

California State University, Monterey Bay  
**Digital Commons @ CSUMB**

---

Capstone Projects and Master's Theses

Capstone Projects and Master's Theses

---

Spring 2018

## The Effects of Simultaneous Prompting and Instructive Feedback For Individuals with Autism

Brandie S. Rankin  
*California State University, Monterey Bay*

Follow this and additional works at: [https://digitalcommons.csumb.edu/caps\\_thes\\_all](https://digitalcommons.csumb.edu/caps_thes_all)

---

### Recommended Citation

Rankin, Brandie S., "The Effects of Simultaneous Prompting and Instructive Feedback For Individuals with Autism" (2018). *Capstone Projects and Master's Theses*. 291.  
[https://digitalcommons.csumb.edu/caps\\_thes\\_all/291](https://digitalcommons.csumb.edu/caps_thes_all/291)

This Master's Thesis (Open Access) is brought to you for free and open access by the Capstone Projects and Master's Theses at Digital Commons @ CSUMB. It has been accepted for inclusion in Capstone Projects and Master's Theses by an authorized administrator of Digital Commons @ CSUMB. For more information, please contact [digitalcommons@csumb.edu](mailto:digitalcommons@csumb.edu).

Running head: EFFECTS OF SIMULTANEOUS PROMPTING AND IF

The Effects of Simultaneous Prompting and Instructive Feedback

For Individuals with Autism

Brandie S. Rankin

Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of Master of Arts in Education

California State University, Monterey Bay

May 2018

©2018 by Brandie S. Rankin. All Rights Reserved

EFFECTS OF SIMULTANEOUS PROMPTING AND IF

The Effects of Simultaneous Prompting and Instructive Feedback

For Individuals with Autism

Brandie S. Rankin

APPROVED BY THE GRADUATE ADVISORY COMMITTEE

---

Kerrie Lemons Chitwood, Ph.D.  
Advisor and Program Coordinator, Master of Arts in Education

---

Erin Ramirez, Ph.D.  
Advisor, Master of Arts in Education

---

Kris Roney, Ph.D. Associate Vice President  
Academic Programs and Dean of Undergraduate & Graduate Studies

### **Abstract**

Autism Spectrum Disorder (ASD) is a developmental delay characterized by significant impairment in many areas including: social communication, academic, occupational, and activities of daily living. The Individuals with Disabilities Education Act (IDEA) mandates that educators use evidence-based practices (EBPs) with individuals receiving special education services. In addition to EBPs, educators should provide the most efficient instruction possible. This study examines the efficacy of two EBPs on the acquisition of spoken category names (i.e., fruit, nut, vegetable, herb): (1) simultaneous prompting – a prompt-fading procedure, and (2) instructive feedback (IF) – a technique in which additional stimuli are presented during a learning trial. IF stimuli (i.e., spoken category names) were presented during listener discrimination training using simultaneous prompting. A multiple-probe single case design was used across three categories and replicated across five participants with ASD. Results indicate that the intervention was effective for Category 1, but was ineffective for subsequent categories, for four participants. The intervention was ineffective for the remaining participant. These findings suggest simultaneous prompting and IF may be effective for individuals with ASD; however, further research is needed to explore how to maintain effectiveness across additional target categories.

*Keywords:* autism spectrum disorder, instructive feedback, simultaneous prompting, instructional efficiency, additional stimuli, applied behavior analysis

**Table of Contents**

Literature Review	1
Method	7
Results	14
Discussion	25
References	29
Appendix A	34
Appendix B	35
Appendix C	36
Appendix D	37

The Effects of Simultaneous Prompting and Instructive Feedback For Individuals with Autism

### **Literature Review**

The American Psychiatric Association (2013) defines Autism Spectrum Disorder (ASD) as a developmental delay characterized by lasting deficits in social communication across multiple contexts. Specifically, individuals with ASD demonstrate challenges in social reciprocity (e.g., poor conversation skills, failure to respond to or initiate social interactions), nonverbal communication, and developing and maintaining relationships. Additionally, individuals with ASD exhibit restricted and repetitive patterns of behavior, interests, or activities, such as stereotyped motor movements or speech, inflexibility with changes in routine, and fixation on objects or topics of interest (American Psychiatric Association, 2013). Further, symptoms can cause significant impairment in academic, occupational, daily living, and other important areas of functioning (American Psychiatric Association, 2013). Estimates of prevalence indicate that approximately 1 in 68 children have been diagnosed with ASD, which is reported to occur in all racial, ethnic, and socioeconomic groups (Center for Disease Control and Prevention, 2016).

### **Evidence-Based Practices**

Due to the high prevalence rates and the associated impairments of ASD, along with the mandates issued by the Individuals with Disabilities Education Act (IDEA, 2004), educators and researchers are required to find treatments that are scientifically validated as effective interventions. According to IDEA (2004), over 30 years of research and experience has indicated that using evidence-based practices (EBPs) can improve the effectiveness of education for individuals with disabilities. One such treatment is Applied Behavior Analysis (ABA), which has shown improvements in intellectual functioning, language development, acquisition of daily

living skills, and social functioning in individuals with ASD (Simpson, 2005; Virués-Ortega, 2010).

ABA is a science that applies principles of behaviorism to produce measurable, socially meaningful, and lasting changes to an individual's life. Those who implement ABA evaluate and alter environmental events, such as consequences, to produce behavior change (Virués-Ortega, 2010). Providing an individual with a preferred item, or a positive reinforcer, following a correct response to a question is an example of altering the consequence of a learning trial to increase the likelihood of correct responding in future presentations of that question (Cooper, Heron, & Heward, 2007). For instance, when a child is given their favorite toy after they accurately respond to the question, "What is your name?" the child is more likely to say their name when asked in the future. This is an example of one of many EBPs utilized during ABA interventions (Cooper et al., 2007). The present study aims to identify ABA-based instructional techniques as a way to target the previously mentioned deficits experienced by those with ASD.

**Response prompting.** In addition to positive reinforcement, a variety of ABA-based instructional techniques are used with individuals with ASD, such as shaping, chaining, stimulus prompts, and response prompting. This study utilized response prompts, which are used to evoke a correct response in the presence of a target stimulus (Cooper et al., 2007). For example, after a teacher gives her student the direction, or target stimulus, "Clap your hands," the teacher uses physical guidance by physically manipulating the student's hands and prompting the student to clap. Further, there are a number of procedures used to fade these prompts to teach an individual to respond to a target stimulus independently; examples include time delay, least-to-most prompts, most-to-least prompts, graduated guidance, and simultaneous prompting (Werts, Wolery, Holcombe, & Gast, 1995; Wolery, Holcombe, Werts, & Cipolloni, 1993). These

prompt-fading procedures are essential for individuals to learn new skills without relying on assistance and, thus, are commonly used with individuals with ASD (Cooper et al., 2007). One of these procedures is simultaneous prompting.

***Simultaneous prompting.*** Simultaneous prompting can be utilized to teach a variety of skills. It is a technique in which the response prompt is presented immediately following the target stimulus during every learning trial; skill acquisition is later assessed by conducting probe sessions without prompting (Wolery et al., 1993). For example, a teacher tells her student, “Clap your hands,” and then immediately physically prompts the student to clap his hands. Later, the teacher checks for skill acquisition by saying, “Clap your hands,” without physically prompting the student. The teacher then documents if the target behavior was observed.

A number of studies have identified simultaneous prompting as an effective instructional technique for teaching new skills to individuals with various disabilities. Some of these skills include receptive identification of pictures (i.e., handing over or pointing to a target stimulus in a field; Wolery et al., 1993), various social skills (e.g., requesting “more”, joining an activity, etc.; Davis, Spriggs, Rodgers, & Campbell, 2017), hand washing (Parrott, Schuster, Collins, & Gassaway, 2000), and playing a card game (Fetko, Collins, Hager, & Spriggs, 2013). Simultaneous prompting has also been used to teach children diagnosed with ASD to teach a variety of skills including: to receptively identify numerals, to respond to personal information questions, to name family members, to prepare simple meals, and various academic skills, such as the location of organs in the human body (Akmanoglu & Batu, 2004; Akmanoglu, Kurt, & Kapan, 2015; Akmanoglu-Uludag & Batu, 2005; Genc-Tosun & Kurt, 2017; Tekin-Iftar & Olcay-Gul, 2016). Further, simultaneous prompting may be preferable to other response prompting procedures in applied settings due to its simplicity and the likelihood that it will be



implemented with high procedural fidelity. Procedural fidelity is critical as it ensures that the intervention is implemented in the same way every time, and EBPs implemented with fidelity are more likely to be effective, efficient, and produce predictable responses (The IRIS Center, 2014). Researchers have been able to train not only educators, but also peers with and without disabilities, to implement a simultaneous prompting procedure with high procedural fidelity (Davis et al., 2017; Fetko et al., 2013; Tekin-Iftar, Collins, Spooner, & Olcay-Gul, 2017). Thus, simultaneous prompting has been shown to be an effective and easily implemented teaching procedure for individuals with ASD.

### **Instructional Efficiency**

In addition to using the above EBPs, educators must provide the most efficient instruction possible to address slow skill acquisition and target the delays in communication, academics, and other areas experienced by individuals with ASD (Vladescu & Kodak, 2013). Researchers evaluate instructional efficiency in two ways: (1) the amount of time or number of trials it takes an individual to learn the target skill, and (2) the effects a teaching procedure has on future learning (Reichow & Wolery, 2011; Vladescu & Kodak, 2013). For example, one teaching procedure may be found to be more efficient than another when a learner acquires a target skill in a shorter amount of instructional time, or if the teaching procedure results in a learner generalizing skills without requiring direct instruction in the future. One strategy for increasing instructional efficiency is instructive feedback (IF).

**Instructive feedback.** IF is a method that involves presenting non-target stimuli in the antecedent or consequence portion of a learning trial (i.e., before the learner response or after the learner response, respectively); the learner is not expected to respond to the IF stimuli, and no consequence (e.g., verbal praise) is provided if they do. Similar to simultaneous prompting,

acquisition of the IF target is later assessed using probe sessions (Werts et al., 1995). IF is typically used in conjunction with a prompt-fading procedure, like simultaneous prompting, which is used to teach the primary target of the learning trial (Nottingham, Vladescu, & Kodak, 2015). For example: a teacher presents a field of pictures and says, “Hand me the carrot.” After the learner hands over the picture of the carrot, the teacher provides a consequence (e.g., verbal praise and an edible) and an IF stimulus, such as “That’s right! A carrot is a vegetable.” In this case, “A carrot is a vegetable” is the IF stimulus. Later, the teacher checks for skill acquisition by holding up the picture of a carrot, saying, “A carrot is a,” and waiting for a response from the student. If the student independently says, “Vegetable,” it can be determined that he has acquired the IF target. When effective, IF can be used to teach two targets in almost the same amount of time it takes to teach one – thus increasing the instructional efficiency of that learning trial.

A number of studies have shown IF to be an effective strategy for increasing instructional efficiency by demonstrating that participants learned at least a portion of IF targets without direct instruction (Loughrey, Betz, Majdalany, & Nicholson, 2014; Nottingham, Vladescu, Kodak, & Kisamore, 2017; Vladescu, & Kodak, 2013; Werts, Caldwell, & Wolery, 2003; Werts, Hoffman, & Darcy, 2011). Nottingham and colleagues (2015) provided a brief review on the literature involving IF for individuals with ASD. They reported the following common findings: incorporating IF targets increased instructional efficiency, and some participants acquired IF targets without direct instruction or required fewer learning trials to reach mastery. In other words, the participants acquired more skills when provided with a teaching procedure that included IF than when provided with only a prompt-fading procedure. These findings suggest that IF can increase the likelihood of closing the gap between skill levels of an individual with ASD and those of their typically developing peers (Vladescu & Kodak, 2013).

Tullis, Frampton, Delfs, and Shillingsburg (2017) replicated these findings in a recent study examining the effectiveness of IF in teaching intraverbal responses to children with ASD. Three participants were presented with a field of stimulus cards and asked to find the problem (primary target), such as a broken pencil tip. Following the participants' response, researchers provided reinforcement and an explanation of the problem (IF target), such as "This is a problem because the pencil is broken so you cannot write." One participant achieved mastery of all IF targets, which was assessed during probe sessions. The remaining two participants required additional instruction with prompt fading to acquire IF targets from the first set of stimuli; however, direct instruction was not needed for subsequent sets of stimuli (Tullis et al., 2017). This suggests that IF can increase overall instructional efficiency even when a prompt-fading procedure is needed to teach initial IF targets. That is, IF affected the participants future learning by removing the need for direct instruction. These findings indicate that utilizing a treatment package consisting of a prompt-fading procedure to teach the primary targets, and IF to teach additional targets, can be an effective and efficient method of instruction for individuals with ASD.

Further, Reichow and Wolery (2011) compared the efficacy of prompt-fading procedures alone with prompt fading and IF combined in teaching children with ASD to read sight words. They found that both treatments were effective; however, the treatment package consisting of a prompt-fading procedure and IF was more efficient due to the amount of time needed for the learner to acquire each skill. Additionally, research has indicated that simultaneous prompting and IF were effective in teaching receptive identification, or listener discrimination, of pictures of different foods and drinks (primary target) and their classification (IF target) to children with developmental delays and Down syndrome (Wolery et al., 1993). These findings are promising,

however, few studies have examined the efficacy of simultaneous prompting and IF as a treatment package for individuals with ASD. Therefore, more research is needed in this area to identify this as an effective treatment for those diagnosed with ASD.

## **Method**

### **Purpose**

The purpose of this study was to replicate and extend research by Wolery and colleagues (1993) by evaluating the effectiveness of IF and simultaneous prompting in teaching individuals with ASD spoken category names (e.g., “fruit,” “vegetable,” “nut”) during listener discrimination learning trials. Effectiveness was determined by comparing the number of correct IF targets (i.e., category names) during baseline and probe sessions.

### **Research Question**

Does the implementation of IF and simultaneous prompting increase the number of IF targets for students with ASD during listener discrimination training?

### **Hypothesis**

Research has demonstrated that simultaneous prompting can be an effective instructional technique in teaching a variety of skills to individuals with ASD (Akmanoglu & Batu, 2004; Akmanoglu et al., 2015; Akmanoglu-Uludag & Batu, 2005; Genc-Tosun & Kurt, 2017; Tekin-Iftar & Olcay-Gul, 2016). Additionally, IF has been shown to increase instructional efficiency for individuals with ASD, demonstrated by participants acquiring at least some IF targets without direct instruction of those skills (Nottingham et al., 2015). Further, Wolery and colleagues (1993) reported that simultaneous prompting and IF combined was an effective treatment package for individuals with developmental delays and Down syndrome. Based on the

aforementioned research, I hypothesized that my participants would acquire at least a portion of the IF targets when provided with the treatment package.

### **Research Design**

A multiple-probe design (Horner & Baer, 1978) across three categories was used for each participant to assess the effectiveness of simultaneous prompting and IF. When using this design, each participant serves as their own control by comparing their rates of responding during baseline and intervention. This design also allows the researcher to determine when the participants acquire the IF targets over the course of the training period. These design characteristics provide evidence to determine the presence of a functional relationship between the intervention and the number of correct responses.

To examine the effectiveness of the treatment package, this research design consisted of up to 4 phases for each participant: baseline for Categories 1 through 3, intervention for Category 1, intervention for Categories 1 and 2, and intervention for Categories 1 through 3. The researcher began with baseline sessions across all three categories for each participant. Once a participant demonstrated stable baseline data (i.e., at least five data points within +/- one correct response), intervention was applied to one of the categories. When there was a therapeutic trend (i.e., at least five data points with an increase of at least one correct response above baseline), the researcher began intervention on a second category, while continuing intervention on the first category. This process was repeated to determine when to begin intervention on the third category. The entire process was replicated for each of the participants.

**Independent variable.** A treatment package consisting of simultaneous prompting and IF was implemented (Wolery et al., 1993). Specifically, a researcher provided a controlling

prompt (i.e., pointing to target stimulus) during listener discrimination training and presented additional stimuli during the consequence (e.g., “That’s right! An almond is a type of nut.”).

**Dependent variable.** The number of correct IF targets (i.e., category names). This was determined by conducting category probe sessions throughout the intervention phase (Wolery et al., 1993).

### **Setting and Participants**

This study occurred at a non-public school for students with ASD and other developmental disabilities in Central California. Forty-seven students, ages 9-22, attend the school. Every student has an Individualized Education Plan (IEP) and a Behavior Intervention Plan (BIP). Educational and behavioral data are charted and reviewed daily, and are overseen by Board Certified Behavior Analysts® (BCBAs®). There are five classrooms in the school, each serving eight to ten students (Gold, 2017).

The researcher used a purposeful convenience sample. To provide anonymity for the participants, pseudonyms have been used. Participants were included in the study if they fit the following criteria: they are (1) diagnosed with ASD, and are (2) vocal communicators (i.e., engage in vocal speech, do not only use augmentative and alternative communication systems, such as speech generating devices or sign language). Five individuals were chosen to participate.

**Participant 1.** Alvin is a 17-year-old male who has attended this school for six years. He typically speaks in two to five word utterances, and primarily communicates his wants and needs. He is able to construct novel sentences without systematic direct instruction.

**Participant 2.** Angie is a 16-year-old female who has attended this school for 11 years. She speaks in one to three word utterances to express her wants and needs. She requires systematic direct instruction to acquire new requests.

**Participant 3.** Ulysses is a 12-year-old male who has attended this program for one year. He typically speaks in four to eight word sentences. Most of his communication is to express his wants and needs; however, he also greets familiar adults each morning and makes some contextual comments (e.g., says, “Whoops” when he drops an item). His teacher reports that he may be able to construct one to two word novel phrases without direct instruction.

**Participant 4.** David is a 19-year-old male who has attended this school for six years. He speaks in full sentences to communicate his wants and needs and to engage in conversations on a variety of topics, and does not require direct instruction to acquire new requests and comments.

**Participant 5.** Angel is an 18-year-old male who has been in this program for three years. He speaks in two to five word utterances to communicate his wants and needs. Angel requires systematic direct instruction to acquire new requests.

Every participant engaged in the intervention on a one-to-one basis. All sessions took place in an assessment room or the participant’s classroom at a desk with teaching materials, data collection materials, and reinforcers. Participants were seated at the desk with the researcher seated either next to or across from them, consistent with typical seating arrangements in the classroom setting.

## **Measures**

The dependent variable was measured by determining the number of correct responses during category probe sessions (Wolery et al., 1993). These sessions consisted of nine trials: one trial per target stimulus, three trials per category. Trials were scored correct if the participant verbally responded with the target category name within five seconds of the task direction (e.g., researcher presents almond stimulus and says, “A pistachio is a,” and participant says, “Nut.”). Trials were scored incorrect if the participant did not respond within five seconds of the task

direction or emitted any response other than the target category name. All data were recorded on data collection sheets during sessions (see Appendix A).

**Validity.** It is common for researchers to use number or percentage of correct responses during probe sessions to determine the effectiveness of teaching procedures, including simultaneous prompting and IF (Lane, Gast, Shepley, & Ledford, 2015; Loughrey et al., 2014; Wolery et al., 1993).

**Reliability.** Interobserver agreement (IOA) data were collected by the researcher or a trained observer during 23% of probe sessions, with 99.4% agreement. Reliability data were calculated by dividing the number of agreements by the number of agreements plus the number of disagreements and multiplied by 100 (Wolery et al., 1993).

### **Intervention**

A treatment package of simultaneous prompting and IF was introduced across categories for each participant. The intervention was applied until the researcher had to end data collection due to time constraints.

### **Procedures**

Three unknown target stimuli from each category (e.g., vegetables, fruits, nuts, herbs) were chosen for each participant. Pictures of the target stimuli and distracter stimuli were printed and laminated on white 3x5 inch index cards.

Before each session, the researcher asked the participants to choose an edible or tangible reinforcer that was to be given to them during the consequence portion of every learning trial during listener discrimination training with IF.

**Category baseline and probes.** Before intervention, the researcher collected baseline data on category names. These sessions consisted of nine trials, one per target stimulus. Target



stimuli were presented in a random order. For each trial, the researcher held the target stimulus card in front of the participant and said, “A [target name] is a.” No response prompts or consequences were provided. Participants were given five seconds to respond before the trial was ended. Following a response or five seconds in the absence of a response, the stimulus card was removed and the next trial began. Additionally, the researcher conducted category probe sessions (identical to category baseline sessions) 30 minutes to one day after each listener discrimination training with IF session.

**Listener discrimination training with IF.** During listener discrimination training with IF sessions, the researcher provided the treatment package consisting of simultaneous prompting and IF. These sessions consisted of three trials per target stimulus. Target stimuli were presented in random order with other target stimuli from that category. During each trial, the researcher placed the target stimulus and two distracter stimuli on the desk, reached out her left hand palm up, and presented the task direction, “Hand me [target name].” The researcher utilized simultaneous prompting by providing a controlling prompt (i.e., pointing to target stimulus) immediately following the task direction (Wolery et al., 1993). After a correct response, the researcher provided verbal praise and an edible or tangible reinforcer, and then presented the IF stimulus (e.g., “That’s right! An almond is a nut.”) while holding the picture in front of the participant. Participants were not required to respond to the IF stimulus, and there was no consequence if they did.

**Fidelity.** Two classroom teachers and a paraprofessional were trained by the researcher to conduct baseline sessions, category probe sessions, and listener discrimination training with IF sessions. The researcher or one of these trained individuals took procedural data during 20% of sessions, with 100% fidelity. Fidelity data were calculated by dividing the number of observed

researcher behaviors by the number of planned researcher behaviors and multiplying by 100 (Wolery et al., 1993).

***Category baseline and probes.*** During category probe sessions, procedural data was taken on the following researcher behaviors: holding stimulus card in front of participant, presenting task direction (e.g., “A carrot is a”), waiting five seconds or for a response from the participant, and removing the stimulus card (see Appendix B).

***Listener discrimination training with IF.*** The procedural data on the following researcher behaviors was taken during listener discrimination training with IF: presenting 3 stimulus cards, giving verbal direction, “look,” while pointing to each stimulus card, holding out left hand palm up, presenting task direction, providing controlling prompt, providing consequence, presenting IF stimulus (i.e., category name), and removing stimulus cards (see Appendix C).

### **Ethical Considerations**

One ethical consideration to be made is that the participants were not accessing their individualized educational curricula during the research sessions. However, the findings from this study may result in more efficient instruction in the future. Additionally, participants were learning new language skills over the course of the study. Regarding participant confidentiality, pseudonyms were used on all documentation. Further, raw data will be destroyed within 1 month of the completion of this study.

**Validity threats.** The researcher’s bias is one potential threat to the validity of this study. This threat was addressed by training another individual to collect reliability and procedural fidelity data during at least 20% of sessions.

### **Data Analysis**

All baseline and category probe data are displayed as line graphs. The researcher used visual analysis to interpret the data. Additionally, the researcher calculated the percentage of non-overlapping data (PND) by counting the number of intervention data points above the highest baseline data point, dividing by the total number of intervention data points, and multiplying by 100. This value helped determine whether there is a functional relationship between the participants' performance and the intervention.

### **Social Validity**

At the completion of the study, the individuals trained to conduct research sessions completed a four-point Likert scale (i.e., 1 = strongly disagree to 4 = strongly agree) social validity questionnaire (see Appendix D). The questionnaire, adapted from Berger, Manston and Ingersoll (2016), consists of seven questions designed to understand the perceived usefulness, significance and satisfaction with the implemented intervention (Kennedy, 2005). Participant responses were kept confidential and descriptive statistics were conducted to gain insights regarding the intervention.

One individual believed the treatment to be effective, acceptable in increasing a participant's skills, and would result in the participant maintaining learned skills. Two individuals would be willing to carry out the treatment themselves and would suggest the treatment to others. Two individuals believed the treatment was ineffective and did not increase participants' skills.

### **Results**

Each participant's results have been charted on a set of three line graphs, one per category. The x-axis represents the session number and the y-axis measures the number of

correct responses during each session. The black vertical and horizontal line indicates when the intervention was introduced.

Figure 1 shows the number of correct responses during category probes for Alvin. During baseline, he had an average of .3 correct responses with a range of 0-1 correct responses during the fruit probes, and had no correct responses during the nuts and herbs probes (average = 0, no range). Once listener discrimination training with IF was implemented for Category 1 (i.e., fruits), correct responding immediately increased to and maintained at 3 with no variability for fruits with a PND of 100% (average = 3). Correct responding remained at 0 for the categories still in baseline (i.e., nuts, herbs). When intervention was introduced for Category 2 (i.e., nuts), he had an average of .33 correct responses with a range of 0-3 correct responses, resulting in a PND of 11%. Alvin did not reach criteria to receive intervention for Category 3 (i.e., herbs).

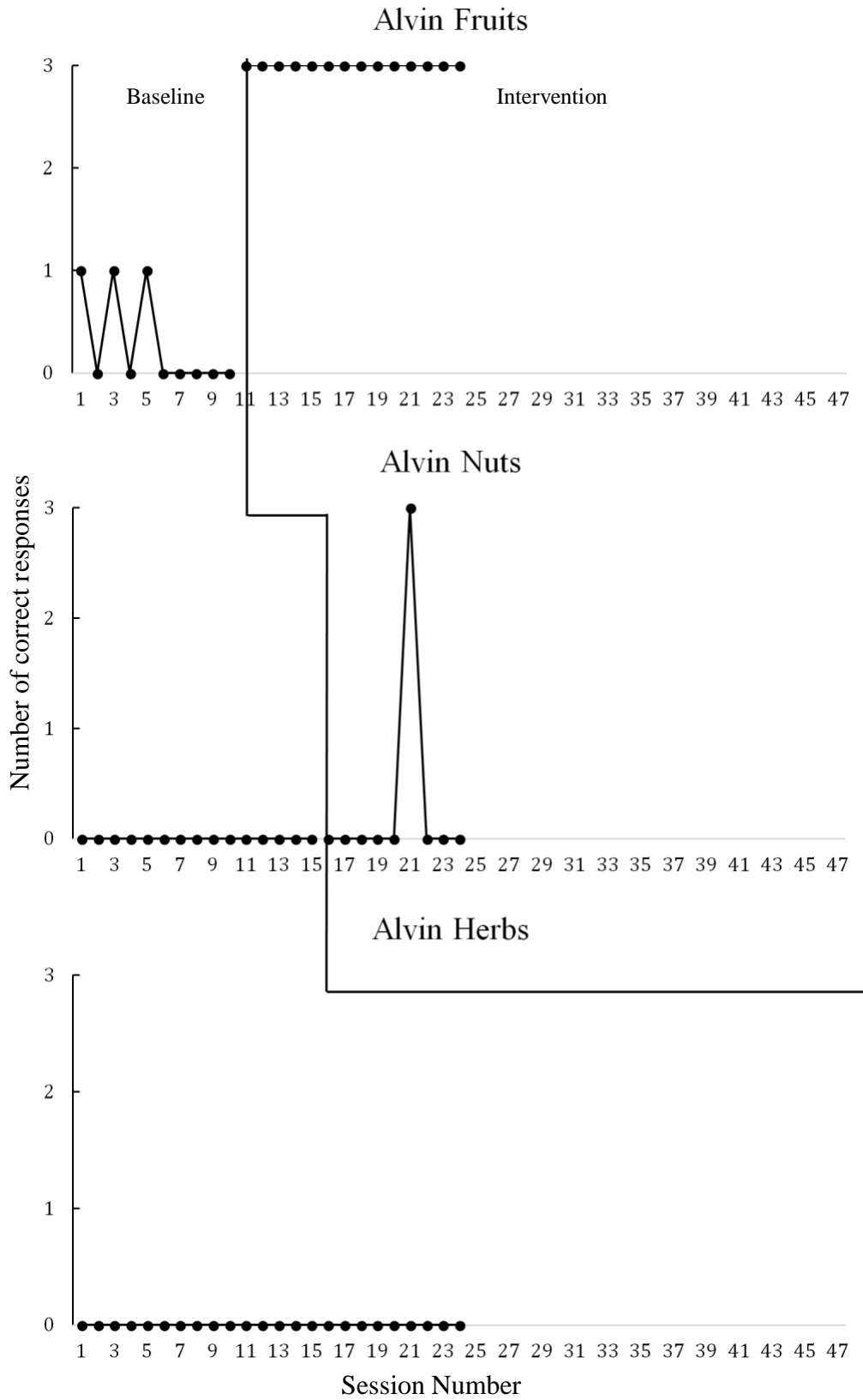


Figure 1. Number of correct responses during category probes for Alvin.

Angie's results are shown in Figure 2. During baseline, she had 0 correct responses for each category, resulting in an average of 0 correct responses with no variability in responses. During listener discrimination training with IF for Category 1 (i.e., fruits), her number of correct responses ranged from 0-3 with an average of 1.3 correct responses and a PND of 57%. Correct responding remained at 0 for the categories that were still in baseline (i.e., nuts, vegetables). Angie did not receive intervention for Categories 2 or 3.

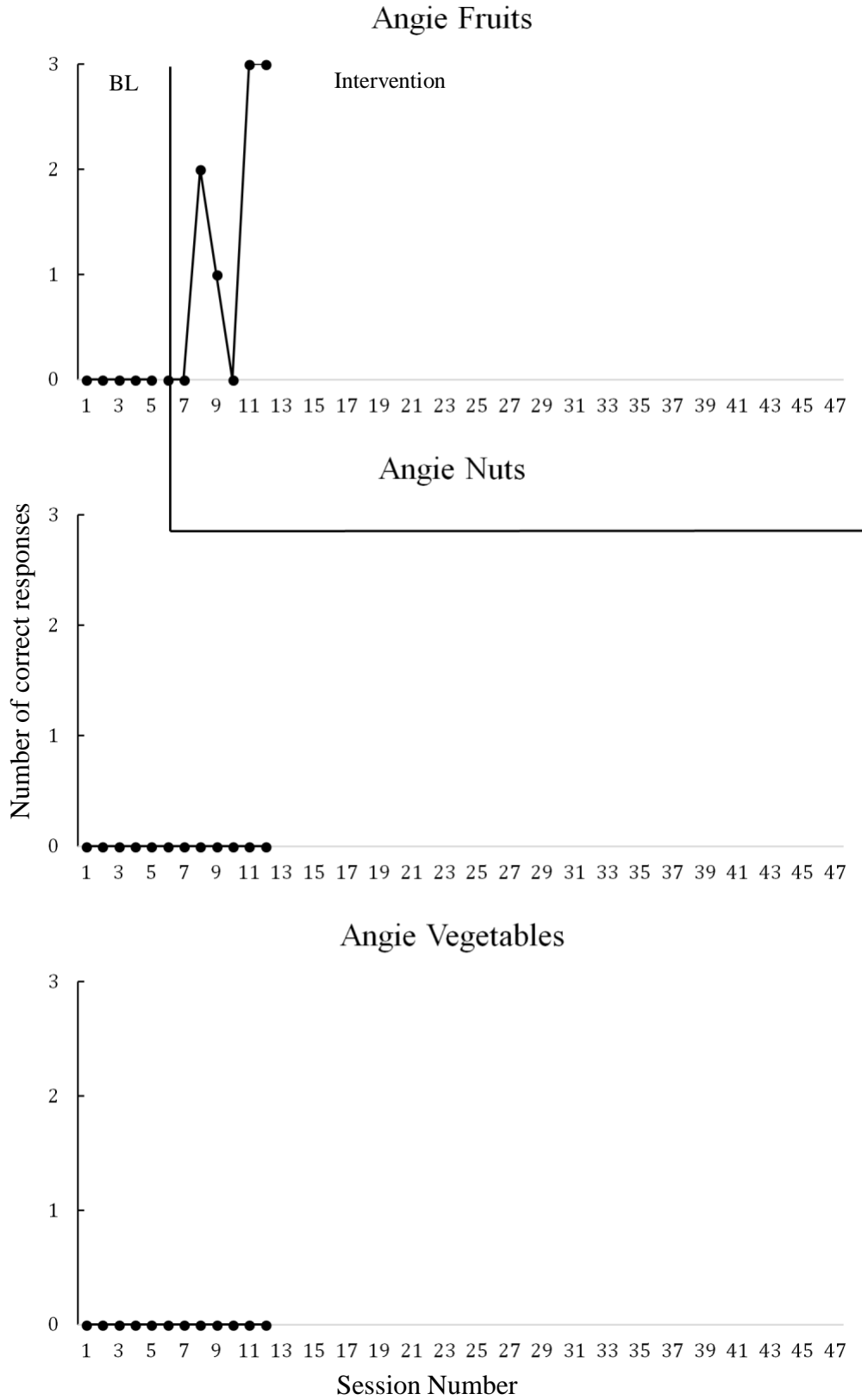


Figure 2. Number of correct responses during category probes for Angie.

Figure 3 shows the number of correct responses during category probes for Ulysses. During baseline, he had 0 correct responses for each category with no variability (average = 0). During intervention for Category 1 (i.e., fruits), his number of correct responses immediately increased to 3, with an average of 2.9 correct responses, a range of 2-3 correct responses, and a PND of 100%. Correct responding stayed at 0 for the categories remaining in baseline (i.e., nuts, vegetables). When listener discrimination training with IF was introduced for Category 2 (i.e., nuts), Ulysses demonstrated an average of 1 correct response, a range of 0-3 correct responses, and a PND of 60%. He did not meet criteria for intervention for Category 3.



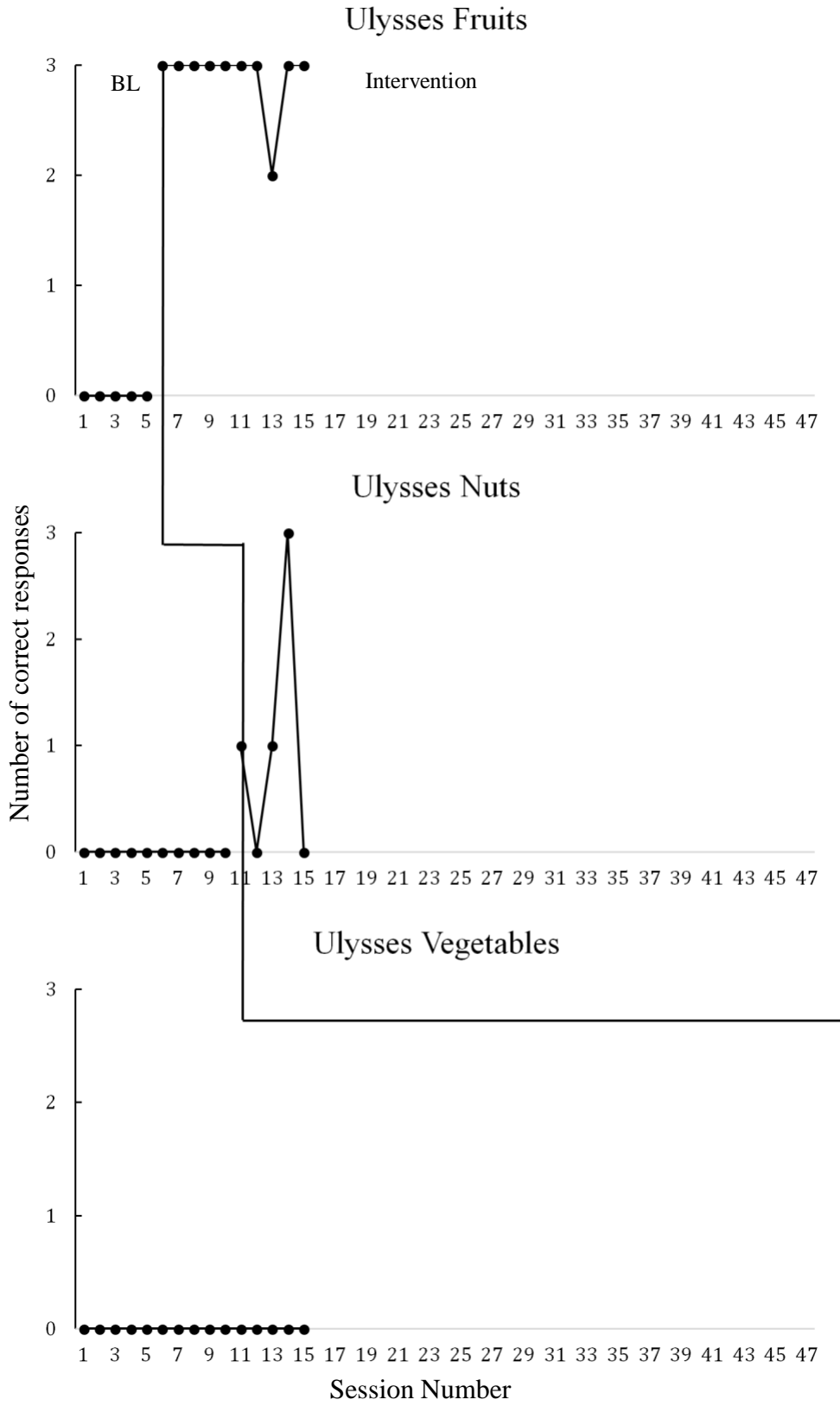


Figure 3. Number of correct responses during category probes for Ulysses.

David's results are shown in Figure 4. During baseline, his correct responses ranged from 0-3 with an average of .7 correct responses for fruits; vegetables had an average of .3 correct responses with a range of 0-3, and he had 0 correct responses for nuts with no variability (average = 0). During listener discrimination training with IF for Category 1 (i.e., fruits), David had an average of 2.6 correct responses with a range of 0-3. Due to his inconsistent performance during baseline, his PND during intervention for Category 1 is 0%. When intervention was introduced for Category 2 (i.e., nuts), David's number of correct responses remained at 0 with no variability (average = 0). He did not meet criteria to move to intervention for Category 3.

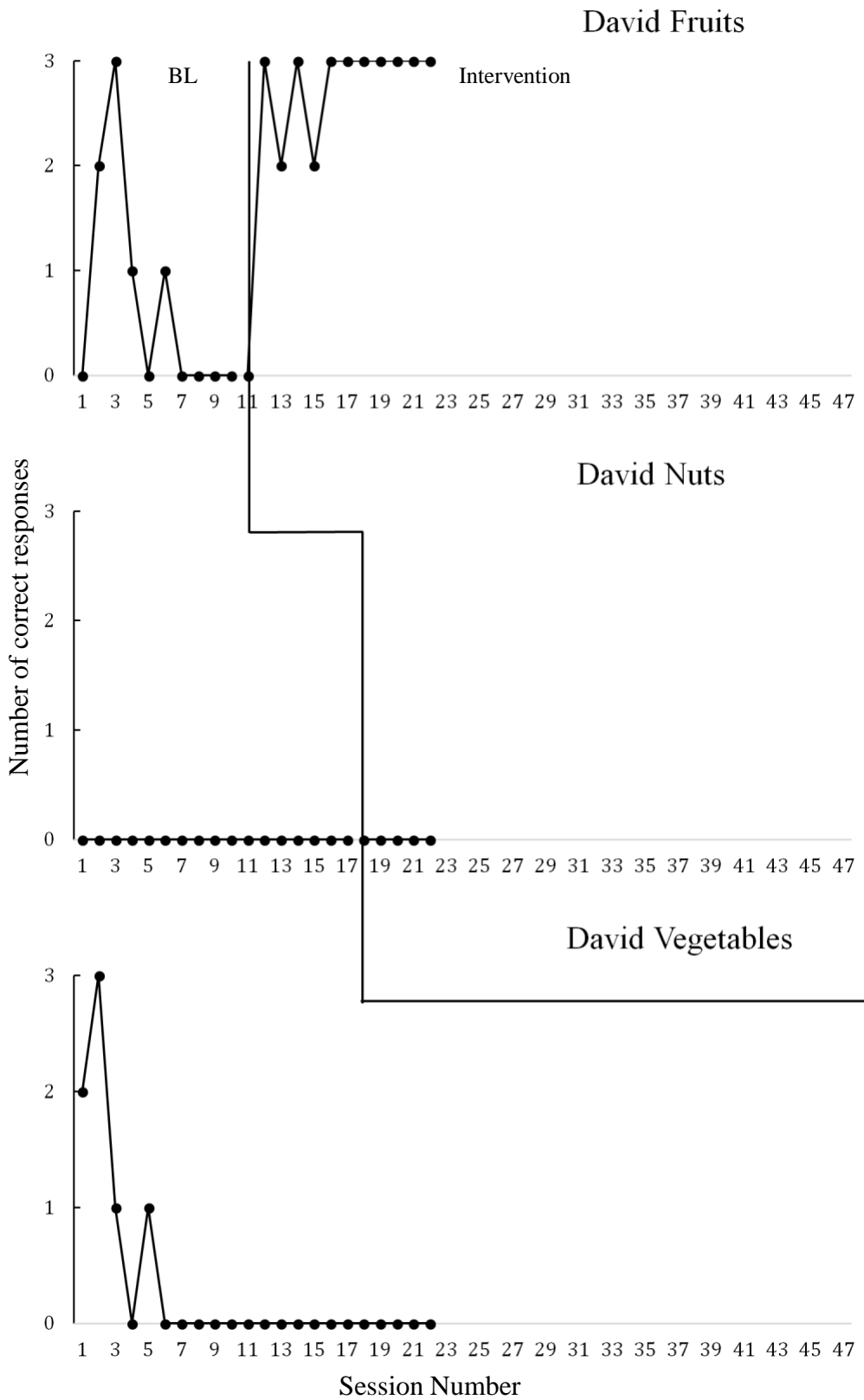


Figure 4. Number of correct responses during category probes for David.

Figure 5 shows the number of correct responses during category probes for Angel. During baseline, he had 0 correct responses across all 3 categories (i.e., fruits, nuts, vegetables), resulting in an average of 0 correct responses and no variability in responses. During intervention for Category 1 (i.e., fruits), Angels' number of correct responses remained at 0, resulting in an average of 0 without variability, and a PND of 0%. Angel did not reach criteria for intervention for Categories 2 or 3.

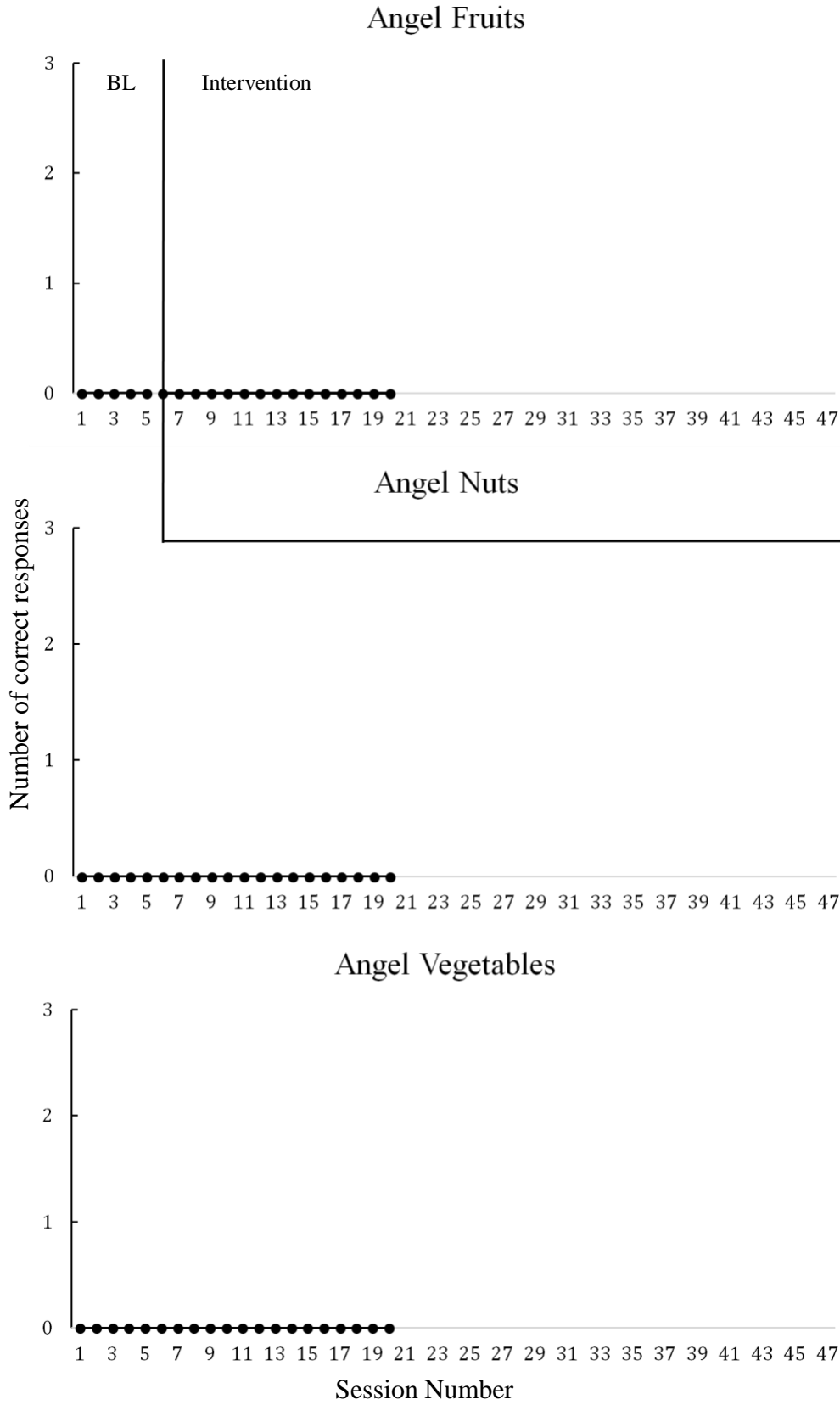


Figure 5. Number of correct responses during category probes for Angel.

### Discussion

The purpose of this study was to examine the effectiveness of a treatment package consisting of IF and simultaneous prompting in teaching spoken category names to individuals with ASD during listener discrimination training. The results demonstrated by Alvin, Angie, and Ulysses suggest that this treatment package may be effective in teaching additional targets during a learning trial. Alvin and Ulysses both showed an immediate increase in correct responses during category probes once intervention was implemented for Category 1, as well as PNDs of 100%, demonstrating a highly effective and functional relationship between the implementation of the treatment package and the number of correct responses during category probes. Angie and David demonstrated gradual and inconsistent positive trends in correct responding, without the immediacy demonstrated by Alvin and Ulysses. Angie's performance resulted in a PND of 57%, indicating a minimally effective intervention. David scored a three during one of his baseline sessions, which did not allow for any non-overlapping data. These findings are consistent with those of Wolery and colleagues (1993), which showed that IF and simultaneous prompting were effective in teaching individuals with developmental delays and Down syndrome multiple targets during listener discrimination training. This study adds to the research conducted by Wolery and colleagues (1993) by extending it to participants diagnosed with ASD, suggesting that this treatment package may be effective for some students with ASD.

However, this treatment package did not maintain its effectiveness for the participants when intervention was implemented for subsequent categories. For instance, during Category 1 intervention, both Alvin and Ulysses had PNDs of 100%. However, their PNDs dropped to 11% and 60%, respectively, during Category 2 intervention. This decrease in treatment effectiveness may be due to some characteristics of the research design used, including: 1) staggered

intervention implementation across categories, rather than mixing and varying the presentation of categories requiring discrimination of stimuli immediately, and 2) the absence of responses from the researcher during category probe sessions, rather than providing reinforcement for correct responses. Interestingly, similar findings were not observed in any research reviewed by the author, even those with the same research design characteristics mentioned above. Further, one participant – Angel – did not demonstrate any increase in correct responding during intervention for Category 1, indicating no functional relationship between the treatment and correct responding during category probes. Angel’s results are similar to those of some participants in past research (Nottingham et al., 2015; Tullis et al., 2017).

It would now be beneficial to know whether there are any pre-requisite skills or characteristics necessary for an individual to possess for this treatment to be effective. In this study, the participants who acquired the most IF targets were primarily those with greater lengths of utterance and those who are able to construct novel phrases and sentences to request and comment without systematic direct instruction. Regardless, this study’s results demonstrate that simultaneous prompting and IF together are not effective for every individual with ASD, which adds weight to the growing understanding that there is not a one-size-fits-all intervention for individuals with ASD. As Dr. Stephen Shore once said: “If you’ve met one person with autism, you’ve met one person with autism.”

### **Limitations and Future Research**

Due to various constraints, including the availability of participants and the researcher, sessions were not conducted each school day. The irregularity and infrequency in presentation of the learning targets may have negatively impacted the participants’ skill acquisition. If possible, future research should aim to present sessions on a regular and frequent time schedule.

Additionally, due to the scope of this research project, the author was unable to make adjustments, such as implementing prompt-fading procedures for IF targets, when the intervention was proving to be ineffective. If this study were to be replicated by the author, or another researcher, it would be interesting to explore whether direct instruction in some IF targets would lead to any effects on future learning; specifically, whether the participants would no longer need direct instruction to acquire IF targets, as demonstrated by Tullis and colleagues (2017). Further, it would be interesting to examine whether there are any similarities between the individuals for whom this treatment was effective and whether those characteristics are present in individuals for whom this treatment was ineffective, across studies. These findings may provide useful information regarding characteristics or prerequisite skills necessary for this treatment to be effective.

### **Conclusion**

The findings from this study suggest that IF and simultaneous prompting may be effective in teaching individuals diagnosed with ASD multiple targets during a learning trial, which is consistent with past research in this area (Loughrey et al., 2014; Nottingham et al., 2017; Tullis et al., 2017; Vladescu, & Kodak, 2013; Werts et al., 2003; Werts et al., 2011; Wolery et al., 1993). However, this treatment package was not effective for every participant or every learning target. Further, although not specifically examined, these findings present the possibility that there are characteristics of this treatment package necessary for some students to be successful, such as mixing and varying the presentation of learning targets and providing reinforcement for correct responding. These findings add to the growing body of research on techniques to increase the efficiency of instruction for individuals diagnosed with ASD by demonstrating that it may be possible to teach more than one target during a single learning trial.



Further research is needed to determine more effective instructional techniques that can be used to close the gap between the skill levels of all individuals with ASD and those of their typically developing peers.

### References

- Akmanoglu, N., & Batu, S. (2004). Teaching pointing to numerals to individuals with autism using simultaneous prompting. *Education and Training in Developmental Disabilities, 39*, 326-336.
- Akmanoglu, N., Kurt, O., & Kapan, A. (2015). Comparison of simultaneous prompting and constant time delay procedures in teaching children with autism the responses to questions about personal information. *Educational Sciences: Theory & Practice, 15*, 723-737. doi:10.12738/estp.2015.3.2654
- Akmanoglu-Uludag, N., & Batu, S. (2005). Teaching naming relatives to individuals with autism using simultaneous prompting. *Education and Training in Developmental Disabilities, 40*, 401-410.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Association.
- Appelman, M., Vail, C. O., & Lieberman-Betz, R. G. (2014). The effects of constant time delay and instructive feedback on the acquisition of English and Spanish sight words. *Journal of Early Intervention, 36*, 131-148. doi:10.1177/1053815114563613
- Berger, N. I., Manston, L., & Ingersoll, B. (2016). Establishing a scale for assessing social validity of skill building interventions for young children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 46*, 3258-3269. doi: 10.1007/s10803-016-2863-9
- Centers for Disease Control and Prevention. (2016). Prevalence of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring

- network, 11 sites, united states, 2012. *Morbidity and Mortality Weekly Report*, 65(3), 1-23.
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2<sup>nd</sup> ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Davis, M. A. C., Spriggs, A., Rodgers, A., & Campbell, J. (2017). The effects of a peer-delivered social skills intervention for adults with comorbid down syndrome and autism spectrum disorder. *Journal of Autism and Developmental Disorders*. doi: 10.1007/s10803-017-3437-1
- Delmolino, L., Hansford, A. P., Bamond, M. J., Fiske, K. E., & LaRue, R. H. (2013). The use of instructive feedback for teaching language skills to children with autism. *Research in Autism Spectrum Disorders*, 7, 648-661. doi:10.1016/j.rasd.2013.02.015
- Fetko, E. E., Collins, B. C., Hager, K. D., & Spriggs, A. D. (2013). Embedding science facts in leisure skill instruction conducted by peer tutors. *Education and Training in Autism and Developmental Disabilities*, 48, 400-411.
- Genc-Tosun, D., & Kurt, O. (2017). Effects of video modeling on the instructional efficiency of simultaneous prompting among preschoolers with autism spectrum disorder. *Education and Training in Autism and Developmental Disabilities*, 52, 291-304.
- Gold, A. (2017). Executive summary school accountability report card, 2017-18, for The Bay School. Retrieved from The Bay School website:  
[https://static1.squarespace.com/static/552df03ee4b0276351fa2652/t/596ce655d1758e3b451172cd/1500309078544/School+Accountability+Report+Card\\_2017-18.pdf](https://static1.squarespace.com/static/552df03ee4b0276351fa2652/t/596ce655d1758e3b451172cd/1500309078544/School+Accountability+Report+Card_2017-18.pdf)

Horner, R. D., & Baer, D. M. (1978). Multiple-probe technique: A variation on the multiple baseline. *Journal of Applied Behavior Analysis, 11*, 189–196.

<http://doi.org/10.1901/jaba.1978.11-189>

Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004)

Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston, MA: Allyn and Bacon.

Lane, J. D., Gast, D. L., Shepley, C., & Ledford, J. R. (2015). Including social opportunities during small group instruction of preschool children with social-communication delays.

*Journal of Early Intervention, 37*, 3-22. doi:10.1177/1053815115588828

Leaf, J. B., Cihon, J. H., Alcalay, A., Mitchell, E., Townley-Cochran, D., Miller, K., Leaf, R.,

Taubman, M., & McEachin, J. (2017). Instructive feedback embedded within group instruction for children diagnosed with autism spectrum disorder. *Journal of Applied*

*Behavior Analysis, 50*, 304-316. doi:10.1002/jaba.375

Loughrey, T. O., Betz, A. M., Majdalany, L. M., & Nicholson, K. (2014). Using instructive feedback to teach category names to children with autism. *Journal of Applied Behavior*

*Analysis, 47*, 425-430. doi:10.1002/jaba/123

Nottingham, C. L., Vladescu, J. C., & Kodak, T. M. (2015). Incorporating additional targets into learning trials for individuals with autism spectrum disorder. *Journal of Applied Behavior*

*Analysis, 48*, 227-232. doi:10.1002/jaba.179

Nottingham, C. L., Vladescu, J. C., Kodak, T. M., & Kisamore, A. N. (2017). Incorporating multiple secondary targets into learning trials for individuals with autism spectrum

disorder. *Journal of Applied Behavior Analysis, 50*, 653–661. doi:10.1002/jaba.396

- Parrot, K. A., Schuster, J. W., Collins, B. C., & Gassaway, L. J. (2000). Simultaneous prompting and instructive feedback when teaching chained tasks. *Journal of Behavioral Education, 10*, 3-19. <https://doi.org/10.1023/A:1016639721684>
- Reichow, B., & Wolery, M. (2011). Comparison of progressive prompt delay with and without instructive feedback. *Journal of Applied Behavior Analysis, 44*, 327-340.  
doi:10.1901/jaba.2011.44-327
- Simpson, R. (2005). Evidence-based practices and students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 20*, 140-149.  
<http://dx.doi.org/10.1177/10883576050200030201>
- Tekin-Iftar, E., Collins, B. C., Spooner, F., & Olcay-Gul, S. (2017). Coaching teachers to use simultaneous prompting procedure to teach core content to students with autism. *Teacher Education and Special Education, 40*, 225-245. doi: 10.1177/0888406417703751
- Tekin-Iftar, E., & Olcay-Gul, S. (2016). Increasing instructional efficiency when using simultaneous prompting procedure in teaching academic skills to students with autism spectrum disorders. *International Electronic Journal of Elementary Education, 9*, 451-472.
- The IRIS Center. (2014). Evidence-based practices (Part 2): Implementing a practice or program with fidelity. Retrieved from [https://iris.peabody.vanderbilt.edu/module/ebp\\_02/](https://iris.peabody.vanderbilt.edu/module/ebp_02/)
- Tullis, C. A., Frampton, S. E., Delfs, C. H., & Shillingsburg, M. A. (2017). Teaching problem explanations using instructive feedback. *Analysis of Verbal Behavior, 33*, 64-79.  
doi:10.1007/s40616-016-0075-1

- Virués-Ortega, J. (2010). Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose-response meta-analysis of multiple outcomes. *Clinical Psychology Review, 30*, 387-399. <https://doi.org/10.1016/j.cpr.2010.01.008>
- Vladescu, J. C., & Kodak, T. M. (2013). Increasing instructional efficiency by presenting additional stimuli in learning trials for children with autism spectrum disorders. *Journal of Applied Behavior Analysis, 46*, 805-816. doi:10.1002/jaba.70
- Werts, M. G., Caldwell, N. K., & Wolery, M. (2003). Instructive feedback: Effects of a presentation variable. *The Journal of Special Education, 37*, 124-133.  
doi:10.1177/00224669030370020601
- Werts, M. G., Hoffman, E. M., & Darcy, C. (2011). Acquisition of instructive feedback: Relation to target stimulus. *Education and Training in Autism and Developmental Disabilities, 46*, 134-149.
- Werts, M. G., Wolery, M., Holcombe, A., & Gast, D. L. (1995). Instructive feedback: Review of parameters and effects. *Journal of Behavioral Education, 5*, 55-75.  
doi:10.1007/BF02110214
- Wolery, M., Holcombe, A., Werts, M. G., & Cipolloni, R. M. (1993). Effects of simultaneous prompting and instructive feedback. *Early Education and Development, 4*, 20-31.  
doi:10.1207/s15566935eed0401\_2



**Appendix B**

## Procedural Fidelity Checklist: Category Baseline/Probe Sessions

Participant Pseudonym:

Date/Time:

Session #:

Phase:

<b>Expected Researcher Behavior</b>	<b>Behavior completed? (circle)</b>	
1. Holds stimulus card in front of participant	Y	N
2. Presents task direction (e.g., "A carrot is a")	Y	N
3. Waits for response up to 5 seconds	Y	N
4. Removes stimulus card	Y	N



**Appendix C**

## Procedural Fidelity Checklist: Listener Discrimination with IF Sessions

Participant Pseudonym:

Date/Time:

Session #:

Phase:

<b>Expected Researcher Behavior</b>	<b>Behavior completed? (circle)</b>	
1. Presents 3 stimuli cards on desk	Y	N
2. Gives verbal direction, "look," while pointing to each stimulus card	Y	N
3. Holds out left hand, palm up	Y	N
4. Presents task direction (e.g., "hand me carrot")	Y	N
5. Provides controlling prompt	Y	N
6. Provides consequence (e.g., "That's right!")	Y	N
7. Presents IF stimulus (e.g., "A carrot is a vegetable.")	Y	N
8. Removes stimulus cards	Y	N

**Appendix D**

## Social Validity Questionnaire

Questions:		1 Strongly disagree	2 Disagree	3 Agree	4 Strongly Agree
1	This treatment was effective				
2	I found this treatment acceptable for increasing the student's skills				
3	Using the treatment improved skills across multiple contexts (home, classroom, community)				
4	I think the student's skills would remain at an improved level even after the treatment ends				
5	This treatment quickly improved the student's skills				
6	I would be willing to carry out this treatment myself if I wanted to increase the student's skills				
7	I would suggest the use of this treatment to other individuals				