ASSESSMENT OF THE DYNAMIC RELATIONSHIP BETWEEN HIGH AND LOW PREFERENCE STIMULI AND RESPONDING IN EARLY INTENSIVE BEHAVIORAL INTERVENTIONS FOR CHILDREN WITH AUTISM SPECTRUM DISORDER

By

Shizhuo Cheng

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ABSTRACT

With the growing number of Autism Spectrum Disorder (ASD) diagnoses, Applied Behavior Analysis (ABA) has become a widely accepted and evidence-supported method for early childhood intervention. Within ABA interventions, the effective use of reinforcement strategies is crucial for successful outcomes, particularly in skill acquisition and behavior maintenance. This study investigated the effectiveness of high-preference (HP) and low-preference (LP) stimuli as reinforcers for young children diagnosed with ASD. Utilizing a multiple baseline design across participants, this study included three children diagnosed with ASD, aged 2 to 5 years, in a community-based early intensive behavioral intervention setting. Reinforcer effectiveness was evaluated using progressive-ratio (PR) schedules following paired-choice preference assessments to identify edible reinforcers. Results demonstrated that HP stimuli consistently achieved higher breakpoints, indicating stronger reinforcement effects. However, LP stimuli also effectively maintained participant responding, although with comparatively lower breakpoints. These results highlight LP stimuli's viability as reinforcers, particularly when HP stimuli are limited or unavailable. The findings offer practical implications for ABA practitioners, suggesting that LP stimuli can support skill acquisition and maintain behaviors effectively under specific conditions. This study contributes to refining reinforcement practices, enabling more versatile and individualized ABA interventions for young children with ASD.

Key words: reinforcement, progressive-ratio, high preferred reinforcer, low preferred reinforcer

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INTRODUCTION

Autism spectrum disorder (ASD) poses significant challenges for individuals, families, and communities worldwide, with its prevalence steadily rising over the years (Maenner et al., 2023). According to recent statistics from the Center for Disease Control and Prevention (CDC), the prevalence of ASD has increased from 1 in 44 infants born in 2010 to 1 in 36 for those born in 2020 (Maenner et al., 2023). This trend underscores the urgent need for effective interventions to support individuals with ASD in achieving their full potential, which entails reaching a level of functional independence, social competence, and adaptive behavior that allows them to effectively navigate daily life and participate fully in society (Lord et al., 2020). Applied behavior analysis (ABA) has emerged as a widely recognized and evidence-based approach in addressing the core symptoms and behavioral challenges associated with ASD. ABA interventions focus on identifying and modifying behaviors through systematic assessment and intervention strategies, often incorporating the use of reinforcement to promote positive behavior change (Johnston et al., 2006).

Critical to the success of ABA interventions is the strategic utilization of reinforcers, which are stimuli or events that increase the likelihood of a target behavior recurring in the future (Johnston et al., 2006). The Behavior Analyst Certification Board (BACB®) emphasizes the importance of Stimulus Preference Assessment (SPA) methodologies by mandating clinical training and schoolwork for certified behavior analysts (Lill et al., 2021). SPA methodologies play an important role in identifying stimuli that are both motivating and effective for individuals with ASD. These methodologies, involving individual and paired presentations as well as concurrent arrangements, yield a relative ranking of stimulus preferences based on factors such as manipulation time or selection frequency (Lill et al., 2021). Such result indicates that highly preferred stimuli are more likely to function as effective reinforcers (Penrod et al., 2008). Highly preferred (HP) stimuli denote those with a higher likelihood of selection by clients or participants, whereas low preferred (LP) stimuli indicate a lower probability of selection (Roscoe et al., 1999). For example, in ten trials, if option A is selected eight times and option B is chosen two times, A would be considered an HP stimulus, whereas B would be categorized as an LP stimulus. By discerning an individual's preferences through preference assessments, practitioners can tailor intervention strategies to maximize engagement and foster meaningful outcomes (Lill et al., 2021). Among SPA methodologies, paired-choice (PC) preference assessments have been widely utilized to systematically determine relative preference rankings by presenting stimuli in pairs and recording selection frequencies (Fisher et al., 1992).

In the PC preference assessment, the individual is presented with pairs of items or activities and asked to choose their preference. This process is repeated multiple times with different pairs to systematically identify preferences (Basile et al., 2021). The paired choice preference assessment offers several advantages over other assessment methods. First, the paired choice assessment method is highly versatile and can be easily adapted to various settings and populations, making it suitable for a wide range of individuals with diverse needs and abilities (Basile et al., 2021). Additionally, the immediate feedback provided by the paired choice assessment fosters engagement and motivation in participants, possibly leading to more reliable and valid results (Basile et al., 2021). Moreover, it provides a direct comparison between two stimuli, allowing for a clear determination of preference without the need for complex analysis (Basile et al., 2021).

While existing studies consistently demonstrate the superiority of HP stimuli over LP stimuli in terms of reinforcing efficacy, some researchers have analyzed the effectiveness of LP stimuli in the absence of highly preferred alternatives (Cannella et al., 2005). In a study by Roscoe and colleagues (1999), the researchers extended previous studies of Fisher and colleagues (1992) and Pace and colleagues (1985) to assess reinforcer preferences in eight individuals with an intellectual disability. Phase 1 involved conducting preference assessments using both single-stimulus and paired-stimulus SPA. HP and LP stimuli were identified based on participant selections. Phase 2 evaluated the reinforcing effects of HP and LP stimuli using reversal designs under concurrent and single schedules of reinforcement. Results revealed a consistent preference for HP stimuli under concurrent schedules, but comparable response rates were found for LP stimuli under single schedules. This study highlights the potential utility of LP stimuli for maintaining therapeutic progress when highly preferred stimuli may not be available, even though LP stimuli alone may not guarantee overall therapeutic effectiveness.

While LP stimuli have been shown to function as reinforcers under low schedule requirements, their performance under increasing schedule demands remains uncertain (Penrod et al., 2008; Roane et al., 2001). Penrod et al. (2008) examined the effectiveness of LP stimuli as reinforcers under increasing schedule requirements, building upon previous research by Roane et al. (2001) that demonstrated LP stimuli had potential comparability with HP stimuli under dense schedules. The study involved four children diagnosed with various developmental disorders, and the researchers employed preference assessments using single-stimulus and paired-choice methods. Reinforcer assessments were subsequently conducted under fixed-ratio 1 (FR 1) and progressive-ratio (PR) schedules for both LP and HP stimuli. Results indicated that while LP stimuli sustained responding under both FR 1 and PR schedules, HP stimuli were generally more effective in maintaining responding, particularly as schedule requirements increased. Cumulative response analysis further illustrated differences in response patterns between LP and HP stimuli.

Specifically, under PR schedules, the differences in response patterns were evident in the breakpoints reached by the participants. Breakpoints for LP stimuli were lower compared to HP stimuli, indicating that participants were willing to exert more effort to obtain HP stimuli as reinforcement, which highlights the distinct value of stimuli in behavior maintenance.

The purpose of the current study was to expand upon the previous research conducted by Penrod and colleagues (2008) by assessing the efficacy of LP stimuli as reinforcers under PR schedules. While acknowledging the valuable contributions of Penrod et al. (2008), several distinct features differentiate their study from the current investigation. Penrod et al. (2008) included a heterogeneous participant group with varied diagnoses (e.g., ASD, Asperger's disorder, ADHD), employed novel or uncommon target responses to evaluate reinforcer efficacy, and conducted sessions in a highly controlled, experimental room setting. In contrast, this study adopts a more targeted approach by exclusively enrolling young children aged 2 to 5 diagnosed specifically with ASD, utilizes clinically relevant, developmentally appropriate responses, and conducts sessions in a naturalistic, community-based early intensive behavioral intervention setting. Additionally, this investigation focused specifically on commonly utilized edible reinforcers within clinical contexts, thereby providing practical insights directly applicable to everyday ABA practice. These methodological differences allow for greater ecological validity and generalizability of the findings to typical clinical settings and populations.

The current study investigates the effectiveness of low-preference (LP) and high-preference (HP) stimuli as reinforcers within Applied Behavior Analysis (ABA) interventions for young children diagnosed with ASD. Utilizing a multiple baseline design across participants and progressive-ratio (PR) schedules, this research aims to: (a) determine if LP stimuli can effectively maintain responding under increasing schedule requirements, and (b) evaluate potential differences in reinforcement efficacy and response patterns compared to HP stimuli. Additionally, this study explores how individual stimulus preferences, identified through paired-choice assessments, influence reinforcement potency within clinical contexts. This research lays important groundwork for ongoing refinements in reinforcement strategies and contributes to more individualized and effective ABA practices. Specifically, the study investigated the following research questions:

1. Do LP stimuli function effectively as reinforcers under progressively increasing schedule requirements for young children diagnosed with ASD?
2. How do response number and patterns under progressive-ratio schedules differ between LP and HP stimuli for young children with ASD?

METHOD

Participants and Setting

Three participants with a medical diagnosis of Autism Spectrum Disorder (ASD) were included in the study. All participants attended a community-based early intensive behavioral intervention (EIBI) program affiliated with a Midwestern university. Participants' skills and developmental levels were assessed using the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP). The VB-MAPP is a comprehensive assessment tool designed to measure verbal behavior, guide individualized instruction, and evaluate progress in individuals with ASD and developmental disabilities (Barnes et al., 2014). It evaluates performance across Skinner’s verbal operants at three developmental levels, providing insights into language, social skills, and pre-academic abilities.

Mario was a 4-year-old male diagnosed with ASD. On his most recent VB-MAPP Milestones Assessment, Mario scored 101.5 points, placing him primarily at Level 3, demonstrating emerging skills in areas such as reading, math, and group instruction. On the VB-MAPP Barriers Assessment, he scored 31, indicating significant barriers across multiple domains, including negative behaviors, instructional control, social skill deficits, generalization difficulties, weak motivators, and self-stimulation, all of which may interfere substantially with effective learning. Mario communicated primarily through vocal responses.

Amy was a 3-year-old female diagnosed with ASD. Her VB-MAPP Milestones Assessment yielded a total score of 39 points, placing her at Level 1, with emerging skills at Level 2 in areas like imitation and listener responding. On the VB-MAPP Barriers Assessment, Amy exhibited significant barriers including defective mand, tact, and listener skills, with moderate scores across multiple domains such as prompt dependency and weak motivators. Amy primarily communicated using vocal approximations, gestures, and limited echoic responses.

Alex was a 5-year-old male diagnosed with ASD. On his most recent VB-MAPP Milestones Assessment, Alex scored 28 points. His most recent VB-MAPP Barriers Assessment revealed moderate levels of barriers, including defective mand and tact skills, with relatively fewer issues in listener and social skills. Alex had been receiving ABA intervention consistently and communicated using PECS supplemented by visual supports.

Sessions occurred in a structured clinic environment resembling a classroom setting. Each participant worked individually at a child-sized table and chair within their clearly defined instructional area. The clinic setting accommodated eight children, each accompanied by one behavior technician to ensure one-to-one intervention. Sessions were conducted at each participant's designated workspace to maintain environmental consistency. The primary implementer was a second-year master's student in Applied Behavior Analysis, who had approximately one and a half years of supervised experience under a Board Certified Behavior Analyst within the same clinical environment.

Response Measurement

The primary dependent variable was the total number of independent responses per session. A response was defined as the participant independently placing a 0.5-inch puff ball into the designated translucent container through a 1-inch hole in the lid, without any physical or vocal prompting from the implementer. Only unprompted responses were counted, and the participant was only told what to do before the first response (e.g., "Put it in the jar.").

Each session continued until a predefined stopping criterion was met. Specifically, a session was terminated if the participant (a) engaged in any form of problem behavior (e.g., elopement, aggression, crying), (b) demonstrated a latency greater than 3 seconds between response opportunities, or (c) emitted a mand for any item or activity unrelated to the task. The total number of independent responses completed before the session ended was recorded as the session data point.

No continuous timing or trial-based intervals were used; instead, the outcome variable reflected the cumulative response total obtained under each progressive schedule requirement for a given stimulus.

Break Point

To evaluate the reinforcing efficacy of each stimulus, break points were recorded for both low-preference (LP) and high-preference (HP) conditions. A break point was defined as the highest completed response requirement under a given progressive-ratio (PR) schedule before session termination. Response requirements increased in fixed increments (e.g., FR 2, FR 4, FR 6, etc.), and participants had to complete the full required number of responses to access reinforcement.

If the participant stopped responding before completing the next ratio requirement due to the predefined stopping criterion described above, the last completed ratio requirement was recorded as that session's break point. For example, if a participant completed ratios of 2, 4, and 6 responses to access reinforcement, but failed to complete the next ratio of 8, the break point for that session was recorded as 6.

Interobserver Agreement and Procedural Fidelity

Interobserver Agreement (IOA) was assessed using a total-count method based on recorded video observations. Approximately 30% of sessions from each experimental condition were video-recorded, and a trained second observer independently viewed these recordings to tally the total number of independent responses per session. IOA was calculated by dividing the smaller total recorded by one observer by the larger total recorded by the other observer, then multiplying by 100 to obtain the agreement percentage. Mean IOA was 100% for Alex over 17 trails (17 out of 17), 89% for Mario over 9 recorded trails (8 out of 9), and 100% for Amy (17 out of 17). The overall IOA of all 43 recorded sessions is 98%.

To ensure consistent implementation of experimental procedures across sessions, procedural integrity (PI) checks were conducted by a secondary observer. The observer was a graduate student in the same ABA program, with approximately one and a half years of supervised experience within the same clinical setting. A procedural checklist was used to evaluate the primary implementer's adherence to the intervention protocol, including accurate delivery of instructions, reinforcement contingencies consistent with the progressive-ratio (PR) schedule, and application of session termination criteria (as Figure 2.). Observations were conducted by watching recorded sessions. The implementer achieved 100% accuracy across all items on the checklist during each integrity check, indicating a high level of procedural consistency. The use of an experienced, independent observer and structured fidelity criteria supports the internal validity of the findings and minimizes concerns regarding procedural drift.

Procedures

Preference Assessment

A paired-choice preference assessment was conducted prior to baseline to identify each participant's preference hierarchy for edible items. (See Figure 3.) Eight individualized edible items representing a variety of tastes and textures (e.g., snacks, fruits, desserts) were presented in pairs. Participants were instructed to choose their preferred item from each pair. Trials were repeated until each edible was paired with every other edible at least once, resulting in multiple trials for reliability. Participants' choices were tallied, and the two items selected most frequently (highest percentages of selection) were designated as HP stimuli, while the two least selected items (lowest percentages of selection) were classified as LP stimuli. Items not selected at all were categorized as non-preferred. If participants refused to select an item pair, they received a brief vocal prompt ("You can pick one") and the pair was re-presented. If non-selection persisted, the trial concluded, and the next pair was introduced. Paired-choice preference assessments were conducted weekly to continually ensure accurate identification and monitoring of participants' stimulus preferences.

Baseline

The purpose of the baseline phase was to establish each participant’s level of responding in the absence of reinforcement. During baseline sessions, the task materials (puff balls and container) were presented at the table. The implementer delivered an instruction (e.g., “Please put it in the jar”) at the beginning of the session. No reinforcers were provided contingent on responding, and no prompts were delivered. Sessions were terminated when the participant met one of the predefined stopping criteria. The total number of independent responses prior to session termination was recorded. Neutral statements such as “Thank you” were delivered at the end of the session. Sessions were typically conducted once daily throughout the study period; however, on no more than three occasions for one participant, two sessions were conducted within a single day.

PR Conditions

In the PR conditions, the purpose was to evaluate how many responses a participant would emit to gain access to LP or HP stimuli under progressively increasing response demands. Each session began with a neutral instruction similar to baseline. A PR schedule was implemented such that the number of required responses to earn a reinforcer increased in fixed increments (e.g., FR 2, FR 4, FR 6, FR 8, etc.). For example, under an FR 2 ratio, participants were required to independently place two puff balls into the container before immediately receiving the designated reinforcer (either LP or HP stimulus). After receiving reinforcement, the response requirement increased to the next predetermined ratio (e.g., FR 4), continuing until the participant met one of the predefined stopping criteria. The total number of responses completed during each session was recorded, and the highest successfully completed ratio requirement was logged as the break point for that session. PR condition sessions were typically conducted once daily throughout the study period.

Experimental Design

The study employed a multiple baseline design across participants to evaluate the effects of HP and LP conditions while controlling for threats to internal validity. Baseline measures were established for each participant and staggered across different time points before the introduction of the intervention. This approach ensured that behavior was assessed in the absence of experimental manipulation, providing a stable reference for comparison. Following baseline stability, all three participants were initially introduced to the LP condition. Once response patterns stabilized under LP reinforcement, participants transitioned to the HP condition. This staggered introduction of conditions across participants strengthened experimental control by demonstrating that observed behavior changes were attributable to the intervention rather than extraneous variables.

RESULTS

Figure one provides a comprehensive illustration of response patterns for participants Alex, Mario, and Amy across baseline (BL), low-preference progressive ratio (LPPR), and high-preference progressive ratio (HPPR) conditions. Additionally, break points for each condition were recorded and analyzed to further evaluate reinforcer efficacy.

Alex exhibited consistently low and relatively stable response counts during baseline, averaging approximately two responses per session (range: zero to seven responses). Upon introduction of the LPPR condition, response counts remained low, fluctuating minimally between zero and five responses per session, with a mean of approximately one response per session. When the HPPR condition was introduced, response counts notably increased and stabilized, consistently ranging between two to 59 responses per session, with an average of approximately 14 responses per session. Alex's break points averaged FR 2 in the LPPR condition and increased to FR 4 under the HPPR condition, demonstrating a moderate enhancement in reinforcement efficacy with high-preference stimuli.

Mario initially demonstrated moderate response counts during baseline, ranging from six to 23 responses per session with a mean of 13 responses. The introduction of the LPPR condition led to substantial increases in responses, yet considerable variability remained, ranging widely from four to 112 responses per session (M = 50). Subsequently, the HPPR condition resulted in a significant increase in responses accompanied by enhanced stability (range: 121–212 responses per session, M = 167). Mario's break points increased from FR 8 in the LPPR condition to FR 16 in the HPPR condition, indicating a substantial improvement in response persistence when high-preference reinforcers were used.

Amy displayed a decreasing trend in responses during baseline, gradually declining from 14 to four responses per session (M = 9). The introduction of the LPPR condition prompted modest and highly variable increases, ranging from two to 52 responses (M = 21). However, when the HPPR condition was introduced, response counts increased substantially, consistently remaining elevated (range: 24–51 responses per session, M = 32). Amy reached an average break point of FR 6 in the LPPR condition and FR 8 in the HPPR condition, suggesting increased reinforcement potency of high-preference stimuli even under higher response demands.

DISCUSSION

The present study evaluated the reinforcing effectiveness of HP and LP stimuli under progressive-ratio schedules for young children diagnosed with ASD. Findings indicate clearly differentiated response patterns across HP and LP conditions, demonstrating that HP stimuli generally resulted in greater and more stable responding compared to LP stimuli. Importantly, LP stimuli maintained responding, albeit at lower and more variable levels. The results of this study align with previous studies, which also found that while HP stimuli were generally more effective at response persistence, LP stimuli may still function as reinforcers, highlighting the conditional efficacy of LP stimuli (Penrod et al., 2008; Roane et al., 2001).

This study uniquely expands upon previous research by specifically targeting young children aged 2–5 years diagnosed exclusively with ASD within a naturalistic, community-based clinical setting. The use of naturalistic environments is critical for increasing ecological validity and generalizability, thus directly informing everyday ABA practice. Conducting studies in realistic clinical settings addresses the gap between tightly controlled laboratory results and the practical implementation challenges practitioners frequently encounter (Cannella et al., 2005; Penrod et al., 2008).

Each participant exhibited unique patterns of responding, underscoring the necessity for individualized assessments and interventions. Alex's minimal responding during LP conditions emphasizes the importance of precise stimulus selection, supported by rigorous individualized preference assessments. The substantial increase in responding observed under HP conditions clearly illustrates the necessity of identifying and employing highly preferred reinforcers to optimize therapeutic outcomes. Utilizing HP stimuli consistently enhances both the effectiveness and efficiency of interventions, reducing behavioral variability and enhancing session stability (Fisher et al., 1992; Roscoe et al., 1999).

Mario’s data offer robust evidence of differential reinforcer efficacy between LP and HP stimuli. While sessions under LPPR conditions did lead to increased responding overall, the pattern was inconsistent, and one session showed a dramatic spike with over 100 responses. This irregularity may reflect short-term factors such as heightened motivation, incidental deprivation, or an unusually reinforcing context tied to the LP item on that day. In contrast, the HPPR condition produced not only higher overall response levels but also more stable performance across sessions. This finding demonstrates that HP stimuli not only sustain higher levels of responding but also improve predictability, an essential consideration for structured clinical environments where consistency is critical (Roane et al., 2001). As a result, practitioners are advised to prioritize HP stimuli during interventions involving high response demands to maximize therapeutic efficacy (Roane et al., 2001).

Amy’s results further illuminate the complexities inherent in individualized responsiveness to reinforcement. The initial variability observed with LP stimuli suggests limitations inherent to standard preference assessments, potentially failing to capture subtle or moment-to-moment shifts in stimulus preference (Perry & Fisher, 2001). The stability and elevated responding observed under HP conditions further highlight the necessity of individualized reinforcement assessments. To enhance sensitivity and responsiveness to shifts in preferences, practitioners should consider adopting other assessment protocols such as the multiple-stimulus-without-replacement (MSWO) assessment, enabling quicker and potentially more accurate identification of preferred stimuli (Basile et al., 2021).

These findings affirm the utility and methodological importance of paired-choice preference assessments in predicting reinforcer effectiveness accurately (Fisher et al., 1992). Nevertheless, paired-choice methods have limitations, including being time-consuming and potentially causing participant fatigue, particularly among young children or individuals with short attention spans (Basile et al., 2021). Practitioners may therefore benefit from integrating more rapid assessment methodologies, such as MSWO, alongside paired-choice assessments to enhance efficiency and accuracy in identifying reinforcers.

Future research should further investigate longitudinal effects, varied response-effort conditions, and competing reinforcement contingencies to refine reinforcement strategies. Given that individual preferences may shift more frequently than traditional weekly or monthly assessments can detect, shorter and more efficient procedures should be developed to capture these changes in real time. Implementing such methods would allow practitioners to dynamically adjust reinforcement strategies, improving the precision and individualization of ABA interventions.

Several limitations within this study should also be recognized. Firstly, although the multiple baseline design offered strong internal validity, an alternating treatments design may have allowed for more direct within-subject comparisons of LP and HP conditions. Additionally, the selected task of placing puff balls into a jar was chosen primarily for consistency and simplicity across participants, but it lacked functional relevance. Using more naturalistic or socially significant tasks in future research may yield findings that are more directly applicable to everyday therapeutic settings. Additionally, the PR schedule increments selected (e.g., FR 2, FR 4, etc.) aimed to expedite reaching the breakpoint; however, this increment strategy may inadvertently result in minimal or no responding, particularly in conditions involving LP stimuli.

This study assessed the effectiveness of high- and low-preference stimuli as reinforcers under progressively increasing schedule demands within a clinical context. The findings demonstrated that high-preference stimuli consistently produced higher and more stable response rates, although low-preference stimuli also displayed reinforcing potential under certain circumstances. These results contribute to the expanding literature supporting tailored and adaptable reinforcement methodologies in early intensive behavioral interventions for children with ASD. Identifying both strengths and limitations of LP and HP stimuli within practical settings provides valuable insights for behavior analysts aiming to optimize intervention outcomes across diverse clinical scenarios.

REFERENCES

Barnes, C. S., Mellor, J. R., & Rehfeldt, R. A. (2014). Implementing the verbal behavior milestones assessment and placement program (VB-MAPP): Teaching assessment techniques. The Analysis of Verbal Behavior, 30(1), 36–47. https://doi.org/10.1007/s40616-013-0004-5

Basile, C. D., Tiger, J. H., & Lillie, M. A. (2021a). Comparing paired-stimulus and multiple-stimulus concurrent-chains preference assessments: Consistency, correspondence, and efficiency. Journal of Applied Behavior Analysis, 54(4), 1488–1502. https://doi.org/10.1002/jaba.856

Cannella, H., O'Reilly, M., & Lancioni, G. (2005b). Choice and preference assessment research with people with severe to profound developmental disabilities: A review of the literature. *Research in Developmental Disabilities*, *26*(1), 1–15. https://doi.org/10.1016/j.ridd.2004.01.006

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

Johnston, J. M., Foxx, R. M., Jacobson, J. W., Green, G., & Mulick, J. A. (2006). Positive behavior support and applied behavior analysis. The Behavior Analyst, 29(1), 51–74. https://doi.org/10.1007/bf03392117

Lill, J. D., Shriver, M. D., & Allen, K. D. (2021). Stimulus preference assessment decision-making system (SPADS): A decision-making model for practitioners. *Behavior Analysis in Practice*, *14*(4), 1144–1156. https://doi.org/10.1007/s40617-020-00539-3

Lord, C., Brugha, T. S., Charman, T., Cusack, J., Dumas, G., Frazier, T., Jones, E. J., Jones, R. M., Pickles, A., State, M. W., Taylor, J. L., & Veenstra-VanderWeele, J. (2020). Autism spectrum disorder. Nature Reviews Disease Primers, 6(1). https://doi.org/10.1038/s41572-019-0138-4

Maenner, M. J., Warren, Z., Williams, A. R., Amoakohene, E., Bakian, A. V., Bilder, D. A., Durkin, M. S., Fitzgerald, R. T., Furnier, S. M., Hughes, M. M., Ladd-Acosta, C. M., McArthur, D., Pas, E. T., Salinas, A., Vehorn, A., Williams, S., Esler, A., Grzybowski, A., Hall-Lande, J., … Shaw, K. A. (2023). Prevalence and characteristics of autism spectrum disorder among children aged 8 years — autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2020. *MMWR. Surveillance Summaries*, *72*(2), 1–14. https://doi.org/10.15585/mmwr.ss7202a1

Pace, G. M., Ivancic, M. T., Edwards, G. L., Iwata, B. A., & Page, T. J. (1985a). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. Journal of Applied Behavior Analysis, 18(3), 249–255. https://doi.org/10.1901/jaba.1985.18-249

Penrod, B., Wallace, M. D., & Dyer, E. J. (2008). Assessing potency of high- and low-preference reinforcers with respect to response rate and response patterns. *Journal of Applied Behavior Analysis*, *41*(2), 177–188. https://doi.org/10.1901/jaba.2008.41-177

Perry, A. C., & Fisher, W. W. (2001). Behavioral economic influences on treatments designed to decrease destructive behavior. *Journal of Applied Behavior Analysis*, *34*(2), 211–215. https://doi.org/10.1901/jaba.2001.34-211

Roscoe, E. M., Iwata, B. A., & Kahng, S. (1999). Relative versus absolute reinforcement effects: Implications for preference assessments. *Journal of Applied Behavior Analysis*, *32*(4), 479–493. https://doi.org/10.1901/jaba.1999.32-479

Roane, H. S., Lerman, D. C., & Vorndran, C. M. (2001). Assessing reinforcers under Progressive Schedule Requirements. *Journal of Applied Behavior Analysis*, *34*(2), 145–167. https://doi.org/10.1901/jaba.2001.34-145

APPENDIX A:

THE NUMBER OF RESPONSE DURING BASELINE AND PR SESSIONS WITH HP AND LP REINFORCERS

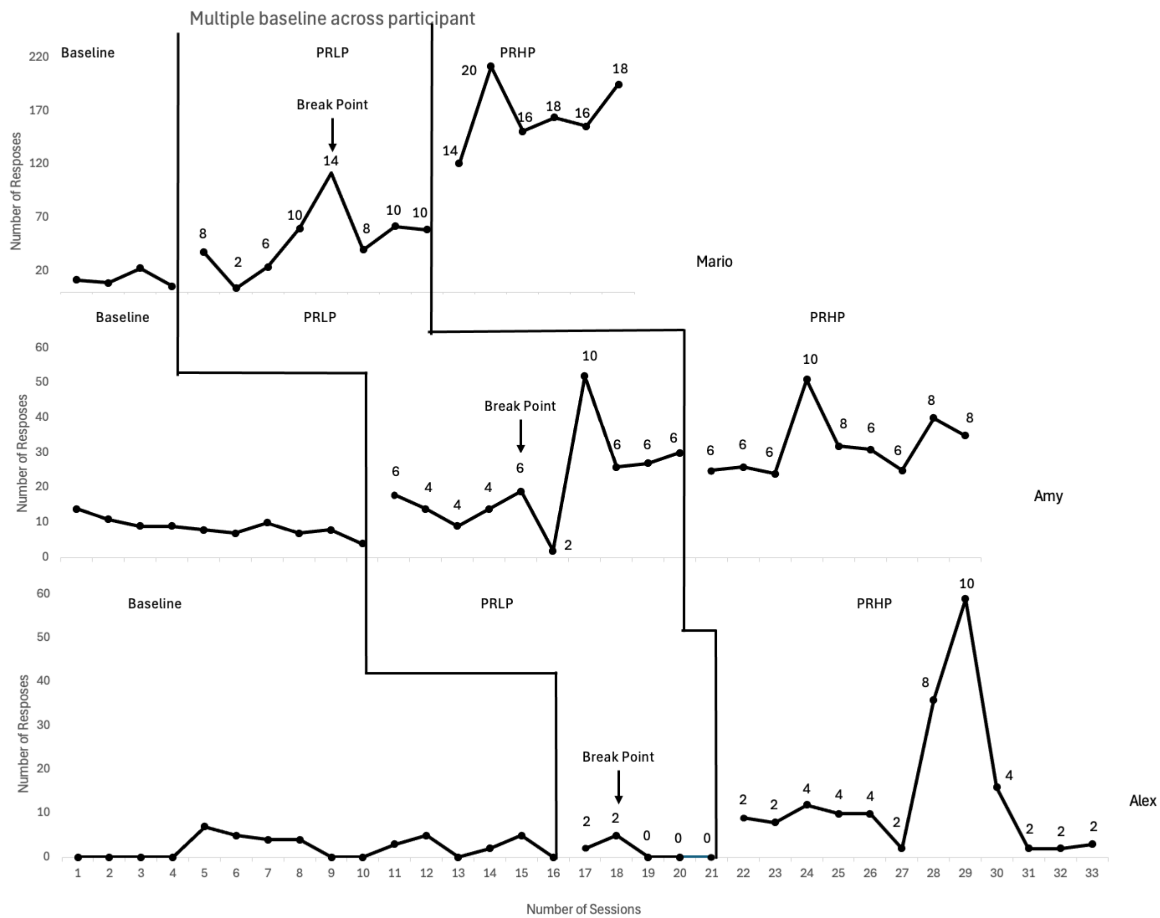

Figure 1 Multiple baseline across participant data for the number of response during baseline and pr sessions with HP and LP reinforcers

APPENDIX B:

PROCEDURAL INTEGRITY CHECKLIST

Step	Procedure Component	(✓/✗)	Notes
1	Materials (puff balls and container) prepared before session starts		
2	Correct reinforcer (HP or LP) prepared and available		
3	Session begins with showing the participant what they are working for		
4	First response requirement presented correctly (starts at FR2)		
5	Implementer delivers reinforcer **immediately** after correct ratio completed		
6	Ratio requirement increases accurately per schedule (e.g., FR2 → FR4 → FR6...)		
7	No prompts provided during session		
8	No reinforcement delivered for incorrect or incomplete data responses		
9	Session ended only when stopping criteria met: – 3s response pause – problem behavior – mands for unrelated items		
10	Break point accurately recorded (last fully completed ratio before termination)		
11	Implementer uses neutral closing statement (e.g., "Thanks, we're all done.")		

Overall: /11

Figure 2 Procedural integrity checklist used to assess participant's implementation of responses

APPENDIX C:

PAIRED CHOICE PREFERENCE ASSESSMENT DATASHEET

Paired Choice Preference Assessment Datasheet

Client Name	Assessor Name	Date & Time

Items	1	2	3	4	5	6	7	8

Instructions: Present each of the pairs of stimuli below and circle the number of the item selected by the client. If no item selected, cross out both numbers in the pair

Trial 1		Trial 2		Trial 3		Trial 4		Trial 5	
L	R	L	R	L	R	L	R	L	R
1	5	7	2	2	8	1	8	5	6
2	6	8	3	3	5	2	5	1	2
3	7	5	4	4	6	3	6	7	8
4	8	6	1	1	7	4	7	3	4

Trial 6		Trial 7		Trial 8		Trial 9		Trial 10	
L	R	L	R	L	R	L	R	L	R
5	7	4	1	1	4	7	5	6	5
6	8	3	2	2	3	8	6	2	1
1	3	8	5	5	8	3	1	8	7
2	4	7	6	6	7	4	2	4	3

Trial 11		Trail 12		Trail 13		Trial 14		TOTALS	
L	R	L	R	L	R	L	R		
8	1	8	2	2	7	5	1	1	5
5	2	5	3	3	8	6	2	2	6
6	3	6	4	4	5	7	3	3	7
7	4	7	1	1	6	8	4	4	8

Figure 3 paired choice, preference assessment, data sheets, used to assess participants, high and low preferred similes

APPENDIX D:

DATA COLLECTION MATERIALS

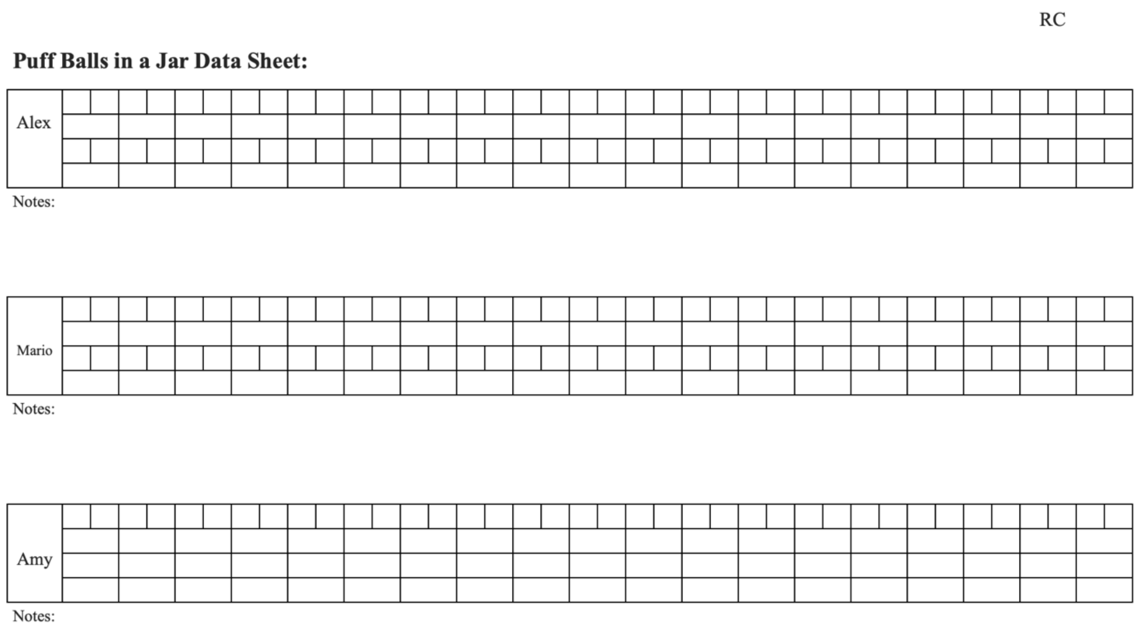

Figure 4 Data collection sheets for dependent variables