

3-16-2022

Case Study: Evaluating the Impact of Preference on the Efficacy of the High Probability Instructional Sequence

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Case Study: Evaluating the Impact of Preference on the Efficacy of the High Probability
Instructional Sequence

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
Department of Applied Behavior Analysis
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Date of Approval:
March 17, 2022

Keywords: High-P, Low-P, HPRS, autism

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DEDICATION

I dedicate this manuscript to my parents Randy and Kathryn Torres, my future husband Daniel Galindo and my little brother Chandler Torres. Thank you for sticking around through all the stressful tears this thesis and the ABA Master's program brought the last two years. A special thank you to Daniel, as he took me on many Twistee Treat runs while I cried, took me on weekend trips for a mental vacation and watched many movies alone while I worked next to him. I would also like to thank my Black Mouth Cur puppy, named Cooper, for all the midnight cuddles while I worked countless hours to finish my manuscript and school projects. Lastly, thank you to Jacy Carr for letting me rant for countless hours about my thesis and being one of the best mentors I could have asked for. I cannot tell you all, how thankful I am to have had you by my side throughout this long process.

ACKNOWLEDGEMENTS

Due to the COVID-19 pandemic the thesis requirements for students graduating from the USF ABA program in 2022 has been modified and may include fewer participants, case studies or literature review.

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ABSTRACT

Non-compliance is a common behavior amongst children with ASD (Esch & Fryling, 2013). Non-compliance is known to have multiple negative consequences, including the hinderance of acquisition of skills which then can result in academic and social deficits (Belfiore et al., 2008; Esch & Fryling, 2013; Lee et al., 2006). Therefore, the purpose of this study was to compare two high-probability instructional sequence (HPIS) conditions, one in which highly preferred high-probability instructions (High-P) were included in the HPIS and another in which the HPIS included non-preferred High-P instructions. Furthermore, this study used a questionnaire to assess sociality validity of HPIS from caregivers and clinicians.

- HPIS was effective with a 6-year-old child diagnosed with autism spectrum disorder
- Each HPIS sequence included three high-probability and one low-probability instruction
- Preference for the high-probability instruction impacted impact outcomes
- Clinician rated both HPIS interventions as socially valid and effective

CHAPTER ONE:

INTRODUCTION

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychological Association, 2013), people with autism spectrum disorders (ASD) have deficits in social communication and social interaction (e.g., functional communication and eye contact) and engage in restricted or repetitive behaviors (e.g., stereotypy and scripting). Non-compliance is a common behavior amongst children with ASD (Esch & Fryling, 2013). Kalb and Loeber (2003) defined non-compliance as actively or passively not completing a request made by a caregiver or other adult within a specific time frame. Non-compliance can have multiple negative consequences including hindering the acquisition of skills which can then result in academic and social deficits (Belfiore et al., 2008; Esch & Fryling, 2013; Lee et al., 2006).

Alternatively, learning to follow instructions (i.e., compliance) can have many potential benefits such as a decrease in maladaptive behaviors (e.g., Cataldo et al., 1986) and increasing overall compliance (Banda & Kubina, 2006). Branda & Kubina (2006) evaluated the use of HPIS with a middle-school aged participant who had autism. In this study HPIS decreased the latency between transitioning to a task and the frequency of prompts to transition. Furthermore, the teacher reported that the participant became more compliant overall which ended up resulting in a better teacher-student relationship. Given that an increase in compliance can possibly decrease maladaptive behaviors and improve relationships, effective treatment of non-compliance in persons with ASD or other developmental disorders is crucial.

The HPIS is a common intervention used for improving compliance and decreasing escape-maintained challenging behaviors (Cooper et al, 2019). The HPIS intervention consists of the presentation, in a rapid succession, of a series of high-probability instructions (High-P) and usually one low-probability instruction (Low-P) (Wood et al., 2018). Instructions with which an individual has a history of non-compliance with are referred to as a Low-P instruction (Bross et al., 2018; Cooper et al, 2019). For instance, in previous studies Low-P instructions were defined as those associated with a history of compliance on 40% or fewer opportunities (e.g., Mace et al., 1988). The High-P instructions, on the other hand, are instructions that are easy to follow and that are associated with a history of compliance prior to the implementation of HPIS (Cooper et al, 2019). Specifically, High-P instructions have been described as those with a history of compliance on 80% or more of the opportunities (Mace et al., 1988). In addition, during a HPIS implementation reinforcers are delivered contingent on compliance to both the High-P and Low-P instructions (Wood et al., 2018).

Previous research on HPIS has studied various iterations of the HPIS including, but not limited to, various ratios of High-P to Low-P requests (e.g., Planner et al., 2018), quality of reinforcers provided for compliance (e.g., Wilder et al. 2015), whether or not consequences were provided for compliance (e.g., Pitts & Dymond, 2012; Wilder et al. 2015), the topographies of instructions (e.g., matched vs unmatched High-P and Low-P instructions; Lipschultz et al., 2018; Trejo & Fryling, 2018). Results of previous studies indicate that HPIS with variable ratios resulted in higher rates of compliance than fixed ratio (e.g., Planner et al., 2018), using HPIS programmed reinforcement and high-quality reinforcers was more successful than using HPIS without programmed reinforcement and low-quality reinforcers (Wilder et al., 2015). Furthermore, results of previous studies have indicated that the topography of the High-P

instruction did not affect the effectiveness of HPIS in increasing compliance (Lipschultz et al., 2018; Trejo & Fryling, 2018).

In a previous research study, Lipschultz et al. (2018) indicated that a possible factor affecting compliance with Low-P instructions is the relative preference for the High-P instructions used within the HPIS. However, we have not located any study that has evaluated the impact of preferred and non-preferred High-P on the efficacy of HPIS. Therefore, the purpose of this study is to evaluate the impact of preference on the efficacy of HPIS. Specifically, this study compared two HPIS conditions, one included High-Ps that are highly preferred and another in which the High-Ps will be non-preferred. Furthermore, this study included social validity measures attained from participants, caregivers, and clinical staff (i.e., BCBAAs).

CHAPTER TWO:

METHOD

Participants, Setting, and Materials

This study included one participant named Danny. Danny was a white 6-year-old male, diagnosed with autism spectrum disorder, who had been receiving ABA services for three years. To determine if Danny met the inclusion criteria, we interviewed his caregivers to gather information about his age, history of behaviors and services, etc. In addition, data from the first two sessions of the compliance assessment were evaluated to determine if the Danny followed simple instructions. These assessments indicated that Danny had a history of non-compliance with at least two tasks, could choose between two stimuli, and had a history of completing instructions. This study also included the board-certified behavior analyst (BCBA®) responsible for Danny's clinical programming. This BCBA® completed a social validity assessment. Sessions were completed in a room at the clinic where the Danny was receiving applied behavior analysis (ABA) services. Sessions were approximately 30 min and conducted multiple times per week (1-4 times per day, 1-5 days per week), depending on the Danny's availability. Materials for data collection included data sheets, pens. A video recording device (laptop, video camera or phone) was used to record sessions to collect interobserver agreement (IOA) and assess procedural integrity (PI). Other materials included preferred items (i.e., edibles) that were used as consequence for compliance and any materials needed for the Danny to complete the target tasks (i.e., High-P, Low-P tasks). Rooms used for sessions contained at least one table, a small slide and two chairs.

Dependent Measurements and Design

The primary dependent measure in this study was compliance to instructions. For this study compliance was defined as initiating the requested instruction within 5 s of a researcher presenting the verbal instruction and completing the task (e.g., putting a toy in the bin and not just picking it up). Compliance was measured on trial-by-trial basis and summarized as percentage of opportunities with compliance per session. During baseline, each session consisted of 10 presentations of the target Low-P instructions. During the HPIS intervention, the number of opportunities per session to comply with the Low-P differed due to trials ending due to non-compliance occurring during the HPIS. Therefore, data were summarized based on opportunities (i.e., how many times the Low-P was presented) and based on the actual trials of the session (i.e., 10 trials total). Data on compliance were recorded during the compliance assessment and during the HPIS evaluation.

Prior to each intervention session, during the preference assessment and during the concurrent chain preference assessment data were also collected on stimulus selection at the beginning of each intervention session during a preference assessment and during the concurrent chain preference assessment. Stimulus selection was defined as the Danny selecting (e.g., pointing to, picking up) and item from the stimuli presented within 5 s of the instruction, “choose one”. In the case of the preference assessment completed with edibles, Dannels also had to consume the item. Data from the preference assessment was summarized as the percentage of opportunities chosen.

Trained research assistants (RAs) assisted in data collection for both interobserver agreement (IOA) and procedural integrity (PI). All RAs were students currently enrolled in a graduate program at the University of South Florida (USF). IOA and PI were taken on all phases

of the study. IOA was calculated using the trial-by-trial method. To assess PI, RAs circled “YES” for each step that the researcher implemented correctly and “NO” for each step that the researcher either implemented incorrectly or not at all.

During the compliance assessments IOA and PI were taken for 50% of sessions across. For the compliance assessments the mean IOA score was 93% (range, 90 -95%) and the mean PI score was 100%. For the preference assessments IOA and PI were taken 67% of sessions; the mean IOA and PI scores were 100%. During the HPIS evaluation IOA and PI were collected for 33% of the baseline sessions; the mean IOA score was 93% (range, 90-100%) and the mean PI score was 100%. Additionally, IOA and PI were collected for 18% of intervention sessions; the mean IOA was 99% (range, 98-100%) and the mean PI score was 100%.

An AB design with an alternating treatment design was used to assess if Danny’s preference of HPIS sequence impacted the effectiveness of the HPIS intervention.

CHAPTER THREE:

PROCEDURE

Pre-Assessments

Phase one of this study consisted of interviews and assessments to determine if the study had contextual fit for a client. This phase included an interview with the caregiver, compliance assessments, and preference assessments. These were conducted before the implementation of the HPIS intervention.

Once consent was attained from a caregiver interview was conducted. During this interview demographic information for Danny was collected such as age, race and ethnicity, any diagnosis, current services, and information on Danny's history of compliance/non-compliance for tasks. Tasks identified during this assessment included but are not limited to cleaning up toys, tracing, giving a high-five, etc.

Low-P and High-P instructions were identified using the information provided by caregivers during the caregiver, and then then these instructions were empirically assessed. During each trial of the compliance assessment the researcher ensured attending (e.g., Danny makes eye contact) and then they presented one instruction to the Danny and recorded compliance or noncompliance. If Danny did not comply (i.e., did not initiate the task within 5 s, or if initiated the tasks but did not complete it) with the instruction, the experimenter immediately ended the trial and a "-" was recorded. If Danny complied with the task to a "+" was recorded. Instructions associated with compliance on 40% or fewer trials were deemed as a Low-P whereas instructions with at least 70% of compliance were classified as High-P. For

Danny at least four Low-P instructions (i.e., two motor and two vocal instructions) and 20 High-P instructions (i.e., 10 motor and 10 vocal instructions) were identified and Low-P and High-P instructions were matched regarding the response modality emitted by Danny (i.e., vocal or motor responses).

Two paired-stimulus preference assessment were also conducted following the procedures described by Fisher et al. (1992); one included edible items and another the High-P instructions identified during the compliance assessment. During the assessment the stimuli were paired with another at least twice with placement of the stimuli counterbalanced across trials. If Danny attempted to take both stimuli, the researcher blocked access and then presented the trial again. If Danny did not select any of the stimuli within 5 s of the onset of the trial, the stimuli were removed for approximately 5 s and then the same trial was represented one time. After Danny made a selection, the non-selected stimulus was removed, and the Danny consumed the chosen stimulus. Instructions selected on approximately 70% of the opportunities or above were deemed highly preferred and used during preferred condition. Stimuli selected during approximately 50% or fewer of the opportunities were deemed non-preferred and used during the low preferred condition. Any stimuli that were not selected during any opportunities or only selected once were not included during the HPIS evaluation.

HPIS Evaluation

The HPIS evaluation phase consisted of baseline and intervention phases. The intervention phase consisted of two conditions Danny's preferred instructions (P) and non-preferred instructions (NP). Sessions were conducted in a similar manner as the compliance assessment expect for the differences described here and thereafter. To ensure the Low-P instructions assigned to each condition were similar in difficulty, two Low-P instructions that

were associated with similar levels of compliance during the compliance assessment (i.e., no more than approximately 15% difference) and that required a similar response effort from Danny (e.g., same number of steps to complete the tasks, same distance to move) were selected, and after baseline data were collected, they were randomly assigned to one of the two experimental conditions. Inter-trial intervals for all sessions during baseline and intervention were 1 min. For Danny the Low-P instructions used consisted of “give me” a preferred item ($M = 33\%$ compliance) and “clean up” ($M = 15\%$) a preferred item. Compliance for the instruction “give me” consisted of the Danny initiating the task within 5s and handing/placing at least one item that was in his possession to/near the researcher (e.g., Danny placed a toy bug in the researcher’s hand or placed it within 15 cm of the researcher and moved his own hand away from the stimulus). Compliance for the instruction “clean up” consisted of Danny initiating the task within 5s and putting away at least one item that was in his possession into another stimulus (e.g., Danny puts a toy car in a box) into a bin. Both instructions required Danny to relinquish the stimulus that was in his possession (i.e., in his hand at that moment and prior to the onset of the HPIS) to either a researcher or to a box placed within 0.6 meters from him when the instruction was given and only required 1-2 steps to complete (e.g., picking up the toy in front of him and placing into the box; giving item in his hand to researcher).

Baseline. During baseline there were no programmed consequences for compliance or noncompliance to the Low-P instructions. Each baseline session consisted of 10 presentations (i.e., trials) of a Low-P instruction. Four baseline sessions were completed for each instruction. Then data were evaluated. If compliance occurred at low and stable level or at a decreasing trend, the HPIS intervention was introduced. Only one Low-P instruction was presented per session.

Intervention. The intervention phase included two experimental conditions, Danny's highly preferred and low preferred instructions. Prior to each session, sequences of High-P and Low-P instructions were created using preferred or non-preferred High-P instructions. To create the HPIS the researcher presented the picture cards for all the High-P instructions for the corresponding condition and instructed Danny to select three High-P instructions (e.g., "please choose from these tasks"). Then, the researcher instructed Danny to place those pictures on a sequence card (e.g., "choose three tasks you want to do today and put them here"). Verbal prompts (e.g., "pick another one") were presented until Danny selected three High-P instructions and placed them on the sequence card. Praise was delivered for compliance with the instructions (e.g., "nice job picking a card"). Each HPIS consisted of the presentation of three High-P instructions from the appropriate sequence in rapid succession (no more than 5 s after compliance with the previous High-P instruction). Compliance with each the High-P instructions resulted in a brief praise statement (e.g., "great job") and preferred edible. High-P instructions were presented until Danny complied with three consecutive High-P instructions; then a Low-P instruction was presented, within 5 s of compliance with the last High-P instruction. Low-P instruction was specific to the condition and the item that Danny had in his hand at the time of the first instruction of the HPIS (e.g., if Danny was playing with a toy train at the beginning of

the HPIS then he would receive the statement “Danny give me the train”). If Danny complied with the Low-P request, the experimenter delivered praise and preferred edible; then the HPIS trial ended. If Danny failed to comply with the Low-P request, the trial also ended. If at any point during the trials Danny did not comply with one of the High-P instructions, the trial ended immediately and the trial was not represented; instead, another trial began after 1 min elapsed since the end of the previous trial. Each session consisted of 10 actual or initiations of the HPIS (i.e., same sequence of High-P and Low-P instructions, presented in the order selected by Danny). However, because non-compliance with the High-P instruction resulted in termination of the HPIS, during some trials the Low-P instruction was not presented. Mastery criteria consisted of three sessions across two days with at least eight opportunities to engage in compliance with the Low-P instruction and 100% compliance.

Preferred High-P Instruction. Prior to start of the session, Danny was prompted to select High-P instructions from the preferred list of High-P instructions to create the HPIS. For Danny, these instructions included, “go down slide”, “give me bus stop”, “give me ice cream”, and “give me flower”.

Non-Preferred High-P Instruction. Prior to starting of the session, Danny was prompted to select High-P instructions from the non-preferred list of High-P instructions to create the HPIS. For Danny these instructions included “clap hands”, “which one is A”, “match”, and “show me a specific animal”

Social Validity. This study also attained social validity data from Danny’s BCBA[®]. The BCBA[®] completed a 10-item questionnaire in which a Likert-scale was used for all but one question. Prior to the completing the questionnaire the researcher explained the HPIS procedures included in this study and showed the BCBA[®] a clip of baseline and the final intervention

session of each condition and the graph in which compliance was scored based on opportunities that the Low-P was presented. Questions included but were not limited to “I believe non-compliance is a behavior that should be addressed” and “which condition appeared to increase compliance to higher levels more rapidly?” The average score for the social validity questionnaire completed by the BCBA[®] was a 5. For the question “which condition appeared to increase compliance to higher levels more rapidly” the BCBA[®] reported the preferred condition.

CHAPTER FOUR:

RESULTS

Results for Danny are displayed in Table 1 and Figures 1-2. Result for the compliance assessments for Danny are the following. A total of ten High-P instructions were identified for both motor and vocal modality of instructions. Additionally, a total of two Low-P instructions were identified for motor instructions (“give me” and “clean up”) but no Low-P instructions were identified for vocal instructions. Figure 1 depicts the results of Danny’s preference assessment. Danny’s highest preferred edible were M&Ms (83%) and Airhead Bites (67%) and the High-P instructions identified as preferred were “go down slide” (100%), “give me picture of bus stop” (100%), “give me picture of ice cream” (75%), and “give me picture of flower” (75%). Figure 2 depicts the hypothetical results of Danny’s HPIS intervention on Low-P compliance. Low levels of compliance with the Low-P instructions (“give me”, “clean up”) were observed during baseline. Percentage of compliance for the Low-P instruction “clean up” during baseline ranged from 0% to 20% ($M=8%$) and compliance for the Low-P instruction “give me” during baseline ranged from 40% to 10% ($M=20%$). Relative to baseline, both HPIS sequences increased compliance to Low-P instructions quickly. For the non-preferred condition, during the HPIS phase compliance to the Low-P instruction ranged from 0% to 100% ($M=76%$) based on opportunities that the Low-P was presented and 0% to 100% ($M=55%$) based on 10 trials. For the preferred condition, during the HPIS phase compliance to the Low-P instruction ranged from 0% to 100% ($M=55%$) based on opportunities that the Low-P was presented and 0% to 100%

($M=58\%$) based on 10 trials. Additionally, mastery criterion was met in the preferred condition in 8 intervention sessions whereas the non-preferred condition required 15 sessions.

Table 1
High-P and Low-P included in the Compliance Assessment for Danny

Instruction	M	Instruction	M
Motor High-P		Vocal High-P	
<i>Touch nose</i>	100%	<i>Count to 10</i>	100%
<i>Match</i>	100%	<i>What color are my shoes</i>	100%
<i>Give me picture of ice-cream</i>	100%	<i>What does a cow say</i>	80%
<i>High-5</i>	100%	<i>How old are you</i>	80%
<i>Clap hands</i>	100%	<i>A... B... C... _____</i>	80%
<i>Give me picture of flower</i>	100%	<i>What color is your shirt</i>	80%
<i>Give me bus stop</i>	100%	<i>What animal says baa</i>	80%
<i>Give me picture of A</i>	100%	<i>What is your dad's name</i>	80%
<i>Give me picture of animal</i>	100%	<i>What is that</i>	80%
<i>Slide down slide</i>	100%	<i>What is your name</i>	75%
Motor Low-P		Excluded Vocal Instructions	
<i>Clean up</i>	15%	<i>What letter is this</i>	75%
<i>Give me toy</i>	33%	<i>Are you wearing shoes</i>	75%
Excluded Motor Instructions		<i>What is my name</i>	20%
<i>Write name</i>	83%	<i>What is outside</i>	0%
<i>Show me the body part that chews</i>	80%	<i>What sound does B make</i>	0%
<i>Show me picture of winter</i>	80%	<i>Tell me seasons</i>	0%
<i>Come to table</i>	80%		
<i>Arms up</i>	80%		
<i>Do puzzle</i>	75%		
<i>Give me picture of firefighter</i>	50%		
<i>Which letter says ah</i>	40%		
<i>Make me a tower</i>	33%		
<i>Trace line</i>	0%		

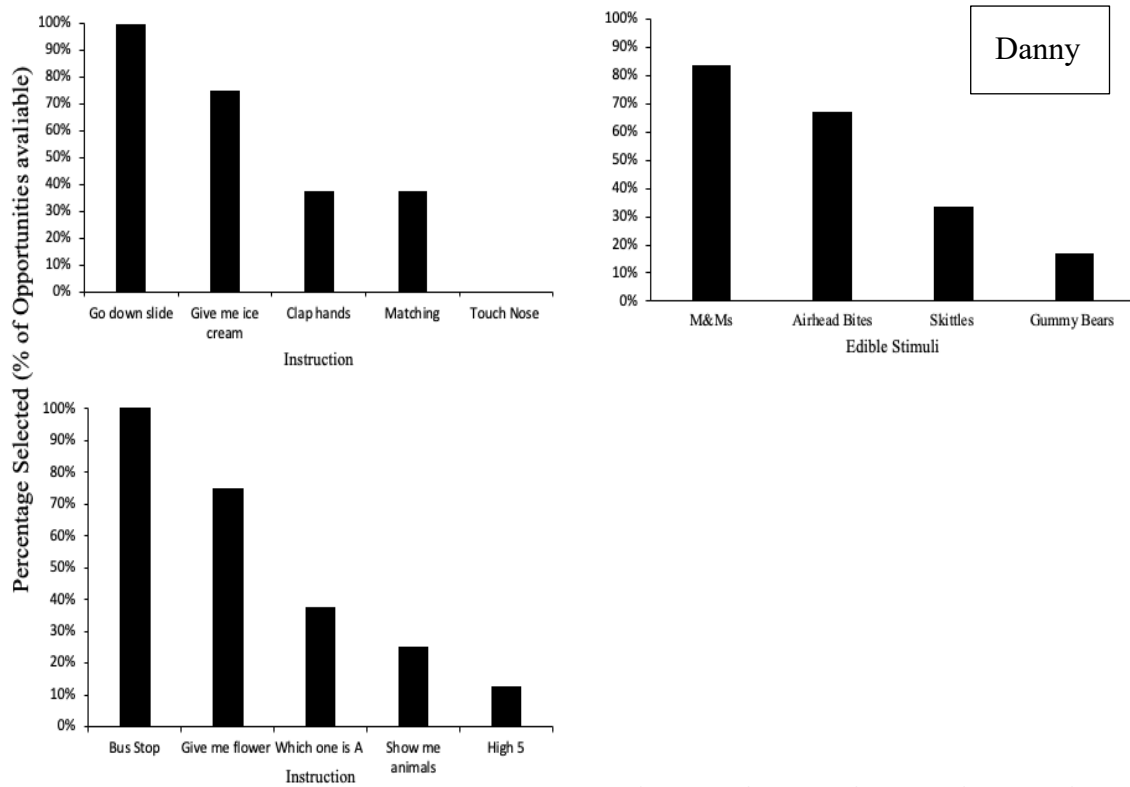


Figure 1

Preference assessments for High-P instructions and edible stimuli for Danny

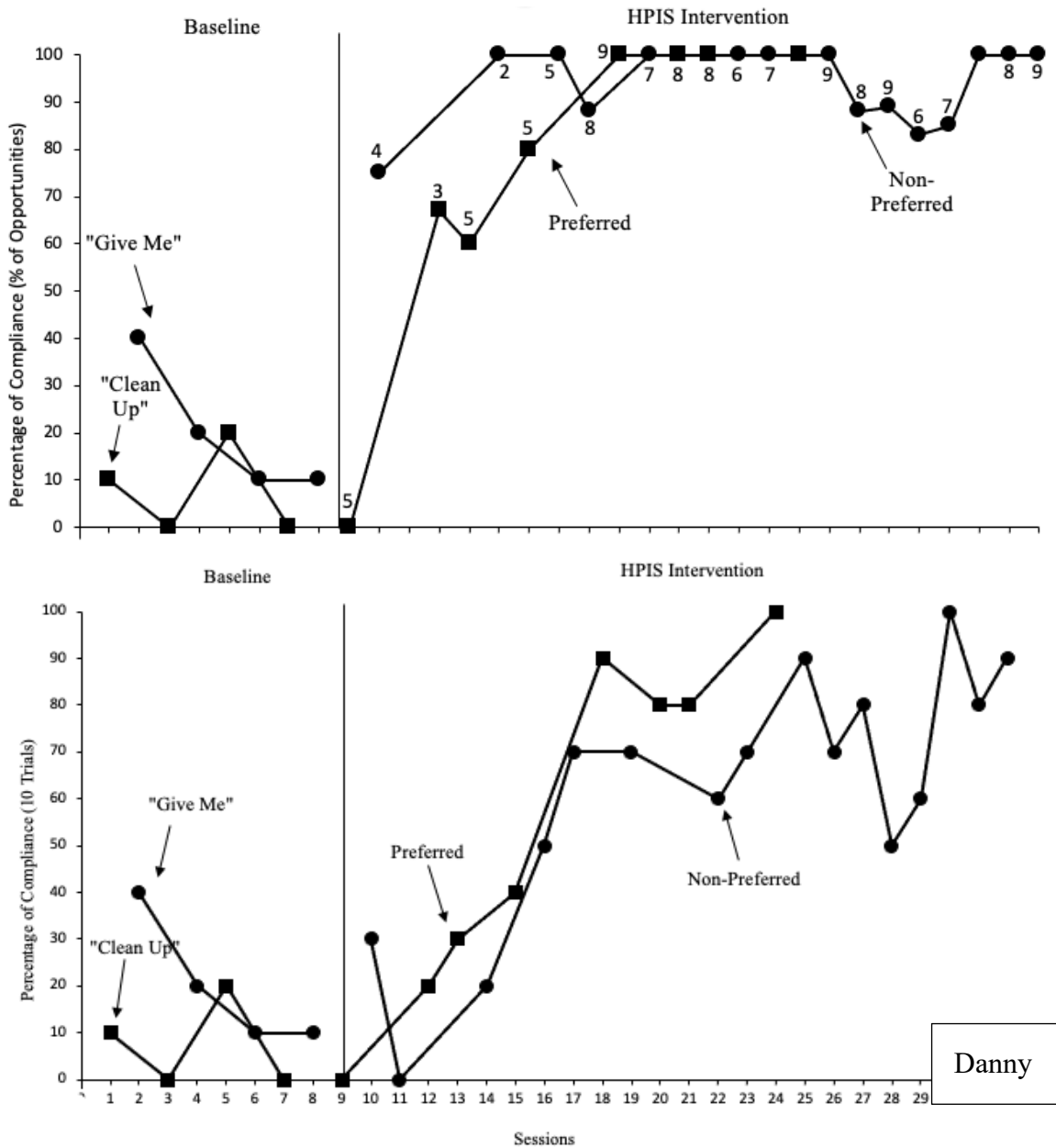


Figure 2

Results of HPIS Evaluation for Danny

Note. Top graph displays data based on opportunities in which the Low-P was presented.

The numbers next to the data points represent number of times the Low-P instruction was

presented, sessions in which 10 trials were presented do not have numbers next to their data point. Bottom graph displays data based on 10 trials.

CHAPTER FIVE:

DISCUSSION

The current study compared two interactions of HPIS, one in which preferred High-Ps were presented to the participant prior to creating the HPIS, and another in which non-preferred High-Ps were presented to the participant. Across both conditions compliance with High-P and Low-P instructions resulted in an edible and brief praise (e.g., “good job”). Results of this study indicated that both were effective at increasing compliance with Low-P instructions for Danny. However, the preferred condition was more efficient in increasing compliance when compared to the non-preferred condition.

Results of this case study are consistent with previous research (Lipschultz et al., 2018; Pitts & Dymond, 2012; Planner et al., 2018; Trejo & Fryling, 2018; Wilder et al. 2015) which demonstrated that HPIS was effective at increasing compliance to Low-P instructions. Although results are consistent, it’s important to note that our procedures differed from previous research by assessing preference for High-P instructions and allowing the participant to choose which High-Ps were included in the HPIS for that session. Previous research evaluated various iterations of the HPIS including, but not limited to, ratios of High-P to Low-P requests (e.g., Planner et al., 2018), quality of reinforcers provided for compliance (e.g., Wilder et al. 2015), whether or not consequences were provided for compliance (e.g., Pitts & Dymond, 2012; Wilder et al. 2015), and the topographies of instructions (e.g., matched vs unmatched High-P and Low-P instructions; Lipschultz et al., 2018; Trejo & Fryling, 2018). Additionally, in our study during the intervention phase sessions consisted of the initiation of 10 HPIS; however, non-compliance

resulted in the termination of the trial (HPIS) which means opportunities to comply with Low-P instruction varied across sessions. In previous studies it seems that, at least in some cases, non-compliance to the High-P instruction resulted in a brief break and the re-presentation of the same HPIS (e.g., 30 s; Lipschultz et al., 2018) or a longer break and the re-presentation of the same HPIS (3 min; Wilder et al., 2018). Future research should evaluate whether the duration of the break provided following non-compliance impacts the efficacy of the HPIS intervention.

Additionally, in our study the number of opportunities to comply with the Low-P instructions was not held constant during the intervention phase. Future research should evaluate whether the efficacy of the HPIS intervention increases when the opportunities to comply with the Low-P instruction is held constant across sessions. Another limitation of this study was that IOA and PI was only collected for 18% of the sessions of the HPIS evaluation.

Additional limitations of the current study include the use of Low-P instructions that included relinquishing an item which means that compliance with the instruction may have been impacted by preference for the item which could have varied across sessions due to fluctuations in motivating operations. Future research evaluation HPIS should consider using Low-P instructions that do not include terminating access to stimuli or should ensure that preference for the stimuli is consistent across conditions and throughout the evaluation. Another limitation is that during baseline the stimulus presented to the participant to engage with (i.e., preferred tangibles) prior to the delivery of the Low-P instruction varied across session and during some trials, it was the same across both conditions. This could have resulted in carry over across conditions. However, during intervention we ensured that the two Low-P instructions involved different stimuli, a set of stimuli used for the preferred condition and another for the non-preferred condition.

This study allowed the participant to select High-P instructions that were preferred or non-preferred and these were used to create the HPIS presented to the participant. Results suggested that preference for the High-P may increase the efficacy of the HPIS intervention. Future research should replicate these procedures with additional participants to determine if the results generalize.

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