Effects of Feedback Statements on Staff Procedural Integrity

By

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Abstract

Supervisor feedback is a powerful and effective tool that can be used to increase employee performance. However, there is a lack of information regarding the essential components of supervisor feedback. This study investigated the effects of the number and type of feedback statements provided by a supervisor on participant's procedural integrity. Verbal corrective-corrective (CC), corrective-corrective-corrective (CCC), positive-positive (PP), and positive-positive-positive (PPP), were provided as consequences during the implementation of a receptive identification two-dimensional (2-D) picture card program. Overall, results showed that all conditions increased procedural integrity, with the PPP conditioned producing a slightly greater influence. Research, such as the current study, is needed to identify ways of providing feedback that are most effective in changing behavior that it follows. Feedback is a powerful tool for a supervisor, but like any power, needs to be used correctly and responsibly.

Keywords: feedback statements, performance, positive feedback, corrective feedback

Table of Contents

List of Figures

List of Tables

List of Appendices

The Effects of Feedback Statements on Staff Procedural Integrity

Feedback is an effective and low-cost procedural element of effective supervision (Vonderen, 2004). Performance feedback has been utilized to improve teacher adherence to protocols (DiGennaro et al., 2007; Martens et al., 1997), behavior support plans (Codding et al., 2005), and teacher performance (Ingham & Greer, 1992) in classroom settings. Unfortunately, beyond initial training, many supervisors are not afforded ongoing training on how to provide meaningful supervision to others (DiGennaro Reed & Henley, 2015). DiGennaro Reed and Henley (2015) conducted a survey of 382 individuals recruited through the Behavior Analyst Certification Board's (BACB®) directory and self-reports obtained from Board Certified Behavior Analyst (BCBA®) active on behavior analytic social media platforms. Of those surveyed, 66.3% reported that their current organization did not provide training on how to effectively supervise others (DiGennaro Reed & Henley, 2015). Colombo et al. (2020) extended these findings by surveying 125 Board Certified Behavior Analyst – Doctoral and BCBAs. They found that 43.2% of respondents reported they did not receive initial or ongoing support or training in general. A lack of initial and ongoing support and training could result in ineffective treatment implementation by staff, which could reduce consumer outcomes and compromise the client's right to effective treatment (Van Houten et al., 1988).

Serving those with disabilities, staff turnover can have deleterious effects on not only the organization but, more important, the clients (Wine et al., 2020) and remaining staff members (Sulek et al., 2017). Kazemi et al. (2015) conducted an online survey 96 behavior technicians and found that training, supervision, and pay were predictors of behavior technicians' turnover. Behavior technicians are paraprofessionals whose primary responsibility is to implement direct one-on-one applied behavior analysis (ABA) techniques with individuals diagnosed with autism

spectrum disorder (ASD). Across a survey of a variety of human service settings, staff turnover cost an average of $3,278 per employee in 2004 (Larson et al., 2016). This included separation costs, hiring costs, and costs related to training a new employee (Larson et al., 2016). The United Cerebral Palsy and American Network of Community Options and Resources Foundation (2020) published the *Case for Inclusion,* which assessed all 50 states and the District of Columbia in 2020 and found that the national turnover rate for direct support care employees was 43.8%. The turnover rate of direct support care employees is much higher than the average U.S. turnover rate in all other industries (3.7%) (U.S. Department of Labor, Bureau of Labor Statistics, 2020).

Feedback

Performance feedback may be defined as information on performance that allows the individual to change or improve their behavior (Daniels, 2016). One way to support employees is through the role of the supervisor. Supervisors may provide training and supervision through the use of performance feedback. In the field of Organizational Behavior Management, performance feedback is a common intervention (Johnson, 2013). Feedback can increase desired performance while keeping relative cost low (Prue & Fairbank, 1981). Performance feedback has been utilized to improve many behaviors including, teacher adherence to protocols (DiGennaro et al., 2007; Martens et al., 1997), safe lifting procedures (Alavosius & Sulzer-Azaroff, 1986), workplace safety (Sasson & Austin, 2005), and seat belt use of pizza delivery personnel (Ludwig & Geller, 1991).

In a meta-analysis of articles published between 1985 - 1998 on the application of feedback, Alvero et al. (2001) found that although feedback alone was the most commonly used method, it was only effective in 47% of cases. Researchers have discovered there are many variables that may influence the effectiveness of feedback. For example, efficacy increased when

consequences (e.g., raises or fines) were combined with antecedent procedures (Godbey & White, 1989; LaFleur & Hyten, 1995). When feedback as a consequence was combined with antecedents such as staff training, task analyses, and task objectives, this combination was effective in 100% of cases (Godbey & White, 1989; LaFleur & Hyten, 1995).

Performance feedback can be provided in many different forms and combinations. Alavosius and Sulzer-Azaroff (1991) found the use of written and verbal feedback effective in increasing the use of safe lifting procedures of employees in a residential facility. Correspondingly, Hagermoser Sanetti et al. (2007) provided feedback to second-grade teachers using a consultant during in classroom observations. The authors found that verbal feedback combined with graphic feedback was more effective than verbal feedback alone in increasing implementation of behavior support plans in a school setting. Burke and colleagues (2012) used what they called a hybrid form of feedback called visual performance feedback (VPF) to increase staff use of behavior specific praise. Visual performance feedback combined the use of graphed target behaviors with verbal or written feedback. Burke and colleagues found that, compared to traditional supervision feedback, using VPF was more time-efficient and prevented observer drift over time. Traditional supervision feedback consisted of only verbal feedback and took between 10 - 12 min to provide, compared to VPF which took seconds to complete (Burke et al., 2012)

Other elements, such as the immediacy and density of feedback, have also been studied (Yu et al., 2013). Immediate and high-density feedback was more effective than delayed and low-density feedback using an automated feedback system for a safe sitting posture (Yu et al., 2013). The automated feedback consisted of chair sensors that were activated by weight. Feedback was defined as the frequency at which the pop-up window for safe sitting posture appeared, high-density feedback was defined as every 10 seconds as opposed to low-density

feedback which appeared at the end of the 6 hr session. If the participant was out of the safe sitting posture position for greater than 14 s a visual would appear on the participant's computer screen indicating the area of the body that needed to be repositioned (Yu et al., 2013). In sum, despite the form in which feedback is provided, feedback has been found to increase performance across a variety of behavior in a variety of settings.

Function of Feedback

Although there is consensus that feedback can be effective in increasing desired behaviors and decreasing undesired behaviors, there is little consensus on how or why feedback changes behaviors. Researchers have agreed that feedback may serve multiple functions (Aljadeff-Abergel et al., 2017; Duncan & Bruwelheide, 1985), such as a discriminative stimulus (Aljadeff-Abergel et al., 2017; Duncan & Bruwelheide, 1985), conditioned reinforcer, conditioned punisher, or motivating operation (Peterson, 1982). For example, feedback may serve as an establishing operation, when information is provided to the worker on how their work will benefit themselves and the company. Duncan and Bruwelheide (1985) provided the example of a worker who was informed that an increase in their work production would provide them a greater percentage of profit share in the company. Thus, the increase in company profit shares makes the work production more valuable as it increases the money gained to the worker. Sundberg (2012) used feedback as a consequence to increase the rate of checks that were inputted correctly into a simulated computer system. Based on participants verbally reporting they were trying to attain higher rates, Sundberg postulated that the feedback potentially functioned as a motivating operant for future behavior.

Some published literature supports the contention that feedback, in some cases, might function as a discriminative stimulus for performance. For example, Aljadeff-Abergel et al.

(2017) had four undergraduate students implement the Direct Instruction program called Language for Learning (Engelmann & Osborn, 1999) with eight preschool-aged children. The researchers examined the influence of the temporal location of the feedback, by providing the feedback either immediately before or after the session (Aljadeff-Abergel et al., 2017). Feedback consisted of reporting the percentage of steps completed correctly by each participant, comparing these results to previous performance, reminding participants of the targeted performance percentage, example and non-examples of skills observed, and if the performance was satisfactory or not. They found feedback provided immediately before a session was more effective than feedback provided after the session in increasing the students' use of specific praise and correct implementation of an error correction procedure (Aljadeff-Abergel et al., 2017). Thus, Aljadeff-Abergel et al. hypothesized that feedback served as an antecedent and a discriminative stimulus signaling approval. Similarly, Duncan and Bruwelheide (1985) provided feedback about a previous day's work at the beginning of the next workday and found it enhanced staff performance, thus possibly serving as an antecedent or a discriminative stimulus signaling the behavior that was more likely to be reinforced (Duncan & Bruwelheide, 1985).

Other researchers have supported the contention that feedback functions as a consequence, either reinforcing or punitive. For example, Johnson (2013) conducted a component analysis comparing no feedback, combined evaluative and object, evaluative alone, and objective alone feedback. The task required undergraduate students to process simulated bank checks using computers. Evaluative feedback consisted of statements such as excellent, good, average, or poor. These evaluative feedback statements were determined based on the number of checks correctly processed. Objective statements consisted of information about their performance such as the number of checks processed correctly. Compared to baseline, both the

evaluative and objective feedback increased performance. When evaluative and objective feedback were combined, the number of correctly inputted checks was the highest. Johnson suggested that evaluative feedback may have served as an establishing or abolishing operation, which may have increased or decreased the effects of the objective feedback as either a reinforcer or punisher.

In attempts to study why feedback changes behavior, researchers have studied the influence the recipient's perceptions of feedback. The operant perspective hypothesizes that feedback may serve multiple functions across individuals due to the individual's history of reinforcement or punishment (Prue & Fairbank, 1981; Skinner, 1974). The function of feedback is dependent on the feedback history of the individual (Choi et al., 2018). In this case, feedback could function as either a positive reinforcer or punisher for future behavior. Knowledge about an individual's feedback history is an important variable that should be considered in the context of supervision, and if possible, controlled for during research on feedback. To investigate the impact of the exact wording of feedback statements, Choi and colleagues (2018) used feedback statements to assess the receiver's emotional states while completing a virtual mobile phone assembly simulated task. Emotional states were assessed using the questionnaire items of the Warr's (2007) Likert scale survey. Depending on the history of the individual Choi and colleagues observed either an increase or decrease in the correct decisions made during quality checks in the phone assembly task.

Feedback Statements

In general, the term "feedback" cannot adequately describe the relevant variables sufficiently in order to determine difference in the functions of a behavior. Due to the use of treatment packages that include multiple elements of feedback, it is difficult to determine the

most essential component(s) of feedback (Vonderen, 2004). Michael (1980) criticized the field of behavior analysis for studying "omnibus" variables such as feedback, for feedback lacks consistent procedures. Thus, feedback is usually implemented in many different ways with many different components, perhaps making it difficult to experimentally study. Much of the research on feedback has focused on variables such as the form, immediacy, and density of feedback. There has been little research in the area of the specific statements provided during feedback. For example, researchers have found that statements two statements of either positive (PP) or negative feedback (NN), were more effective than mixed PN or NP statements (Choi et al., 2018). As noted, earlier Choi et al. (2018) examined the effects of uniform feedback statements on the quality control of mobile phone assembly in undergraduate and graduate students. The researchers compared the average number of correct decisions made during the quality control checks and found that participants receiving the PP conditions completed the most work tasks correctly. The lowest performing participants were those who received the mixed (NP or PN) feedback. In addition to examining the effect of feedback statement, Choi et al. also used the Warr (2007) Likert scale questionnaire to evaluate emotional responses. Not surprisingly, participants had more positive emotional responses during the PP condition and more negative emotional responses during the NN condition. Positive responses included reported feelings of surprise, happiness, satisfaction, or excitement (Choi et al., 2018). Negative responses included reported feelings of anxiety, nervousness, boredom, or discouragement (Choi et al., 2018). Choi et al. concluded that uniform feedback such as PP or NN was more effective than mixed feedback statements (PN or NP) in the number of work tasks completed correctly.

A popular form of feedback, referred to as the "feedback sandwich," places the corrective or negative feedback between two positive feedback statements (James & Shepard, 2001). The

feedback sandwich can be referred to as positive-corrective-positive (PCP). For example, “great job implementing the program, you failed to prompt correctly, but showed great energy.” The feedback sandwich was developed by Wyatt Woodsmall while conducting research for the United States Army on how officers should provide feedback to army recruits (James & Shepard, 2001). According to Nelson and Quick (2013) use of the feedback sandwich may reduce the defensiveness of the receiver, improve communication, and increase tolerance of feedback. Sandwiching corrective feedback between positive feedback has been used in a multitude of fields such as medicine (Dohrenwend, 2002), education (Kimball & Jazzar, 2011; Leibold & Schwarz, 2015), sports training (Docheff, 1990), and management (Cherches, n.d.).

Controlled studies using easily accessible students as subjects have shown the feedback sandwich to be more effective than only corrective or no feedback (Prochazka et al., 2020). Prochazka et al. claimed that the feedback sandwich was more effective based on the result that participants who received the feedback sandwich solved more mathematical problems than the participants who received only corrective or no feedback. The authors supported their findings by citing that Henley and DiGennaro Reed (2015) who found the feedback sandwich resulted in a greater completion of an administrative task than positive-positive-corrective (PPC) feedback. However, Prochazka et al. failed to mention that Henley and DiGennaro Reed also found that the corrective-positive-positive (CPP) condition produced greater task completion than both the PPC and PCP conditions. Thus, the effectiveness of the feedback sandwich can vary depending on the other types of feedback and possibly the task.

Despite the popularity of the feedback sandwich, research has shown very little empirical support for its use or the PCP sequence. In terms of feedback containing three statements, researchers have found no differential effects between the different mixed sequences (PCP, CPP,

PPC; Henley & DiGennaro Reed, 2015; Slowiak & Lakowske, 2017). Henley and DiGennaro Reed (2015) compared no feedback, PCP, CPP, and PPC in a simulated office task completed by eight undergraduate students. Office tasks included folding brochures, stuffing envelopes, collating packets, and filing timesheets. Feedback sequences consisted of a specific positive statement, general positive statement, and a specific corrective statement that focused on the quality or accuracy of the student's performance. The rate at which the students completed the office tasks was compared to baseline for each of the feedback sequences. Henley and DiGennaro Reed found that for those in the pre-session feedback condition, CPP resulted in the greatest percent change and PPC resulted in a decrease of percentage change. Similarly, for those in the post-session feedback condition, the CPP resulted in the greatest percent change and the no feedback condition resulted in a decrease percentage change (Henley & DiGennaro Reed, 2015). The authors noted that the amount of information provided before the first corrective statements may have resulted in performance differences.

Slowiak and Lakowske (2017) conducted a study similar to that of Henley and DiGennaro Reed (2015) and examined the quantity and quality of task performance and persistence toward performance-based goals. Slowiak and Lakowske compared the conditions of no feedback, PCP, CPP, and PPC. Thirty-six undergraduate students were asked to input medical transcription data into a computer in a simulated job environment. In addition to access to relevant task-related materials, the students also had access to distractors such as computer games and the Internet (Slowiak & Lakowske, 2017). Each experimental session lasted 12 min and was followed by a 5 min break, but students were allowed to take a break at any time. During the break, the students were provided feedback on their performance during the previous trial. The adherence to goals, quantity and quality (accuracy) of the medical transcripts were

compared across the four conditions. With the use of performance-based goals as a constant additional variable, Slowiak and Lakowske found no differences between the different feedback sequences compared to the no-feedback condition. Students preferred the CPP feedback statement sequence followed by the PCP, but student preference did not correlate with increased performance. Slowiak and Lakowske hypothesized that one reason for a lack of differential effects may have been due to the simplicity of the work tasks. In contrast to a controlled experimental setting, Slowiak and Lakowske stated it may be more realistic to provide feedback on a multitude of performance tasks in an applied setting. Due to this limitation, the authors indicated the need to assess the effects of feedback statement on multifaceted tasks performance.

In addition, Sundberg (2012) compared the effects of information on performance, the feedback sandwich, and post-choice conditions. Participants were undergraduate students and were required to input dollar and cents amounts into a computer program that corresponded to a check image. Sundberg focused on the average number of checks completed correctly per session as the dependent variable. During the information on performance condition, participants received feedback on the number of correctly inputted checks. During the feedback sandwich condition, participants received general feedback. General feedback included statements such as "great job" or "not quite as high as last time" (Sundberg, 2012). In the choice condition, participants chose the type of feedback they would like to receive. Overall, participants preferred the information on performance over the feedback sandwich. Although there were slightly higher rates of checks completed correctly in the information only condition, Sundberg found no differential effects between the information on performance and feedback sandwich conditions. The study indicated that both types of feedback improved performance compared to baseline. Sundberg also emphasized the results of the choice condition, where participants reported that

receiving corrective feedback thwarted motivation. Thus, the corrective feedback may have functioned as a punisher and decreased the number of checks completed correctly. There have been no studies to date that have directly compared the effects of uniform two- versus three-feedback statements on the accuracy of a multiple performance task.

In sum, the extant literature generally supports the contention that feedback can enhance behavior change. In the context of staff performance, results have been mixed, due to the large number of variables that can influence the effectiveness of performance feedback. Factors such as the type of feedback (corrective or positive), the amount of feedback (two or three statements), and the order of feedback (CP or PC) can have differential effects on the behavior of the population being studied. There is a lack of research about the essential elements of feedback and that may be one reason why less effective supervision techniques such as the feedback sandwich continue to be used today. Thus, the present study investigated the effects of two and three feedback statements provided by a supervisor on procedural integrity. Verbal feedback was provided as a consequence during the implementation of a receptive two-dimensional (2-D) picture card program. The aim of this study was to investigate the effects of different amounts and forms of sequential corrective or positive feedback statements on procedural integrity.

Method

Participants and Setting

Participants were two Registered Behavior Technicians (RBTs) who implemented ABA procedures with children in the home setting. Participants were 26 and 33 years of age with one and two years of experience (respectively) working with children with ASD or other developmental disabilities. The participants were employees of a company providing in-home ABA services located in the Midwest. Participants completed the 40 hr training packet requirements based on the RBT Task List (2nd ed.) required by the Behavior Analyst Certification Board (BACB; 2020). The 40 hr training was completed through the Relias Academy© Autism Therapy Curriculum RBT training (Relias Academy LLC, 2020). The Relias Academy is an authorized continuing education course approved by the BACB. Participants were also required to have worked with their client for at least three months.

The two participating children were three and seven years of age with a diagnosis of ASD with various levels of severity and intellectual and language impairments. The Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008) was used to determine current levels of language and social competence. This particular assessment approach is developed for children with ASD and other developmental disabilities and based upon ABA with a focus on Skinner's (1957) analysis of verbal behavior. The VB-MAPP can help identify a student's strengths and weaknesses across a variety of critical skills (Sundberg, 2008). At the start of the study, Child 1 was male, with a most recent VB-MAPP overall score of 55 out of 170 (see Table 1) (Sundberg, 2008). Child 2 was female, with a most recent VB-MAPP overall score of 30 out of 170 (see Table 1) (Sundberg, 2008). Prior to the start of this study, both children were referred for ABA services by a physician. Approval from the parents of the children and the

University of Kansas Human Research Protection Program Institutional Review Board (IRB ID 00146424) were obtained prior to the start of the study.

Sessions occurred in the child's home at a table with at least two chairs. The table and chairs were located in the kitchen of the child's home. The participant and child sat next to each other in order to allow for prompting procedures.

The researcher functioned as the supervisor of the participants and delivered the feedback to participants remotely using Zoom tele-conferencing. All tele-conference sessions were conducted through a Health Insurance Portability and Accountability Act-secure Zoom license provided by the state's telehealth network (Health Insurance Portability and Accountability Act [HIPAA], 1996). Video of the sessions were recorded with Zoom using the record option to collect treatment integrity data and reliability. Recorded videos were stored on the supervisor's personal laptop that required password-protected access.

Discrete Trial Training and Errorless Teaching

Due to the ASD diagnosis of the participants and discrimination being a new skill, discrete trial training (DTT) procedures were used in the current study to implement the 2-D receptive identification program. For children diagnosed with ASD, DTT and errorless teaching are common instructional technique that transfer stimulus control from a response prompt to the natural stimuli with minimal errors (Cooper, et al.,2020; Frea & McNerney, 2008). During the DTT procedures, an errorless teaching procedure with a most-to-least (MTL) intrusive prompting procedure, or a least-to-most (LTM) intrusive prompting procedure was used. Errorless teaching and MTL prompting were used to increase visual discrimination skills, decrease avoidance, and decrease aberrant behaviors during difficult tasks in two teenage children with severe intellectual disabilities (Weeks & Gaylord-Ross, 1981).

Prompt levels were determined based on the necessary prompt for the child to emit the correct response as indicated in baseline. A LTM prompting procedure was used for Participant 1 and an errorless teaching with MTL prompting procedure for Participant 2. The prompting hierarchy from most to least intrusive was as follows (a) hand-over-hand guidance, (b) hand-over-wrist guidance, (c) hand-at-elbow guidance, (d) gestural, (e) model, (f) verbal, then (g) positional prompt (Jerome et al., 2007). The supervisor instructed to fade the prompt and instructed the participant to use the next less-intrusive prompt, when the child correctly identified the requested picture card at the previous prompt level for three consecutive trials. If the child failed to identify the correct picture card at the less intrusive prompt level during the first trial of the less intrusive prompt level, the participant was instructed to return to the more intrusive prompt. When the child correctly identified the requested picture card at that prompt level for three consecutive trials, a less intrusive prompt was implemented.

Dependent Variables and Response Measurement

The primary dependent variable was the percentage of correctly implemented DTT steps (see Table 2). These steps included both the teaching protocol for the learning tasks (see below) and data collection of child performance. The secondary dependent variable the number of 2-D picture cards acquired by the child participants during the treatment condition.

During teaching sessions involving the participant and child, the supervisor collected data on the participant's correct or incorrect implementation of the receptive identification program according to the task analysis. Participant procedural implementation was scored as either correct (+) if the participant implemented the step as instructed, or incorrect (-) if the participant deviated from the instruction or omitted a step. Errorless teaching and DTT procedures were used and included a predetermined set of instructional components (see Table 2), such as

arranging the picture cards in the indicated field, gaining the child's attention, providing the discriminative stimulus, and correctly responding to the child's response (Vonderen, 2004). The appropriate field of the picture cards was determined based on the child's ability to attend to, scan, and process visual information (Grow et al., 2011). The field was determined prior to start of the study during probed session with other similar materials. The pace of instruction was tailored to each child's response latency. For each child the task analysis provided to the participant indicated the field, prompt level, and response latency, based on the child's responding during the previous session. The accuracy of implementing the DTT procedures was calculated by scoring whether each step was implemented correctly, divided by the total number of procedural steps, multiplied by 100.

The participants used an electronic data collection software, Catalyst, by DataFinch (DataFinch Technologies, Inc., n.d.). Each participant was equipped with a company-issued iPad, which was connected to Wi-Fi to collect data using the Catalyst system. This allowed the participant to capture the correct or incorrect child responding and the prompt level used. Correct child responding was if the child independently identified the requested picture card. An incorrect was defined as the child requiring a prompt, in this case the participant recorded the necessary prompt used. Simultaneously the supervisor also collected data on the child's responding. The participant correctly implemented the data collection step in the task analysis if the participant and supervisor data collection matched. If the participant and supervisor data collected did not match, this was considered an incorrect implementation of the data collection step of the participant task analysis. Child performance data were analyzed and reported based on the overall number of 2-D picture cards receptively acquired over the course of the study.

Materials

The participants taught both children 2-D picture cards. There were five categories: food, colors/shapes, animals, personal/school items (e.g., spoon, toothbrush), and household items (e.g., T.V., chair). Picture cards were royalty-free photos obtained through ShutterStock.com (ShutterStock, n.d.), Pexels.com (Pexels, n.d.), and Stock.Adobe.com (AdobeStock, n.d.). The items were printed in color and placed against a white background in order to reduce the influence of other controlling variables, such as the stand that held the TV. The picture cards were laminated and were 9 by 6½ cm. This receptive identification task was determined based on the participating children's skill level determined by the VB-MAPP, which was completed by the supervisor prior to the start of the study. The items for the picture cards were based on the first 220 nouns list of the Assessment of Basic Language and Learning Skills Revised (ABLLS-R; Partington, 2006).

Participant 1 was also provided access to Boom Cards (Boom Learning, n.d.), an online interactive learning platform that used the same paper images. Zoom conference occurred via the child parent's laptop connected to Wi-Fi.

During the study, the participants instructed the children on this receptive identification task. Mastery criterion of an identification card was set at 100% independent identification of the named card, over three consecutive trials.

Participant Training

Prior to the start of the study and as part of participant's employee onboarding procedures with the agency, all employees were required to complete the 40 hr Autism Therapy Curriculum through Relias Academy, which was conducted asynchronously within a 1-week period. There were two sections on DTT, an introduction and the details on implementation. The introduction included information about the history, requirements of each component, prompting procedures,

prompting hierarchies, and steps (Relias Academy LLC, 2020). The DTT implementation learning objectives included implementation of essential components, integrating basic ABA principles, maintenance, and generalization procedures. (Relias Academy LLC, 2020). Employees were then required to pass the Relias Academy (20202) exam.

After completion of the Autism Therapy Curriculum, the employees completed the BACB-required RBT Competency exam via in-person observation by a BCBA employed by the agency. During this competency exam, the employee was required to implement DTT procedures with a child or in a role-play context. The BCBA provided feedback and modeled areas that needed to be corrected. The employee was required to display proficiency as judged by the BCBA. Next, employees were required to pass the BACB RBT exam; if all steps were completed, the employee earned the title of RBT. Finally, before starting with their own clients, participants completed three in-person observations with a lead RBT out in the field. The lead RBT was employed by the same agency, the three observations were conducted over the course of two weeks, each lasting between two t0 three hours in length. Employees were required to take data, ask questions, and implement procedures. The process above was a standardized employee onboarding process for this agency.

In order for the BCBA to conduct the RBT competency exam, the BACB required the BCBA to (a) be in good standing, (b) be certified for at least one year, (c) be an active BCBA, (d) complete the required continuing education units (CEU), (e) complete eight hrs of supervision CEUs, (f) abide by the BACB's Professional and Ethical Compliance Code for Behavior Analyst (BACB, 2019), and (g) have no reported violations of that code.

Each participant was paired with a child. Participants were instructed to use DTT procedures to implement the receptive identification program. In the current study, prior to

implementation of the program, participants were provided staff training on the implementation of the receptive identification program, a step-by-step task analysis, and task objectives with target performance percentages. Training on how to implement the receptive identification program occurred via Zoom tele-conferencing during a group meeting outside of scheduled sessions with the supervisor. Training included program introduction, visual of the task analysis (see Table 2), role-play, feedback, and another role-play opportunity. Role-play opportunities were conducted with three adults, one adult acting as the child. Mastery criterion was set at the participant implementing all of the steps of the task analysis with 90% - 100% fidelity across three consecutive trials. Feedback was provided in the form of verbal feedback with a model of the correct procedure.

Experimental Design and Procedures

A multielement design with a baseline phase was used to compare the effects of the different amounts and forms of feedback statements (CC, CCC, PP, PPP; Henley & DiGennaro Reed, 2015; Slowiak & Lawaske, 2017). In the multielement design, staff procedural integrity was measured over time to provide a baseline against which the effect of the feedback statements would be evaluated. The multielement design assessed the effects of each of the feedback statements, in an alternating fashion, on the participant's accuracy of procedural implementation. Each participant began in the baseline condition and remained in baseline for at least three data points, stable responding and/or a counter therapeutic effect was observed. The feedback statement condition was then applied to each participant. The order of instruction was predetermined.

In order to minimize any potential carryover effects, (inherent in the multielement design), several strategies were employed. First, feedback statements were associated with

different training sets (e.g., household items; foods) during training. Second, each feedback condition was associated with a colored cue card that was placed on the table during each training session. For example, a green cue card indicated it was the corrective-corrective feedback condition. Third, the feedback sequence delivered within each session was randomly determined and counterbalanced across sessions. Fourth, each training session involved an alternation of the participant training a skill set targeted for the current study, and then training a skill set unrelated to this study. In other words, to minimize any potential carryover effect, the participants never trained two consecutive skill sets that involved the feedback conditions being studied; rather, participants interspersed the targeted training across the session. For example, between set one and two of the picture cards, the participant trained pretend play. This also provided time for the supervisor to set up the feedback statements based on the participant's previous performance according to the provided script (see Table 3). During these nontargeted training trials, the supervisor gave feedback similar to baseline conditions (see below).

Baseline

Prior to the start, participants were told that the purpose of the study was to evaluate the use of supervision provided through Zoom tele-conferencing. During baseline, no verbal feedback was provided to the participant on their implementation of the training protocols. Feedback was provided as usual per normal supervision on all other skills. For example, the supervisor provided feedback on other skills such as general compliance and following one-step instructions. Baseline data were collected for at least three sessions until stable responding or a counter-therapeutic trend occurred. The first trial of the treatment condition was an untargeted set of picture cards. During the first trial of the treatment condition, the participant implemented the first set of five picture cards having received no prior feedback.

Feedback Conditions

Positive and corrective feedback statements were delivered with influencing participants' training fidelity. The supervisor employed these sequences. The independent variable was the different amounts and type of feedback statements. These included a sequence of two corrective statements (corrective-corrective [CC]), three corrective statements (corrective-corrective-corrective [CCC]), two positive statements (positive-positive [PP]), or three positive statements (positive-positive-positive [PPP]). The feedback sequence and associated skill set were held constant throughout the study. For example, three positive statements (PPP) were always provided for the 2-D picture category of household items. In order to provide feedback that contained information on which the participant could improve, feedback statements consisted only of objective information. In other words, the supervisor followed feedback statement examples (see Table 3) substituting the current performance measurements of the participant.

Participants ran the receptive identification program, each set consisting of 5 trials, lasting an average of 3 min, and no more than 25 trials during the 30 min session. Sessions occurred one to two times a week. The supervisor instructed the participant to place the colored cue card (representing the feedback condition in use) on the table to indicate the feedback condition. The participant then placed the 2-D picture cards on the table in the indicated field or number of cards and asked the child to identify the targeted picture card (see Table 1).

The supervisor provided feedback on the previous set of picture cards. The supervisor began the feedback focusing on the procedural step with the lowest percentage and continued the feedback on the procedural steps with an increasing number of errors (similar to Vonderen, 2004). This hierarchy was chosen to enable the supervisor to provide corrective feedback on the most affected incorrect steps. If the participant was under the positive feedback condition, the

supervisor provided feedback starting with the procedural step with the highest percentage, then worked down from there. For example, if under the two positive feedback condition (PP), the participant provided the instruction, prompted appropriately, and gained the child attention all at 100%, the supervisor provided feedback in the order of task analysis beginning with gaining the child's attention, providing the instruction, and then prompting appropriately.

In the case that multiple procedural steps were equal in percentage either in the corrective or positive conditions, feedback was provided in the order in which the steps were outlined. For example, if after five trials the participant performed equally on providing the instruction, gaining the child's attention, and collecting data. The supervisor provided feedback in the following order: gaining the child's attention, providing the instruction, and collecting data.

CC

During this condition, the supervisor provided the participant two corrective feedback statements on the participant's performance on the previous set of picture cards. For example, "You did not obtain the child's attention prior to providing the first instruction and only correctly collected data for two out of the five picture cards."

CCC

The supervisor gave the participant three corrective feedback statements on the participant's performance on the previous set of picture cards. For example, "Your accuracy was 60% and the goal is 80%. For incorrect responses be sure to reinstruct. The pace was too slow to keep the child's attention."

PP

During this condition, the supervisor provided the participant two positive feedback statements on the participant's performance on the previous set of picture cards. For example,

"Your procedural accuracy was 80% which was higher than last time. Your prompt was effective, and you prompted appropriately."

PPP

The supervisor gave the participant three positive feedback statements on the participant's performance on the previous set of picture cards. For example, "You prompted correctly during four out of the five trials, collected data on all five cards correctly, and provided reinforcement for every response."

The supervisor provided feedback using the assigned feedback condition. Feedback was provided on the set of picture cards within one min of completion of the set. The feedback duration never exceeded 60 sec.

Null Circumstances

If a participant completed all procedural steps without any errors under the corrective feedback conditions, this trial was considered null, no positive or corrective feedback was provided, and the trial not counted. If one trial was null, then the entire session was not used in the data analysis. The participants were not exposed to any corrective or positive feedback and data was not collected for this session. Similarly, if the participant completed all of the procedural steps with all errors under the positive feedback conditions in the prior set of picture cards, the, this trial was also considered null and did not count, and no positive or corrective feedback was provided. If the participant did not display enough errors to satisfy the number of condition feedback statements, this trial was also considered null. For example, under the three corrective feedback statements conditions, if the participant only made two errors across the procedural implementation steps this trial was considered null.

Highest Percentage Condition

Once the participant met the mastery criterion of 90% - 100% across all four feedback statements and showed stable responding for at least three sessions, the researchers placed the participant into the condition with the highest percentage during which the supervisor only provided the feedback sequence that produced the greatest percentage of procedural integrity. The supervisor again collected data on the participant's correct and incorrect procedural implementation of the 2-D receptive identification program. The highest percentage condition continued for three sessions.

Maintenance

Once the participant completed the three sessions of the highest percentage condition at 90% - 100%, the researcher placed the participant into a maintenance condition that occurred two weeks after the last highest percentage condition session. During the two weeks, supervision occurred as it did in baseline conditions. No specific feedback or additional training was provided for the receptive identification tasks during the two-week period. During maintenance, the supervisor again collected data on the participant's correct or incorrect procedural implementation of the receptive identification program for one session.

Interobserver Agreement

Interobserver agreement (IOA) data were collected on the participant's procedural implementation. Interobserver agreement data were collected using a checklist listing all the steps in the task analysis (see Table 2); a plus sign (+) was used for the correct implementation and a negative sign (–) was used for the incorrect implementation. Secondary observer data were collected from video recordings of the baseline and treatment condition sessions. Across the two participants, IOA was collected for a total of four out of the nine session, or 44.4% of baseline sessions. Across the two participants, IOA was collected for a total of five out of the 14, or

35.7% of treatment conditions sessions. Interobserver agreement was calculated using a trial-by-trial agreement. An agreement was scored when the primary and secondary observers both indicated a step was implemented correctly or incorrectly by the participant. To calculate the IOA, the number of trials with agreements were divided by the total number of trials, multiplied by 100%. For participants implementation, the IOA between the primary and secondary observer during baseline conditions ranged from 82% - 88.9% (*M* = 85.5%). Interobserver agreement between the primary and secondary observer during treatment conditions ranged from 89.4% - 97.8% (*M* = 93.8%).

Treatment Integrity

In order to ensure that the correct procedures were followed by the supervisor, a trained secondary observer collected treatment integrity data on the number of steps correctly implemented by the supervisor. Supervisor treatment integrity data were collected using a checklist of all the supervisor steps in the task analysis (see Table 4), a plus sign (+) was used for the correct implementation and a negative sign (-) was used for the incorrect implementation. Treatment integrity data were completed by the secondary observer viewing video recording of the session. Treatment integrity was collected for 5 out of the 14, or 35.7% of the treatment condition sessions. Treatment integrity was calculated by dividing the total amount of (+) scores by the total number of opportunities multiplied by 100%. Treatment integrity data on the supervisor's implementation of feedback statements ranged from 89% - 100% (*M* = 94.5%).

Social Validity

A post-intervention questionnaire was used to assess perceived effects, feelings of stress, and preferences for future feedback. The questionnaire (see Appendix A) consisted of ten questions. Questions about perceived effects and feelings of stress contained 5-point Likert

scales (1 = Not at all, 2 = Somewhat, 3 = Neutral, 4 = A lot, 5 = Completely/Great Deal). Questions about preferences and future preferences of feedback consisted of response such as corrective/positive, minimum/maximum, and more/less. The participants completed the questionnaire on their own without the primary observer present. Social validity measures were implemented after the highest percentage condition was completed. The post-intervention questionnaire was not required and optional.

Results

Participant 1

Data for Participant 1 are depicted in Figure 1. During baseline his percent of procedural integrity increased initially from 53% to 74%, (*M* = 61.75%), but then showed a decreasing trend. During the first trial of the first treatment condition, Participant 1 continued to display a procedural integrity percentage within the baseline range of 69%. Participant 1 had a total of seven sessions during the feedback condition. The PPP statements had the largest effect on accuracy, ranging from 89% - 97% (*M* = 94.7%). Performance during the CC condition ranged from 77% - 100% (*M* = 92.58%). Performance during the PP condition ranged from 89% - 97% *(M* = 92.57%). Performance during the CCC condition ranged from 83% - 100% (*M* = 91.14%). Across the four feedback conditions, overall feedback condition performance was variable for **Participant 1.**

Immediately after the mastery criterion was met for the treatment conditions, the participant was placed in the highest percentage condition (see Figure 1). During this condition, percent of procedural integrity ranged from 98.5% - 100% (*M* = 99.5%). Maintenance was conducted two weeks later, and his procedural integrity was 94%.

Participant 2

Data for Participant 2 are depicted in Figure 2. During baseline, data indicated Participant 2 had an increasing trend that stabilized during the fourth session of baseline. Her percent of procedural integrity ranged from 48% - 79% (*M* = 66.6%) but showed stable responding. During the first trial of the first treatment condition, Participant 2 continued to display a procedural integrity percentage within the baseline range of 76%. Across the feedback conditions, PPP statements had the largest effect on accuracy for the participant, with the precent of procedural

integrity ranging between 93% - 100% (*M* = 97.7%). Corrective-corrective-corrective statements had the second largest effect, with a range of 91% - 100% (*M* = 97.29%). Corrective-corrective statements ranged from 94% - 100% (*M* = 96.43%). Under the PP condition, performance ranged from 89% - 100% (*M* = 93.71%).

During the highest percentage condition (see Figure 2), Participant 2's precent of procedural integrity ranged from 98% - 100% *(M* = 99.33%). On the maintenance probe, her accuracy was 96%.

The feedback conditions were further analyzed by comparing corrective versus positive and two versus three statements.

Two versus Three Statements

Two versus three corrective statements for Participant 1 (top panels) and Participant 2 (bottom panels) are displayed in Figure 3. Participant 1 had a greater percentage of procedural integrity under two corrective statements (*M* = 92.58%) compared to three corrective statements (*M* = 91.14%). For the CC condition, this participant's level of fidelity varied considerably, with a low of about 77% accuracy, to a high of 100%. The CCC condition had less variability, but eventually, both conditions produced very high accuracy. There was 42.9% overlap between data points for two versus three corrective statements for Participant 1.

Participant 2 had a greater percentage of procedural integrity under three corrective statements (*M* = 97.29%) compared to two corrective statements (*M* = 96.43%). For this participant, her performance in both of these conditions showed similar stability. Accuracy in the CC condition ranged from about 88% to 100%. Variability for Participant 2's CCC condition ranged from 91% - 100%. There was 28.6% overlap between the data points for two versus three corrective statements.

For further analysis, two versus three positive statements for Participant 1 and Participant 2 are displayed in Figure 3. Participant 1 had a greater percentage of procedural integrity under three positive statements (*M* = 94.7%) compared to two positive statements (*M* = 92.57%), with five of the seven sessions in PPP scoring at the 97% level. In contrast, the PP condition resulted in two of the seven sessions at 97%. There was a 42.9% overlap between data points for two versus three positive statements for Participant 1. Participant 2 had a greater percentage of procedural integrity under three positive statements (*M* = 97.7%) compared to two positive statements (*M* = 93.71%). That is, the PPP condition resulted in consistently higher accuracy throughout the feedback condition, as compared to the PP condition. There was 0% overlap between data points for two versus three positive statements for Participant 2 until the last session, when both feedback conditions produced 100% accuracy.

Corrective versus Positive Statements

Figure 4 depicts the two corrective versus positive statements for Participant 1 (top panels) and Participant 2 (bottom panels). Participant 1 had equal mean percentages of procedural integrity under the two corrective statements (*M* = 92.58%) and two positive statements (*M* = 92.57%), although there was slightly better performance under CC over the last three sessions. Corrective-corrective produced a variable trend, ranging from a low 77% accuracy, to 100% over the last two sessions. In contrast, the PP condition had less variability, but never produced as high of accuracy as the CC condition. There was a 28.6% overlap between data points for two corrective versus positive statements for Participant 1. Participant 2's accuracy performance was initially different under the two conditions, but performance was identical across the conditions for the last three sessions. Initially accuracy in the CC condition for the first three session was higher (*M* = 96.6%), with two of the three at 98%. In contrast,

performance in the PP condition during these same sessions ranged between 89% and 93% (*M* = 90.3%). There was 57.1% overlap between data points for two corrective versus positive statements for Participant 2.

Figure 4 depicts the three corrective versus positive statements for Participants 1 and 2. Participant 1 had more consistent accuracy in the PPP condition, with five of the last seven session at about 97% (compared to the first two sessions below 90%). Accuracy in the CCC condition was considerably more variable, ranging from a low 83% to 100% (M = 91.1%). Two of the seven data points on the PPP condition overlapped with the CCC data. Participant 2's accuracy was consistent across the two feedback conditions. Positive-positive-positive showed four of the seven sessions at about 100%, as opposed to only two for the CCC condition. For both conditions, there was an increasing trend and similar data pattern. For example, accuracy in the PPP condition started at 93%, increased to 100% accuracy by the fourth session, and then eventually remained at about 100% across the last four sessions. There was 14.3% overlap between data points for three corrective versus positive statements for Participant 2.

Compared to baseline, all of the feedback conditions produced increased correct procedural integrity during the treatment conditions (see Figure 5). For Participant 1, the average percent accuracy during baseline was 61.75%, with an increase of 31% during all treatment conditions (*M* = 92.75%). Averages per condition for Participant 1 were as follows: CC 92.58%, CCC 91.14%, PP 92.57%, and PPP 94.7% The PPP condition had the greatest effect for Participant 1. For Participant 2 averaged 66% percent accuracy during baseline. When the feedback conditions were implemented, her performance increased to a mean of 96.28%. Averages per conditions for Participant 2 were: CC 96.43%, CCC 97.29%, PP 93.71%, and PPP 97.7% (see Figure 5). The greatest effect was during the PPP condition for Participant 2.

Treatment Effectiveness

The frequency of the mastered 2-D picture cards is shown in Figure 6. Child 1 had eight picture cards mastered in baseline and mastered an additional 24 picture cards during treatment. Child 1 acquired the greatest amount of picture cards under the CCC condition. Child 2 had no picture cards mastered in baseline and mastered two picture cards during treatment. Both children acquired the greatest amount of picture cards under the CCC condition.

Null Circumstances

As stated in the procedures, if the participant was under a corrective condition but previous performance produced no errors, the supervisor could not provide any corrective feedback, so this trial was considered null. If one trial was null, then the entire session was not used in the data analysis. This occurred once for each of the two participants. Once out of seven total session or once in 28 feedback conditions. The situation in which the participant implemented all of the procedural step with errors, or 0% never occurred. A session was also considered null if the participant did not satisfy the number of feedback statements, this event also did not occur, the supervisor was able to provide either positive or corrective feedback in all of the trials.

Social Validity

The participants completed the post-intervention questionnaire after the data were collected in the maintenance condition. The ten questions included the participant's perceived effects and feelings of stress presented in a 5-point Likert scale (1 = Not at all, 2 = Somewhat, 3 = Neutral, 4 = A lot, 5 = Completely/Great Deal). Questions regarding preferences and future preferences of feedback consisted of response such as corrective/positive, minimum/maximum, and more/less. Participant responses indicated that the positive feedback statements improved

their performance (5 = completely). Participant 1 felt that the corrective feedback statements increased performance “a lot” compared to baseline (see Figure 7). Participant 2 also felt that the three corrective feedback statements increased their performance completely but felt that the two corrective feedback statements were neutral (see Figure 7).

Figure 7 displays the average rating by the participants in regard to the amount of discomfort or stress they felt when receiving feedback. Participant 1 indicated stronger feelings of discomfort and stress when receiving corrective feedback (4 = a lot). Participant 2 indicated she did not feel any discomfort or stress during either the corrective or positive feedback conditions. Both participants felt minor discomfort or stress when receiving positive feedback. Participant 1 stated they would like to receive less feedback in the future. While Participant 2 indicated, they would like to receive more feedback in the future. The preference for more or less feedback correlated with the amount of discomfort or stress felt by the participant.

Both participants indicated a preference for corrective feedback. For Participant 2, this correlated with a high percentage of procedural integrity under both corrective feedback conditions (97.3%), although PPP feedback (97.7%) for this participant. Participant 1 expressed a preference for positive feedback, and this condition did, in fact, produce higher accuracy (PPP condition specifically).

Discussion

The purpose of the present study was to examine the effects of two and three verbal feedback statements provided by a supervisor on participant procedural integrity of DTT of children with ASD. A multielement experimental design with two participants was used to assess the differences in feedback statements. The results of this study varied across the two participants, the type of feedback (corrective v. positive), and the number (two v. three statements). Overall, compared to baseline in which no feedback was given, feedback in general increased the accuracy of procedural implementation. Three positive statements generally were superior for both participants, but all four feedback conditions resulted in high procedural fidelity.

The lack of differential differences between the feedback conditions is similar to the findings of Slowiak and Lakowske (2017). They compared the conditions of no feedback, PCP, CPP, and PPC. The authors hypothesized that one reason they found a lack of differential effects may have been due to the simplicity of the work tasks, simulated medical transcription data entry into a computer. The current study extended the research of Slowiak and Lakowske by evaluating feedback statements in an applied setting in which the performance tasks involved multiple tasks, thus suggesting that the effectiveness of different feedback conditions may not be dependent upon the type of task.

When comparing three corrective versus three positive statements, Participant 1 had a greater percentage of procedural integrity under the three positive statements, while Participant 2 showed no differential effect. The findings for Participant 1 are similar to those found by Choi et al., (2018), who learned that PP conditions produced more work task completed correctly

compared to NN feedback. Negative-negative feedback was referred to as corrective feedback by Choi et al., and is comparable to the CC feedback condition of the current study.

A majority of the research on feedback statements have compared mixed sequence forms of feedback, such as the feedback sandwich. However, researchers have expressed the need for more research on the effects of uniform feedback statement in order to properly evaluate if these variables have different influences (Daniels, 2009). The current study aimed to study these variables by focusing on uniform feedback statements. The limited findings here are evidence that feedback does work, but feedback that produces the greatest percentage of procedural integrity may depend on the reinforcement history of the individual person.

The social validity of the current study was assessed through the participant questionnaire. Participant 2 showed a faster acquisition of the procedural implementation steps compared to Participant 1, Participant 2 also showed higher percentages of accuracy during the CC and CCC conditions compared to the PP and PPP conditions. The corrective statements may have provided Participant 2 specific information on which steps to improve upon. Thus, the corrective statements may have provided Participant 2 with salient stimuli that needed to be changed, producing greater gains. From the questionnaire, Participant 2 indicated a preference for corrective feedback. Participant 2's preference for corrective feedback correlated with her higher percentages of procedural integrity overall under the corrective feedback conditions, although PPP feedback produced the greatest percentages for Participant 2. Participant 2 also indicated that she preferred to have more feedback than less feedback. These results from the current study align with results found by Wine et al. (2014), who found that employee stated preference of stimuli correlated with increased responding from baseline. Stimuli were reported reinforcers (e.g., movie tickets, scratch-offs, office supplies, electronics) and responding

included increased frequency of completed transcribed data sheets. There is a lack of a standardized approach to designing and the utility of self-reported preferences in the field of experimental analysis of behavior (Critchfield et al., 1998). The current study contributed to this body of research on the correspondence between employee preference for feedback and performance outcomes.

Potential Limitations

There are several potential limitations of the current study that could suggest different interpretations of the results unrelated to the perceived effective of the feedback conditions. One concern is the potential for carryover effects of the multielement design, commonly a recognized potential treat. In other words, perhaps the high accuracy of performance of the two participants across virtually all of the feedback conditions were due to the different conditions, once implemented, influencing the behavior of the participant, in exclusion or in combination with other feedback conditions. The use of the four feedback conditions potentially confounded the results, in contrast to if each feedback conditions was implemented alone. Because each feedback condition was used in each session, and the sessions were 30 min in duration, one could argue that the participant's accuracy in one feedback condition could have been influenced by the feedback they received earlier in the session.

Regardless of this potential threat, the multielement design is an "experimentally sound and efficient method for comparing the effects of two or more treatments" (Cooper et al., 2020, p. 181). Several different methodological strategies were used to minimize this potential threat inherent in this design. First, since there is some reason to believe that carryover effects have been due to the subject not being able to discriminate among treatments (Blough, 1983), the participants in the current study were made aware of the different conditions by using a few

different strategies. Each feedback condition was associated with both a visual cue (i.e., colored card) and card set (being learned by the two children). This colored cue card was place in view of each participant for each session and each trial. Additionally, from the beginning of the feedback condition phase, the same learning content was paired with a particular feedback condition, and this was maintained through the course of the study. These strategies were put in place in order to potentially exert some stimulus control over responding to each visual cue (feedback condition), which could potentially reduce the likelihood of carryover effects.

Another strategy that was implemented to potentially reduce carryover effects was keeping the feedback conditions in place for short period of times, only five trials per session. Less exposure to the different conditions could potentially reduce the likelihood of sequence effects (O'Brien, 1968). In addition, the order of the treatment feedback conditions were randomized (Barlow & Hersen, 1984), which could decrease the chances of consistent carryover.

A final strategy imposed was to teach an irrelevant task after the implementation of a feedback condition. Each participant alternated teaching one of the required card sets with a period of teaching an irrelevant (i.e., not targeted) skill set. Thus, a period of time, and different type of supervisory feedback, was given, separating teaching periods with the targeted skill sets and feedback conditions.

In the current study, an initial baseline was used for comparative purposes. Wilder et al. (2006) also used a baseline to compare the effects of three levels of treatment integrity on the compliance of preschool children. Several researchers have observed no carryover effects in their research and thus have expressed little concern for this threat when evaluating feedback statement sequences (Henley & DiGennaro Reed, 2015; Slowiak & Lawaske, 2017). Carryover effects cannot be completely dismissed.

Another perspective about the potential of carryover effects concerns a visual analysis of the data. If carryover effect were influencing participant accuracy, performance should increase with the addition of each feedback condition. A within-session analysis of both participants showed the percentage of accurate performance increased during positive feedback conditions and decreased during corrective feedback conditions. If carryover effect were occurring, there may have been a continued increase across the feedback conditions.

The potential for carryover effects cannot be fully dismissed. Therefore, future research could test through independent verification (Sidman, 1960) by administering each feedback condition alone and compare the results to the alternating treatment design. Carryover effects could also be examined through a functional manipulation (Sidman, 1960) by significantly increasing the magnitude of one feedback condition and watch for changes in the other feedback condition. In the case of comparing corrective and positive feedback, future research could increase the number of corrective statements (for example, ten statements) and examine changes in responding under the positive condition in which fewer positive statements are provided. If changes occurred in the positive condition, this could be evidence of carryover effects.

Due to the inclusion of the four different types of feedback, each feedback condition only consisted of five trials. The four feedback conditions which each included five trials and the inclusion of an initial set, resulted in a total of 25 trials per session. The five trials were selected due to the toleration limits of the child participants. Initially, each feedback condition consisted of ten trials, but during initial pilot testing, it was observed that the child participants often refused to participant around trial 25; thus, the decision was made to only include five trials per feedback condition in order to reduce the total number of trials.

Another potential concern is whether the poor performance in baseline was due to a skill deficit in implementing DTT or a motivational problem that led to poor fidelity. For there is the lack of formal assessment if the initial low response percentages of the participants were due to motivation or a skill deficit. The baseline conditions allowed for identification the naturally occurring frequency of present responding (Barlow & Hensen, 1984). The immediate change from baseline to the treatment conditions may suggest that the change in behavior was due to a motivation deficit rather than skill deficit. If the issue was a skill deficit, the one application of feedback may not have been sufficient to provide the participants all of the salient information needed to improve their behaviors. For both participants, the first condition was the positive feedback. Positive feedback in contrast to corrective feedback did not provide the participants any information steps to improve upon. For example, the corrective statement of "You failed to prompt correctly on the third trial," would indicate to the participant that they needed to change their prompting procedure. The change from baseline with the first implementation of any feedback, which was in this study positive feedback may suggest that the poor initial performance during baseline was due to motivation rather than a skill deficit.

Although the participants were provided information and instruction on DTT procedures through the Relias Academy training and required to perform the skill, there was no objective verification that the participants were proficient in DTT procedures. Future research could utilize assessments such as the Performance Diagnostic Checklist – Human Services (PDC-HS) (Carr et al, 2013) to determine if poor performance due to lack of training or lack of employee motivation. In addition, if a lack of motivation was the reason for poor initial performance, then the random alteration of the feedback conditions in the alternative treatment design is not a concern. Again, the percentage of performance results across the feedback condition were very

high compared to baseline and very similar across conditions and participants. The slight differences across the conditions may be tied to participant preference for feedback.

In regard to the results of the post intervention participant questionnaire, questions one through four were worded incorrectly. Questions one through four asked how the feedback statements the participant received before each receptive identification picture cards affected their performance. These questions should have been worded to assess the feedback statements as a consequence rather than an antecedent. The use of "before" wording may have confused the participants in which performance the participant questionnaire was referring to.

Another limitation that could have influenced the results was the difference in functioning levels of the children. Although they both had a diagnosis of ASD, the functioning level of each was different. Child 1 was male, had mild maladaptive behaviors, and approximately ten signs/words/or word approximations. Child 2 was female, had moderate maladaptive behaviors, and no consistent functional language. Maladaptive behaviors included behaviors such as throwing items, screaming, hitting, kicking, screaming, spitting, etc. The degree of difficulty in implementing the procedural steps in the current study could have been affected by the severity of the maladaptive behaviors, as participant focus shifted from procedural implementation to behavior management. The influence of maladaptive behaviors on procedural implementation was not directly assessed during the current study but could have had an influence on participant performance. Trials in which the child exhibited maladaptive behaviors were considered null. It was anecdotally observed that participants would speed up the implementation of the procedural steps during trials that followed a trial in which maladaptive behaviors.

One last potential limitation could have been the exclusion of null data. Although null circumstances only occurred twice out of the total 14 feedback sessions. This occurred when the participant achieved 100% during the first trial which was a corrective condition, so the supervisor was unable to provide any feedback. Because data was not collected for all of the feedback conditions, the inclusion of the sessions with null trials might influence the results.

Future Research

The results of the current study suggest several areas of potential future research. For example, since little research has been conducted on the type and frequency of feedback. The number of two and three feedback statements may not have been enough to produce differential effects. This question could be addressed in a replication study in which the number of feedback statements was significantly manipulated, for example comparing one versus ten statements. Due to the potential of carryover effects, Future research could compare the effects of feedback when provided in random alternation versus in isolation. The number of trials was limited to what the child participant could handle which may have resulted in misleading percentage results, future research should select a performance with multiple tasks that can be implemented with more than 30 trials per session. The influence of maladaptive behaviors were not assessed in the current study, future research should assess the influence of maladaptive behaviors on staff performance or compare participants with similar maladaptive or other competing behaviors.

Conclusion

In clinical setting, client outcomes are intimately tied to the competency of the staff who are implementing the clinical intervention. Staff training and staff supervision directly relates to the quality of staff intervention implementation. Feedback by a supervisor is a long-standing attempt to maintain high qualify staff performance. The current study contributes to the

development of more effective supervision of direct care staff. More effective supervision can produce more effective employees, reduce staff turnover, and improve client outcomes. Standardized supervision techniques can be created through the use of well controlled research discovering and examining the essential features of supervision. The current study supported previous research on the ease and effectiveness of feedback and provided a more detailed account of the effects of corrective versus positive feedback. Research, such as the current study, is needed to eliminate these ineffective techniques and help determine effective components. Research, such as the current study, will continue to examine the nuances of feedback so that staff will hopefully perform at maximum levels, producing more motived staff and maximum outcomes for the people they serve.

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Figures

Figure 1

Percent Accuracy across Sessions for Participant 1

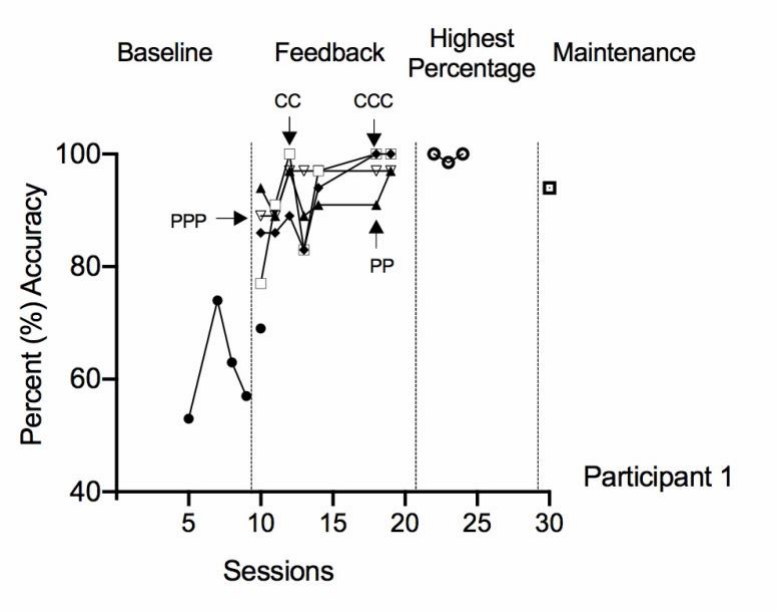


Figure 2

Percent Accuracy across Sessions for Participant 2

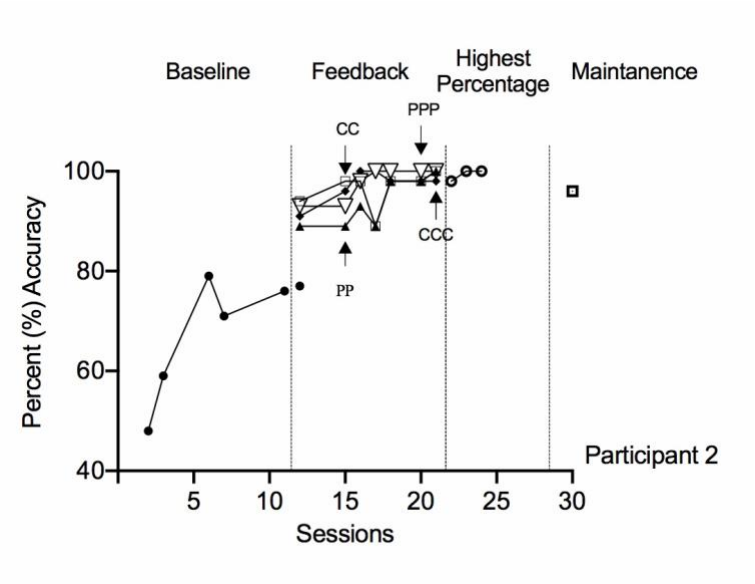


Figure 3

Two versus Three Feedback Statements

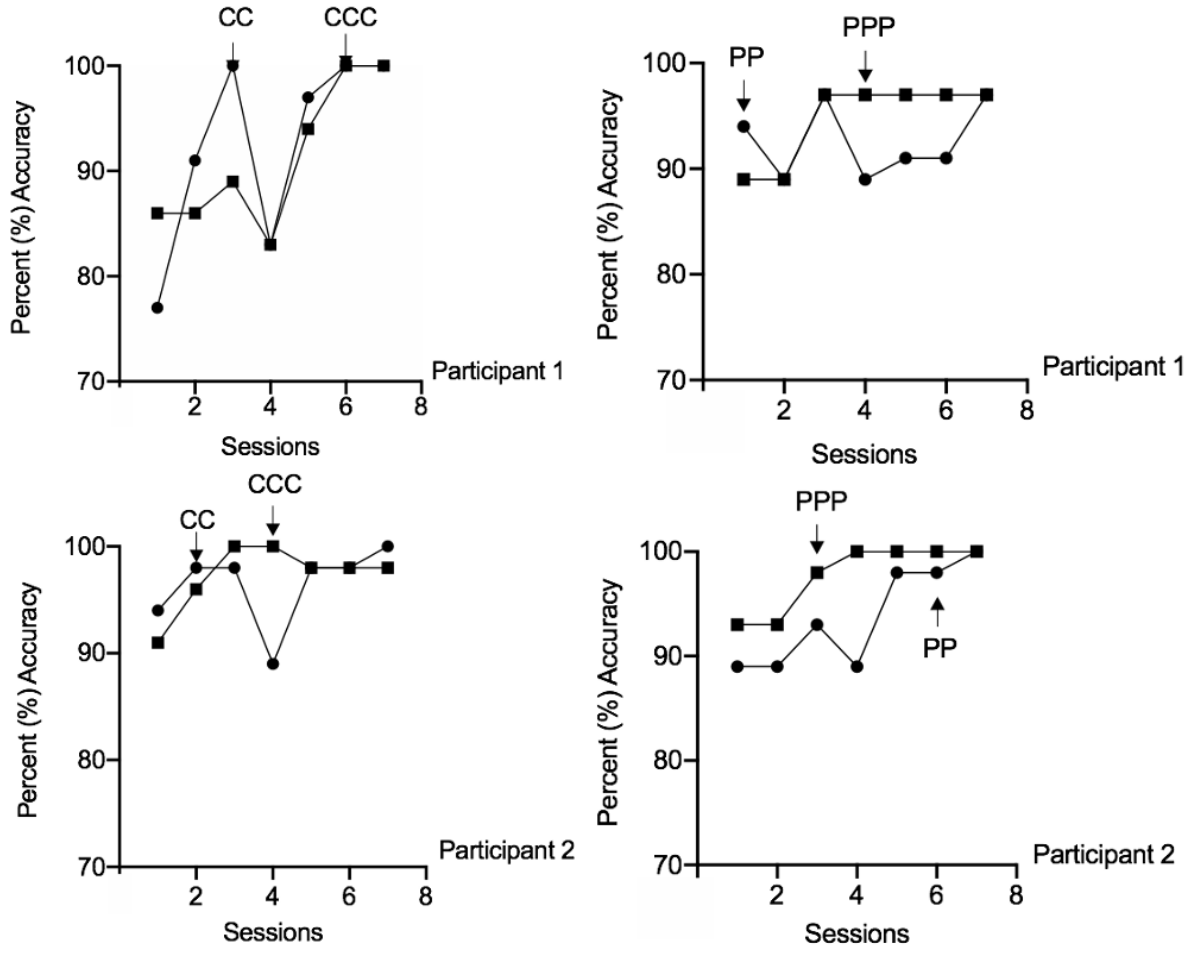


Figure 4

Corrective versus Positive Feedback Statements

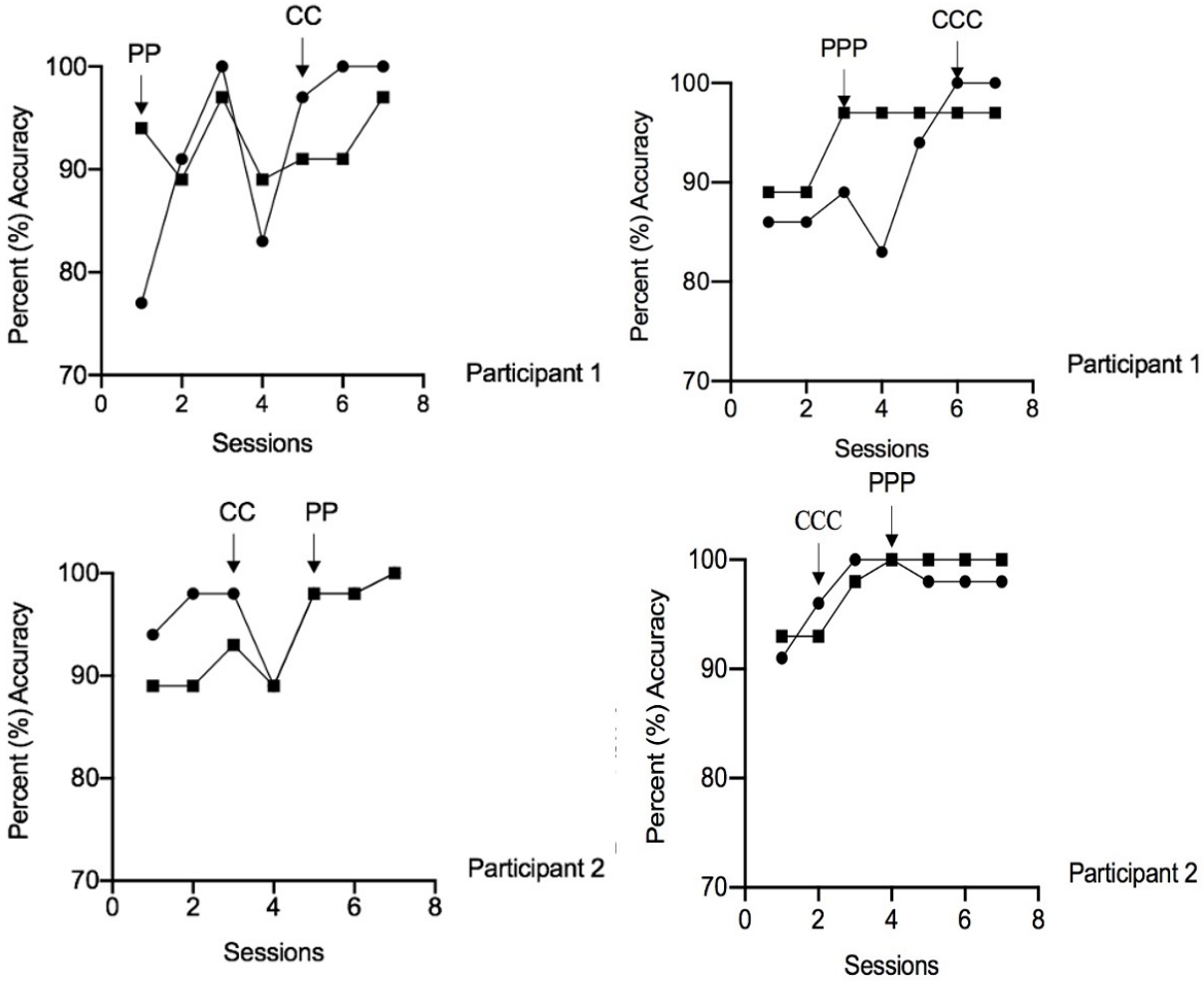


Figure 5

Overall Summary for Participant Performance

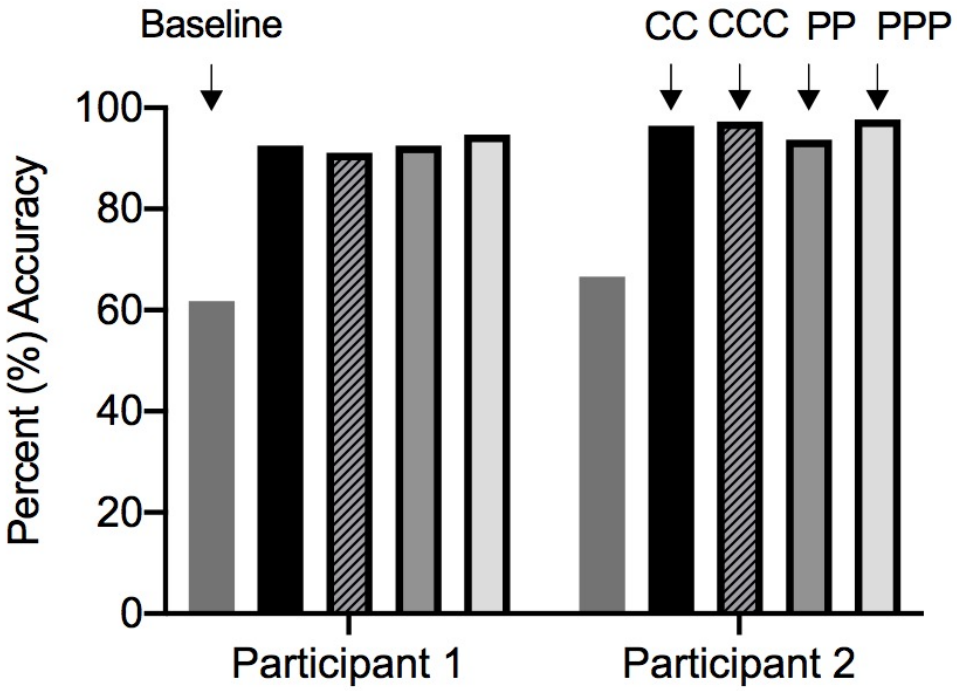


Figure 6

Child Outcomes per Feedback Condition

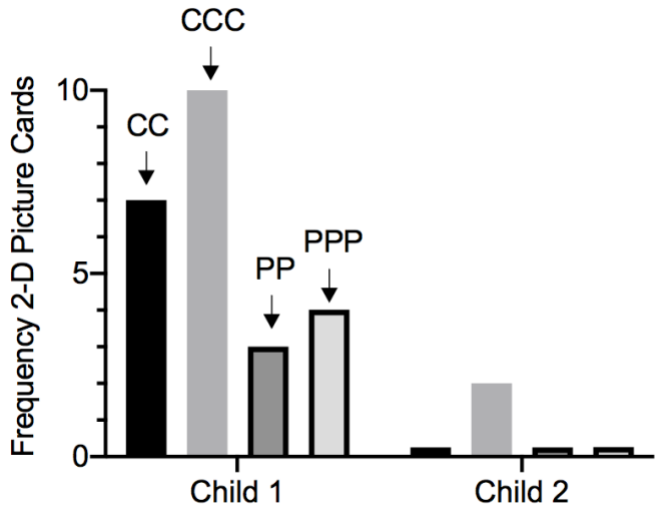
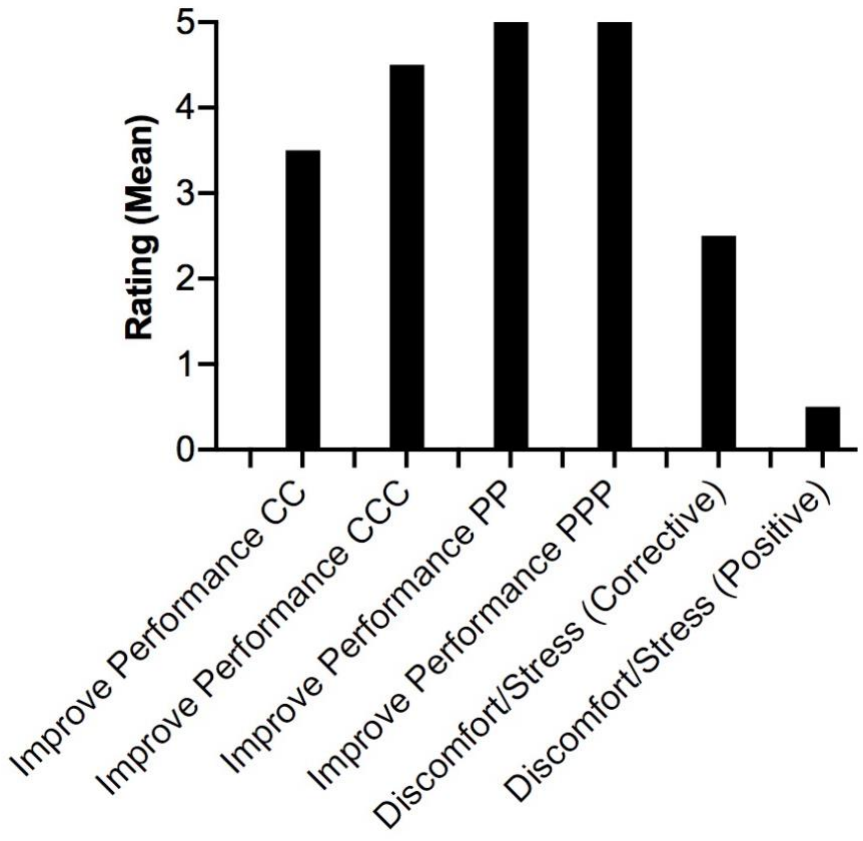


Figure 7

Participant Survey Rating



Tables

Table 1

Child Demographics

	Child 1	**Child 2**
Age	3 years 8 months	7 years 1 month
Gender	Male	Female
Diagnosis	ASD Severe speech delay	ASD
VB-MAPP: Overall Score	55	30
Skills		
Toilet trained	Yes	No
Functional Language	10 Signs, words, approximations	No
Maladaptive Behaviors	Mild	Yes

Table 2

Participant Task Analysis

Child 1	Child 2
Gain child's attention	Arrange the picture card in the instructed field
Provide the instruction	Gain child's attention
Wait for the child to respond (3 - 5 sec)	Provide the instruction
If incorrect prompt using least-to-most intrusive prompting hierarchy	Wait for the child to respond (3 - 5 sec)
Provide an appropriate consequence	If incorrect prompt using most-to-least intrustive prompting hierarchy
Collect the data	Provide an appropriate consequence
Provide the next instruction within the instructed number of seconds	Collect the data
	Provide the next instruction within the instructed number of seconds

Table 3

Example Feedback Statements per Condition

CC	CCC	PP	PPP
You missed the first two opportunities to prompt the child and only correctly collected data for two out of the five picture cards.	You failed to prompt during two of the trials, and presented two of the same cards, next time be more vigilant of the child's responses.	You correctly verbally prompted correctly nine out of the ten opportunities, and presented the pictures in a random order.	You prompted correctly for each picture card, kept an appropriate pace, and provided sufficient time for the child to response.
Your accuracy was not a high as last time. Try to prompt at a higher intrusiveness.	Your accuracy was 60% and the goal is 80%. Next set try to collect the data right after the child's response. Be sure to focus on the positioning of the	Your accuracy was higher than last time. You prompted at the correct level.	You presented all of the cards in a random presentation. Your accuracy was 90%. Which was higher than the goal of 80%.
You implemented two of the picture cards correctly, and had 30% accuracy on data collection.	Two of the cards were not presented, you prompted early on the last card, and you did not implement the instruction during the first card.	You implemented all five picture cards correctly, and had 100% accuracy on data collection.	You presented all of the cards correctly, prompted right on time, and implement all instructions at 100%.

Table 4

Supervisor Task Analysis Example

Supervisor Steps	Primary Observer (+ or -)
Set 1 Colors/Shapes (CCC) Red	
Instructed to put out red colored card	
Provided feedback at end of set 1	
Provided first corrective	
Provided second corrective	
Provided third corrective	
Set 2 Foods (CC) Green	
Instructed to put out green colored card	
Provide feedback end of set 2	
Provided first corrective	
Provided second corrective	
Set 3 Household (PPP) Purple	
Instructed to put out purple colored card	
Provide feedback end of set 3	
Provided first positive	
Provided second positive	
Provided third positive	
Set 4 Personal (PP) Orange	
Instructed to put out orange colored card	
Provide feedback at end of set 4	
Provided first positive	
Provided second positive	

Appendix

Appendix A

Participant Questionnaire

The following questions are in regard to the session in which you received two or three statements of positive or corrective feedback on your data collection performance on the two-dimensional (2-D) receptive identification programs.

1. To what extent do you feel the two corrective feedback statements you received before each set of receptive identification picture cards increased your performance? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Completely

2. To what extent do you feel the three corrective feedback statements you received before each set of receptive identification picture cards increased your performance? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Completely

3. To what extent do you feel the two positive feedback statements you received before each set of receptive identification picture cards increased your performance? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Completely

4. To what extent do you feel the three positive feedback statements you received before each set of receptive identification picture cards increased your performance? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Completely

5. To what extent did receiving the corrective feedback cause you any discomfort or stress? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Great deal

6. To what extent did receiving the positive feedback cause you any discomfort or stress? (Please circle one)

1	2	3	4	5
Not at all	Somewhat	Neutral	A lot	Great deal

7. If you did feel any discomfort stress, please elaborate on the type of discomfort or stress.

_____

_____

8. In the future, which type of feedback would you prefer to receive? (Please circle one)

Corrective Positive

9. In the future, what amount feedback would you prefer to receive? (Please circle one)

Minimum Maximum

10. In the future, compared to what you received, would you prefer to receive more or less feedback? (Please circle one)

More Less