisure items.

DeLeon et al. (1977) identified a potential explanation for displacement that differed from previous studies. They proposed that the reinforcement obtained from consuming an edible item may be more preferred than accessing a leisure item because it requires less effort. In

contrast, interacting with a leisure item may be less reinforcing than consuming an edible item, even if the time spent engaging with both items is equal. Bojak and Carr (1999) acknowledged this hypothesis in their study but noted that testing it would be challenging. Previous studies have relied on arbitrary quantities for edible and leisure items, such as 30s of access to leisure items, as it is difficult to standardize reinforcement quantities across different stimulus classes. However, this approach may result in inequivalent magnitudes of reinforcement, which could contribute to displacement. It is unclear whether displacement would still occur if preference assessments were repeated with the same individual using varying quantities of edible items and access to leisure items. This has important clinical applications for clinicians who use edible or leisure items as reinforcers. If edible items displace leisure items at a small magnitude, it might be more feasible for the edible item to serve as the reinforcer. However, if the leisure item is preferred, even if it requires increased duration of access, it might be more socially valid, when considering sugar and caloric intake with young children, to let the leisure item function as the reinforcer. The purpose of the present study was to examine displacement of leisure items when the magnitude of the leisure was manipulated to allow for longer access within a paired stimulus preference assessment.

Conine and Vollmer (2018) conducted a study to extend previous research that examined the effects of displacement in preference assessments when high-tech leisure items were paired with edible items. Specifically, the authors sought to expand on the existing literature by using a more diverse sample of participants and by incorporating high-tech leisure items into the assessment process. Prior studies conducted by DeLeon et al. (1997) and Bojak and Carr (1999) had investigated the displacement of leisure items by edible items in preference assessments but had focused exclusively on adult participants diagnosed with an intellectual disability. Given that

a majority of behavior analysts currently work with young children with autism spectrum disorder (ASD), it is important to study population and age differences in preference assessment methodology. The purpose of Conine and Vollmer's (2018) study was to advance our understanding of preference assessment procedures and provide insights into the applicability of these procedures in clinical practice, given that the majority of practicing behavior analysts are provided services to young children with ASD.

DeLeon et al. (1977) identified a potential explanation for displacement that differed from previous studies. They proposed that the reinforcement obtained from consuming an edible item may be more preferred than accessing a leisure item because it requires less effort. In contrast, interacting with a leisure item may be less reinforcing than consuming an edible item, even if the time spent engaging with both items is equal. Bojak and Carr (1999) acknowledged this hypothesis in their study, but noted that testing it would be challenging. Previous studies have relied on arbitrary quantities for edible and leisure items, as it is difficult to standardize reinforcement quantities across different stimulus classes. However, this approach may result in inequivalent magnitudes of reinforcement, which could contribute to the phenomenon of displacement. It is unclear whether displacement would still occur if preference assessments were repeated with the same individual using varying quantities of access to leisure items. This has implications for clinicians who use edible or leisure items as reinforcers, as it may be more socially appropriate to use leisure items as reinforcers if they are preferred, even if they require longer access. While researchers recognize this might not be possible in some situations, when caloric and sugar intake are of concern using leisure items may be more socially appropriate. The aim of our study was to investigate whether displacement would occur when the magnitude of

leisure items was manipulated to allow for longer access within a paired stimulus preference assessment.

CHAPTER 2

Method

Participants

The present study involved three African-American children with an educational eligibility of autism and speech or language impairment. The participants utilized a Picture Exchange Communication System (PECS; Bondy & Frost 1994), book for communication purposes. The selection criteria for the participants included the ability to discriminate items, stay in a designated area for a minimum of 5 min, choose an item when given a choice, and pick up and exchange a 5cm x 5cm card.

Abby was a five year old female with an educational eligibility of autism and speech or language impairment. Abby's Verbal Behavior Milestones and Placement Program (VP-MAPP; Sundberg, 2008) were 34.5 out of 170 which suggests that Abby has some deficits in language and communication skills compared to neurotypically developing peers. Abby scored 73 out of 96 in Barriers which indicates that Abby is experiencing barriers to learning new language and communication skills, but she has made progress in overcoming some barriers. Abby's academic goals include receptively identifying colors, shapes, letters, common objects and imitating strokes and identifying body parts. Abby communicated with her PECS book by exchanging pictures of items with various staff members.

Joey was a four year old male with an educational eligibility of autism and speech or language impairment. Joey scored 21 out of 170 on the VB-MAPP milestones suggesting that he may have significant deficits in language and communication skills across a wide range of

domains such as vocal imitation, receptive and expressive language, social referencing and play skills. A score of 21 suggests that Joey has not yet demonstrated mastery in many of these areas. Joey scored 51 out of 96 in Barriers suggesting that Joey may be experiencing some barriers to new language and communication skills but has already made some progress in overcoming the barriers. Joey's academic goals include matching colors and shapes, receptively identifying common objects and imitating strokes and motor movements. Joey communicated with a PECS book by using sentence starters such as "I want" with pictures of items.

Kyle was a five year old male with an educational eligibility of autism. Kyle scored 46 out of 170 on the VP-MAPP milestones suggesting that Kyle may have deficits in language and communication skills across a broad range of domains but has demonstrated some proficiency in certain areas. Kyle scored 51 out of 96 in Barriers suggesting that Kyle may be experiencing some barriers to new language and communication skills but has already made some progress in overcoming the barriers. Kyle's academic goals include identifying body parts, receptively identifying common objects and letters. Kyle communicated with a PECS book by using sentence starters such as "I want" with pictures of items.

Setting and Materials

All sessions were conducted in a self-contained special education pre-k classroom. The preference assessments, magnitude training, magnitude discrimination assessments, and progressive magnitude assessments were conducted at the table in the classroom where discrete trial training (DTT) took place or in the play area. Twelve stimuli (six edible items and six leisure items) were selected for each participant for the paired stimulus preference. The edible and leisure items were selected based on caregiver and therapists reports and direct observation. The edible items that were selected were items that the participants had access to in the

classroom as edible reinforcers during work times, or items that were similar in nature. The leisure items that were selected were items from the centers in the classroom that participants had access to during their time in centers for play. Other items were selected that were similar but not identical to items that were preferred in the classroom play area. Access to the specific edible and leisure items that were included in the assessment were restricted outside of the sessions to control for satiation. Pictorial representations, in the form of a 5cm x 5cm laminated card were used for all relevant edible and leisure items in the combined assessment (Heincke et al., 2016) to limit bias that could be introduced due to picking between the actual edible item as opposed to a picture of the leisure item.

Measurement System and Data Collection

The dependent variable was a selection response during paired stimulus preference assessments and displacement assessments. A selection response in the edible item, leisure item, and combined preference assessments was defined as the participant touching or picking up one of the edible or leisure items (Clark et al., 2019). The selection response for the magnitude training, magnitude assessment, and yoked magnitude assessment was defined as the participant touching or picking up the 5 cm x 5 cm card that depicted the leisure item or edible item. Data was also collected on if the participant independently exchanged the card or if prompting was required for the participant to exchange the card during magnitude training. Displacement was defined as any instance in which the participant selected a leisure item over an edible item when both items were presented simultaneously. For all paired stimulus preference assessments, the researcher collected paper and pencil data on the number of times an item was selected and divided the number of times the item was presented and multiplied by 100 to generate a percentage. These percentages were then ranked to create an order with the highest percentage

being the highest preferred item. The dependent variable for the displacement assessment was calculated as the percentage of trials in which a stimulus was chosen given its availability (Bojak & Carr, 1999).

Reliability and Fidelity

A second observer independently collected reliability data and procedural fidelity data during preference assessments, magnitude training, magnitude discrimination assessment, and the progressive magnitude assessment. Two observers independently but simultaneously collected data on participants' selection during 56% of edible preference assessments and 44% of leisure and combined preference assessments. Interobserver agreement for the paired stimulus preference assessment was calculated by dividing the total number of trials in which the two data collectors agreed, by the total number of trials in the session (Cooper et al., 2020). The mean agreement for item selection during the edible preference assessment was 99.25% (range=93.33%-100%). The mean agreement during the leisure and combined preference assessment was 100%.

Two observers independently but simultaneously collected data on participants' behavior during 100% of magnitude training, 100% of magnitude discrimination assessments, and 56% of progressive magnitude assessments. Mean agreement for the primary dependent variable during the magnitude training was 96.6% (range=90%-100%), 100% during magnitude discrimination assessments, and 100% during progressive magnitude assessments. Procedural fidelity data were collected for 56% of all sessions and scores were 100%.

Experimental Design

The researcher employed a reversal design to evaluate the effects of differing magnitude on the displacement of leisure items by edible items within paired stimulus preference assessments. The study began with the 30s condition with all participants to evaluate their preference of a high preferred edible item paired with 30s of access to their three highest preferred leisure items. The researchers then moved to the 60s condition, and after completing the procedure, they progressed to the 90s condition. Once displacement was observed for participants, the researchers reversed the condition and returned to the 60s condition. After completing the pairings with 60s of access, the researchers continued to the 90s condition to assess the stability of participant choices. The use of the reversal design allowed the researchers to evaluate the effects of different magnitudes of access on displacement effects and assess the stability of the observed effects over time.

Procedures

Displacement Assessment

Three separate paired stimulus preference assessments were conducted for each participant to demonstrate displacement (Bojak & Carr, 1999). The three preference assessments presented edible items alone, leisure items alone, and then a combined assessment that included edible items and leisure items. In the edible items alone paired stimulus preference assessment, there were six edible items. In the leisure items alone paired stimulus preference assessment, there were six leisure items. Each of the three preference assessments were conducted three times across the span of three weeks to create a clear hierarchy of preferences (Carr et al., 2000). The order of the preference assessments was alternated across the participants, but the combined

assessment was conducted last for all participants. Access to the edible and leisure items were restricted outside of the sessions to control for satiation.

During the preference assessments, the researcher brought the participants to the table. The trial began by the staff member presenting the participant with two items simultaneously in front of the participant equidistant from one another. The order of the items was semi-randomized so that each item appeared in each position an equal number of times. In the preference assessment that included edible items the participant was presented with one piece of the edible item (e.g., half of a Sour Patch Kid). In preference assessments that included leisure items, the participant was presented with the actual item. Once the staff member presented the participant with the two items, they delivered the vocal direction to "pick one" or "choose one". A selection response by the participant resulted in delivery of the edible item or 30 seconds of access to the leisure item (Piazza et al., 1996). If the participant did not make a selection within 10 seconds of presentation, or the participant attempted to select both items, the items were removed and then represented. If the participant did not make a selection following the representation of the items, the researcher denoted "no response" on the data sheet and presented the next choice trial. The results of the preference assessment were used to create a hierarchy of preference. The top three items from the edible items alone, and the leisure items alone preference assessments were used in the combined preference assessment. In the combined assessment, each edible item was paired with each leisure item. The results of the combined assessments were used to create a hierarchy of preferences for the magnitude training and the progressive magnitude assessment.

Forced Exposure Magnitude Training

Once the participants completed the edible, leisure, and combined preference assessments, they began magnitude training. The purpose of magnitude training was to expose the participants to the differing magnitudes of access to the leisure item and then ensure that they could discriminate between the differing magnitudes prior to conducting the progressive magnitude assessment. The leisure item used for the magnitude training was the top preferred leisure item from the leisure item alone preference assessment, and the combined preference assessment. The methodology for this procedure was adopted from Hanley et al., (1999). The magnitude of the leisure item was depicted by the number of 5 cm x 5 cm cards presented accompanied by a shaded clock. Each card had an image of the corresponding leisure item. Each 5cm x 5cm card represents 30 seconds of access to the leisure item (e.g., one card equals 30 seconds of access, three cards equal 90 seconds of access.) The magnitude training consisted of small and large magnitude training. Small and large magnitude training consisted of five trials of forced exposure so that the participants could understand the contingencies. For the small magnitude training, the card depicting the leisure item and a clock with one fourth of the clock shaded, was placed in front of the participant. The participant's selection response resulted in the removal of the card and 30 seconds of access to the leisure item. If the participant did not emit a selection response, the therapist conducting the magnitude training physically guided the participant. This physical guidance rarely occurred. Large magnitude differed from small magnitude in that three cards were presented to the participant along with another image of a clock that was three-fourths shaded. A selection response resulted in removal of the cards, one at a time, in 30 second intervals, until there were no cards remaining and 90 seconds had elapsed.

Magnitude Discrimination Training

Following the forced exposure trials a discrimination training was conducted. The discrimination training consisted of 10 trials, five with the large magnitude and five with the small magnitude. The order of trials and the number of cards presented was determined randomly. Following the completion of the 10 trials, a series of probes were conducted to assess participant's sensitivity to the differing magnitudes. The therapist presented both the small magnitude and the large magnitude and instructed the participant to "pick one." The orientation of the small and large magnitude was randomized prior to conducting the probes. Once the participant had independently selected the large magnitude over the small magnitude five times, it was determined that his or her behavior was sensitive to the differing magnitudes per the guidelines in Clark et al., (2018).

Progressive Magnitude Assessment

Following the criteria set for identifying the participant's sensitivity to magnitude, the progressive magnitude assessment was conducted for each participant. The assessment followed a methodology similar to that of a paired stimulus combined preference assessment, with the exception that the therapist administering the assessment presented the participant with two cards, one depicting a leisure item and the other depicting an edible item. The items depicted on the cards were from the participant's three highest ranked edible and leisure items. The assessment began by the therapist presenting the participant with cards depicting their highest preferred edible item and their highest preferred leisure item along with the shaded clock that represented 30 seconds of access and saying, "pick one." Once the participant made a choice, they were granted access to the leisure item or the edible item. This process continued until all three edible items had been paired with the three leisure items once. If displacement did not

occur, the magnitude was increased to 60 seconds and the process was repeated. If displacement did not occur in the 60 second condition, the magnitude was increased to 90 seconds and the process was repeated. The magnitude at which the participant selected the leisure item over the edible item was defined as the switch point.

If the participant chose the edible item in any of the conditions, the next choice trial was not presented until 30s, 60s, or 90s had elapsed, dependent on the corresponding magnitude condition. As a result of the disparity in access rate between the two item categories, participants could potentially maximize their access to preferred items by selecting the edible items. To avoid this, access to the edible items was yoked to access to the leisure items. For example, if a participant selected an edible item over 90 seconds of access to the leisure item, they were required to wait 90 seconds for the next choice trial. During this waiting period, participants received minimal attention from the therapist and were not granted access to any other edible or leisure items.

CHAPTER 3

Results

The results of the paired stimulus preference assessments are depicted in Figure 1, 2, and 3 for each participant. The separate preference assessments including only edible items and only leisure items created a hierarchy of preference for the types of items. In the combined assessment, all of the edible items displaced all of the leisure items for all participants. Table 1 shows the list of items of each participant for the edible and leisure preference assessments in average rank order.

The results of the progressive magnitude assessment are depicted in Figure 4, 5, and 6 for each participant. Abby's top three preferred leisure items were a slinky, a blue squishy ball with white netting, and a fidget spinner. Abby's highest preferred edible item was a Starburst®. For Abby, at 30 seconds, the edible items were chosen over the three leisure items. At 60s, Abby continued to select the highest preferred edible item over her top three ranked leisure items. At 90s, Abby chose all three leisure items over her highest preferred edible item. After displacement occurred, the next condition presented 60s of access to leisure items, Abby selected the highest preferred edible item over all three of the leisure items. Following this condition, the magnitude of access to the leisure item was increased to 90s, and displacement occurred.

Joey's top three preferred leisure items were a plastic dolphin figurine, a blue squishy ball with white netting, and a fidget spinner. Joey's highest preferred edible item was a Nerd

Cluster Joey selected the three highest ranked leisure items over the highest preferred edible item, a Nerd Cluster in the 30s and 60s condition. The leisure items displaced the edible item in the 90s condition. Once displacement occurred the condition was reversed and conducted again with 60s of access to the leisure items. In the 60s condition, Joey selected the Nerd Cluster® over the three leisure items. The researchers then conducted the 90s condition again, and Joey selected all three leisure items over the Nerd Cluster®.

Kyle's top three preferred leisure items were a blue squishy ball with a white netting, a slinky, and a fidget spinner. Kyle's highest preferred edible item was a Starburst®. When presented with the choice of 30s of access to the top three preferred leisure items and a piece of a Starburst®, Kyle selected the Starburst® each time. The results in the 60s condition were the same as in the 30s condition. In the 90s condition, Kyle continued to select the Starburst® over the top three highest preferred leisure items. Following the first series of choices between 90s of access to leisure items and a Starburst®, the size of the Starburst® was reduced. After the size of the Starburst® was reduced, the edible item continued to displace the leisure item. The size of the Starburst® was reduced again, with the size being equivalent to one sixteenth of a whole Starburst®. The researcher paired the one sixteenth Starburst® with 90s of access to the highest preferred leisure items, and displacement occurred. After displacement occurred in the 90s condition, the researcher conducted the assessment with 60s of access to the leisure items, and the edible item was chosen. The researcher then presented Kyle with 90s of access to the leisure item and one sixteenth of the Starburst®. In this condition, only the highest preferred leisure item displaced the Starburst®. Data collection concluded at session 21 due to the participant moving to another school.

CHAPTER 4

Discussion

In previous studies conducted by DeLeon et al. (1997), and Bojak and Carr (1999), edible items frequently displaced leisure times when using MSWO preference assessments. The present study aimed to evaluate the effects of magnitude on the displacement of leisure items by edible items within a paired stimulus preference assessment. The results of the study suggest that when the magnitude of high preferred leisure items is increased, displacement occurs within a paired stimulus preference assessment. These findings also suggest that displacement of leisure items is not dependent on the type of preference assessment utilized.

In this study, the duration of access to high preferred leisure items was increased to evaluate the effects on displacement. The researcher systematically manipulated the duration of access to highly preferred leisure items and reassessed preference between the leisure items and the highest preferred edible item. For all three participants, as the duration of access was increased to 90s, the participants selected the leisure item over their highest preferred edible item. These findings suggest that displacement during preference assessments may be a product of the arbitrarily assigned duration of access that is typically used when assessing preferences for both leisure items and edible items.

The results of this study are important for clinical application for clients and practitioners who prefer the use of leisure reinforcers as opposed to edible reinforcers. Practitioners should not automatically discount the use of leisure items as reinforcers if edible items displace leisure items in preference assessments. Rather, the use of leisure items as reinforcers should not be

discounted until the magnitude of access has been increased and evaluated.

The outcomes of this study are especially important in scenarios in which leisure items are favored over edible items in assessment and treatment. The preliminary results of the study showed that food was a highly preferred stimulus which is consistent with previous research demonstrating that food can be an effective reinforcer when aiming to reduce the frequency or duration of challenging behaviors (Murphy et al., 2003). However, there have been some notable problems with using food items as opposed to nonfood items due to motivational properties of food items. Rincover and Newsome (1985) found that participants were likely to become satiated on food reinforcers quicker than they became satiated with non-food items. There are also ethical and legal concerns associated with food deprivation and withholding food to control for motivating operations. On the contrary, there are no legal or ethical concerns associated with withholding leisure items, and a study by Vollmer and Iwata (1991), found that the reinforcing effects of leisure items can be enhanced by manipulating establishing operations. There are various limitations present in the current study. One limitation includes the time of day that progressive magnitude sessions were conducted. Participant's choices could have been influenced by their level of hunger. On the contrary, participants also could been satiated on the edible items and chosen the leisure item. While a study by DeLeon et al. (1977) found that there was no impact on participant preference when assessments were conducted before and after mealtimes, this could be a factor to consider in this study with younger participants.

Another limitation of the study was in regard to Kyle. At the beginning of the study, Kyle had been a student in the classroom for one full school year. The last day of data collection was Kyle's last day in the classroom where the study was being conducted. Kyle moved out of the county, and therefore started attending another school. Therefore, this limited the researcher's

ability to continue to collect data and potentially see more stable responding.

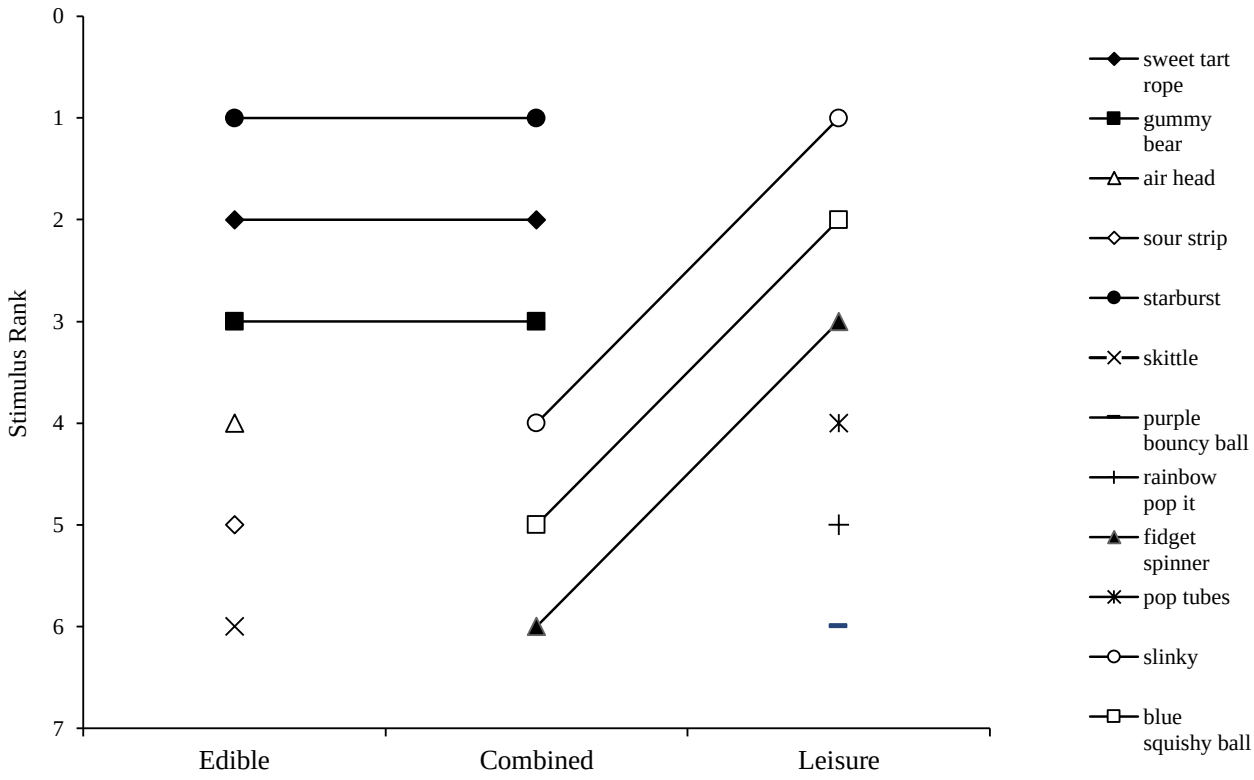
Studies conducted by Call et al. (2012), and Lee et al. (2010), have demonstrated that there is a high probability that stimuli that are highly preferred in preference assessments, also function as reinforcers. Further research should consider conducting a reinforcer assessment to validate the findings that different magnitudes of access to leisure items can function as reinforcers. The results of this study demonstrate that displacement of leisure items by edible items can be achieved by manipulating the magnitude of access to leisure items. These findings provide clinicians with the choice to use leisure items as reinforcers, despite displacement of edible items by leisure items in preliminary preference assessments.

Table 1: *Edible and leisure items in average rank order*

Participant	Age	Edible Items	Leisure Items
Abby	5	Starburst®, Sweet Tart Rope®, gummy bear, Air Head®, Sour Strip®, Skittle®	Slinky, sensory squishy ball, fidget spinner, pop-it, pop tubes, bouncy ball
Joey	4	Nerd Cluster®, Chips Ahoy cookie®, gummy bear, Air Head®, Sweet Tart Rope®, Skittle®	Dolphin figurine, sensory squishy ball, fidget spinner, slinky, pop tubes, finger puppets
Kyle	5	Starburst®, Air Head®, Sour Strip®, Nerd Cluster®, Sweet Tart Rope®, Fruit snack	Slinky, Tonka Garbage Truck, fidget spinner, pop-it, Legos®, sensory squishy ball

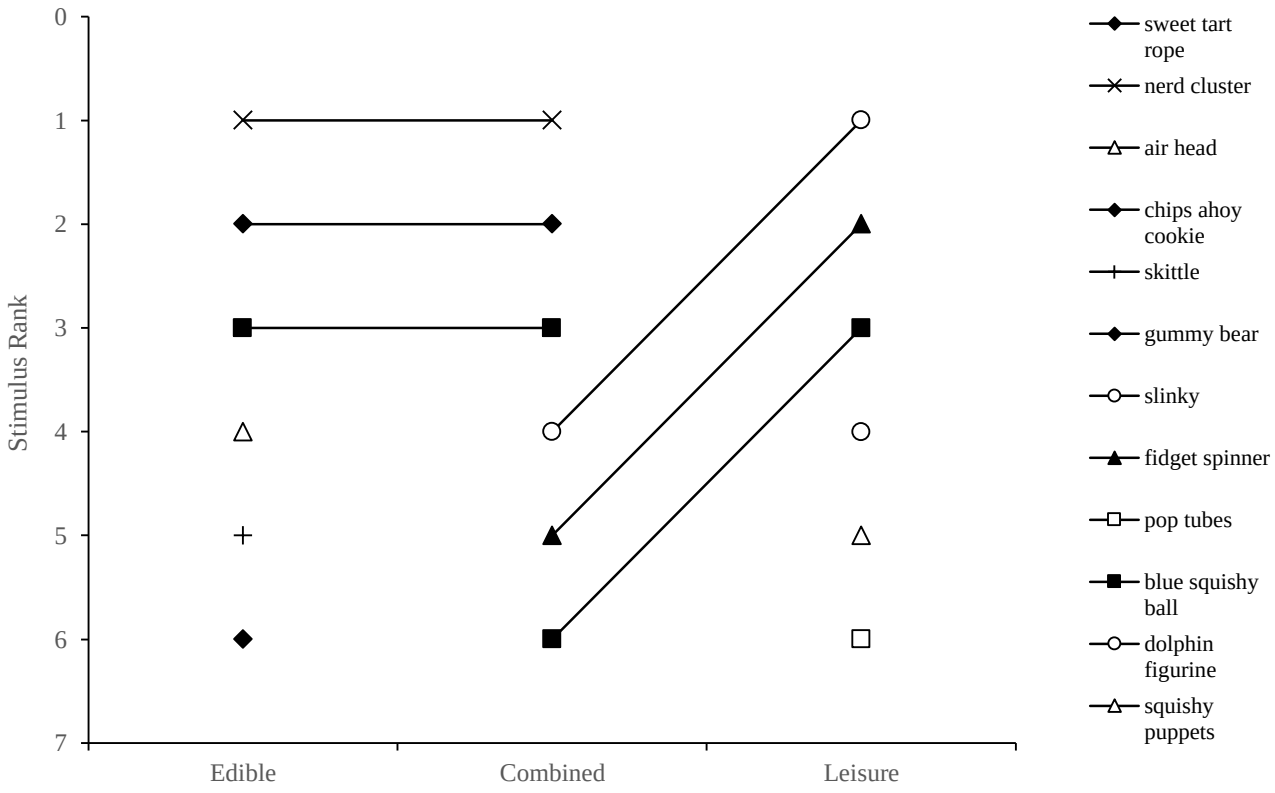
Note. Items within each stimulus class are listed in rank order from participant's highest-preferred to least-preferred.

Figure 1: *Results of the edible alone, leisure alone, and combined preference assessments.*



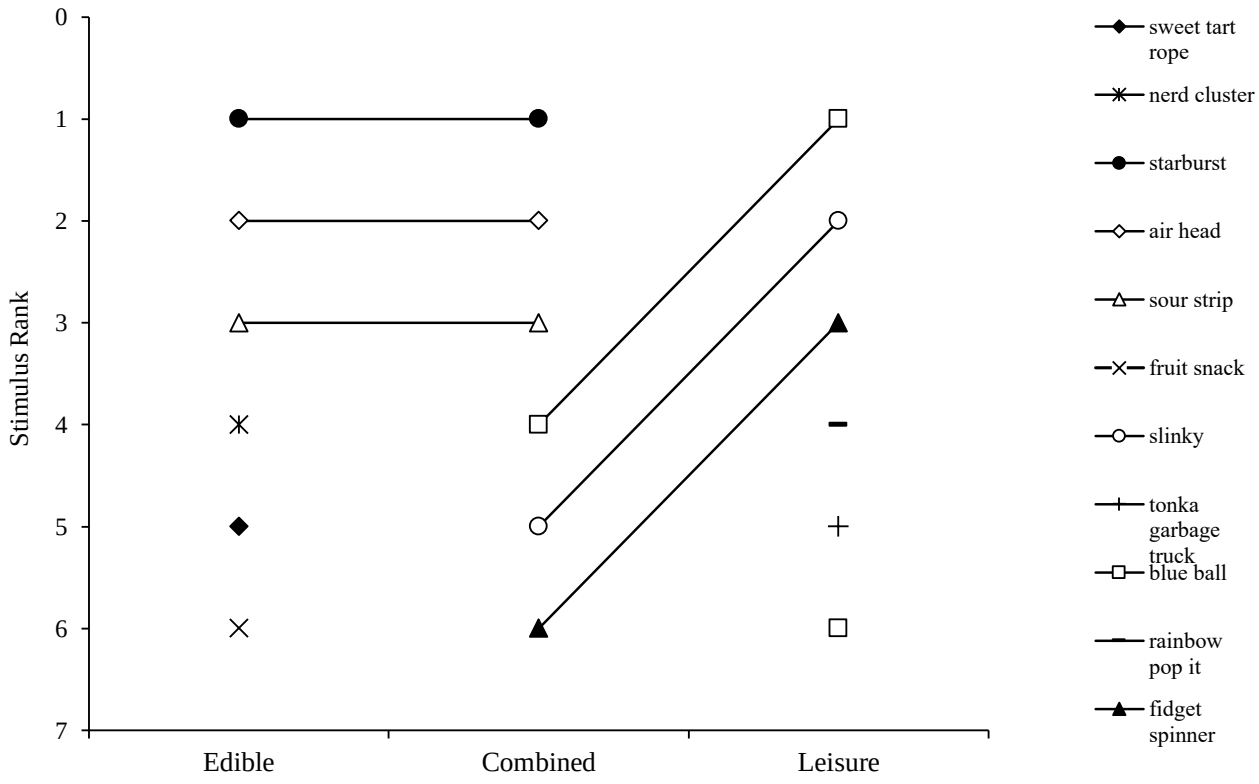
Note. Stimulus rankings from the edible-only, leisure-only, and combined paired stimulus preference assessment for Abby. There was total displacement of leisure items by edible items (i.e., edible items were selected before all leisure items)

Figure 2: *Results of the edible alone, leisure alone, and combined preference assessments.*



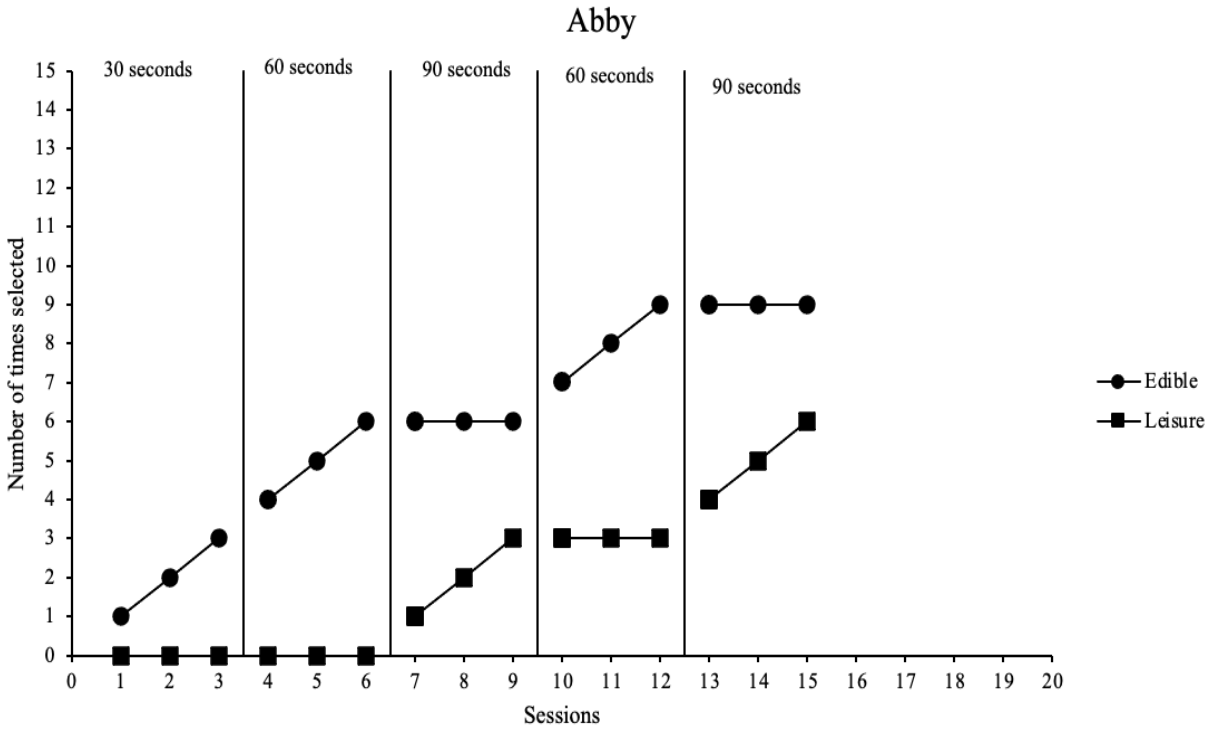
Note. Stimulus rankings from the edible-only, leisure-only, and combined paired stimulus preference assessment for Joey. There was total displacement of leisure items by edible items (i.e., edible items were selected before all leisure items)

Figure 3*: Results of the edible alone, leisure alone, and combined preference assessments.*



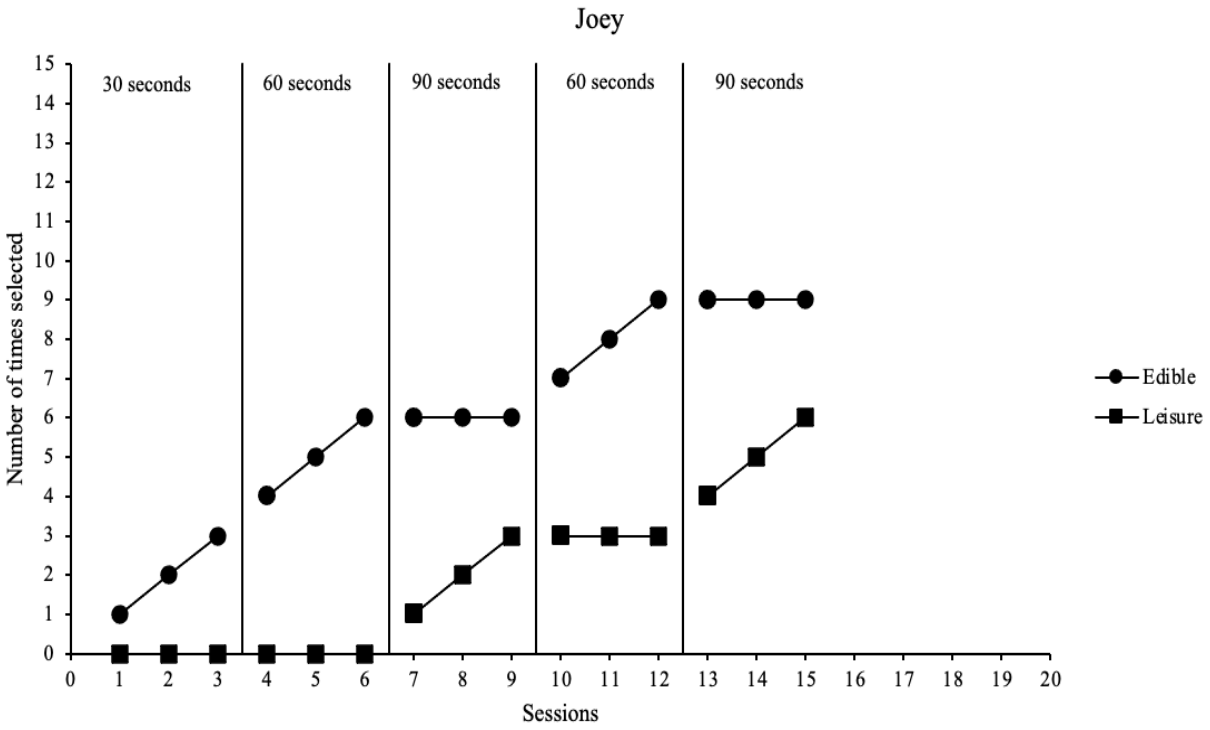
Note. Stimulus rankings from the edible-only, leisure-only, and combined paired stimulus preference assessment for Kyle. There was total displacement of leisure items by edible items (i.e., edible items were selected before all leisure items)

Figure 4: *The results of the progressive magnitude assessment.*



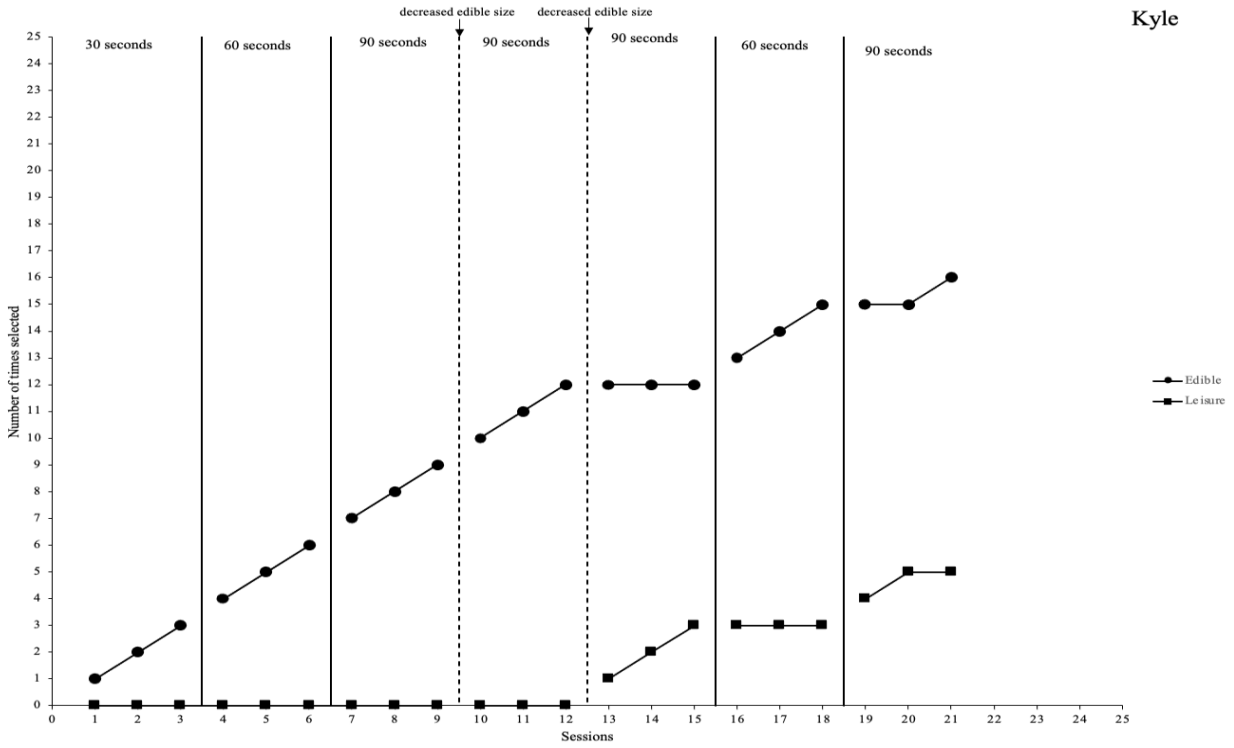
Note. The selection of edible and leisure items displayed as a cumulative record for each systematic increase in magnitude of access to leisure items.

Figure 5: *The results of the progressive magnitude assessment.*



Note. The selection of edible and leisure items displayed as a cumulative record for each systematic increase in magnitude of access to leisure items.

Figure 6: *The results of the progressive magnitude assessment.*



Note. The selection of edible and leisure items displayed as a cumulative record for each systematic increase in magnitude of access to leisure items.

REFERENCES

Bojak, S. L., & Carr, J. E. (1999). On the displacement of leisure items by food during multiple-stimulus preference assessments. *Journal of Applied Behavior Analysis, 32*(4), 515–518. https://doi.org/doi: 10.1901/jaba.1999.32-515

Carr, J. E., Nicolson, A. C., & Higbee, T. S. (2000). Evaluation of a brief multiple-stimulus preference assessment in a naturalistic context. Journal of Applied Behavior Analysis, 33(3), 353–357. https://doi.org/10.1901/jaba.2000.33-353

Clark, S. B., Call, N. A., Simmons, C. A., Scheithauer, M. C., Muething, C. S., & Parks, N. (2019). Effects of magnitude on the displacement of leisure items by edible items during preference assessments. *Behavior Modification, 44*(5), 727–745. https://doi.org/10.1177/0145445519843937

Conine, D. E., & Vollmer, T. R. (2018). Relative preferences for edible and leisure stimuli in children with autism. *Journal of Applied Behavior Analysis, 52(*2), 557–573. https://doi.org/10.1002/jaba.525

DeLeon, I. G., Frank, M. A., Gregory, M. K., & Allman, M. J. (2009). On the correspondence between preference assessment outcomes and progressive-ratio schedule assessments of stimulus value. *Journal of Applied Behavior Analysis, 42*, 729-733. doi:10.1901/jaba.2009.42-729

DeLeon, I. G., Iwata, B. A., & Roscoe, E. M. (1997). Displacement of leisure reinforcers by food during preference assessments. *Journal of Applied Behavior Analysis, 30*(3), 475–484. https://doi.org/10.1901/jaba.1997.30-475

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*(4), 519–533. https://doi.org/10.1901/jaba.1996.29-519

DeLeon, I. G., Iwata, B. A., & Roscoe, E. M. (1997). Displacement of leisure reinforcers by food during preference assessments. *Journal of Applied Behavior Analysis, 30*(3), 475–484. https://doi.org/10.1901/jaba.1997.30-475

Fahmie, T. A., Iwata, B. A., & Jann, K. E. (2015). Comparison of edible and leisure reinforcers. *Journal of Applied Behavior Analysis*, *48*(2), 331–343. https://doi.org/10.1002/jaba.200

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, *25*(2), 491–498. https://doi.org/10.1901/jaba.1992.25-491

Hoffmann, A. N., Samaha, A. L., Bloom, S. E., & Boyle, M. A. (2017). Preference and reinforcer efficacy of high- and low-tech items: A comparison of item type and duration of access. Journal of Applied Behavior Analysis, 50(2), 222–237. https://doi.org/10.1002/jaba.383

Lee, M. S., Yu, C., Martin, T. L., & Martin, G. L. (2010). On the relation between reinforcer efficacy and preference. *Journal of Applied Behavior Analysis, 43*, 95- 100. doi:10.1901/jaba.2010.43-95

Murphy, E. S., McSweeney, F. K., Smith, R. G., & McComas, J. J. (2003). Dynamic changes in reinforcer effectiveness: Theoretical, methodological, and practical implications for Applied Research. *Journal of Applied Behavior Analysis, 36*(4), 421–438. https://doi.org/10.1901/jaba.2003.36-421

Piazza, C. C., Fisher, W. W., Hagopian, L. P., Bowman, L. G., & Toole, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis, 29*(1), 1–9. https://doi.org/10.1901/jaba.1996.29-1

Rincover, A., & Newsom, C. D. (1985). The relative motivational properties of sensory and edible reinforcers in teaching autistic children. *Journal of Applied Behavior Analysis, 18*(3), 237–248. doi:10.1901/jaba.1985.18-237

Rincover, A., Newsom, C. D., Lovaas, O. I., & Koegel, R. L. (1977). Some motivational properties of sensory stimulation in psychotic children. *Journal of Experimental Child Psychology, 24*(2), 312–323. doi:10.1016/0022-0965(77)90009-1.

Steinhilber, J., & Johnson, C. (2007). The effects of brief and extended stimulus availability on preference. *Journal of Applied Behavior Analysis, 40*(4), 767–772. https://doi.org/10.1901/jaba.2007.767-772

Sundberg, M. L. (2008) VB-Mapp: Verbal Behavior Milestone Assessment and Placement Program: A language and social skills assessment program for children with autism or other developmental disabilities