

AN EVALUATION OF THE USE OF FEEDBACK AS AN ANTECEDENT ON
SECURING A WHEELCHAIR IN A VAN

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ABSTRACT

Performance feedback has long been a popular strategy for organizational change (Fairbank & Prue, 1981). One of the primary advantages of performance feedback interventions is the relatively low cost of implementation for organizations when compared to other productivity-enhancement techniques, such as monetary incentives (Yukl, Wexley, & Seymore, 1972) like pay for performance (Lazear, 1995) or employee of the month programs with rewards associated with them (Daniels, 2000). Performance feedback is beneficial to ensure that employees are knowledgeable of the expectations, and what aspects of job performance need to be improved. Three studies (i.e., Betchel, McGee, Huitema, & Dickinson (2015); Alajadef Abergel, Peterson, Wiskirchen, Hagen & Cole (2017) and Wine et. al. (2019)) have published research evaluating feedback presented prior to completion of a task; however, results varied. The current study evaluated whether feedback presented prior to a performance event improves performance when compared to a baseline condition where no feedback was presented.

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CHAPTER 1

INTRODUCTION

The application of behavior analytic principles in business and industry was first established in the late 1960s and early 1970s (Brethower & Rummel, 1966; Andrasik, 1979; Frederiksen & Johnson, 1981; Hopkins & Sears, 1982; Komaki, Coombs, & Schepman, 1991; O'Brien & Dickinson, 1982). This practice formally became known as Organizational Behavior Management (OBM; Wilder, Austin, & Cassella, 2009). All of the principles and practices of OBM are derived from operant psychology of B.F. Skinner (1953), focusing mostly on staff training and performance improvement (Madden, Dube, Hackenberg, Hanley, & Lattal, 2013).

Performance feedback has long been a popular OBM strategy for organizational change (Fairbank & Prue, 1981). One of the primary advantages of performance feedback interventions is the relatively low cost of implementation for organizations when compared to other productivity-enhancement techniques, such as monetary incentive (Yukl, Wexley, & Seymore, 1972) like pay for performance (Lazear, 1995) or employee of the month programs with rewards associated with them (Daniels, 2000). Use of minimal resources and ease of implementation further contributes to performance feedback being a frequently-used technique. As a result of its influence in OBM, performance feedback has widely been used in OBM research (Prue & Fairbank, 1981; Balcazar, Hopkins, & Suarez, 1984; Alvero, Bucklin, & Austin, 2001). Balcazar, Hopkins, and Suarez (1984) found that 60% of articles in the first five volumes of the *Journal of Organizational Behavior Management* used performance feedback. An evaluation of the research from 1989-1999 found that 71% of studies used a form of

feedback (Nolan, Jarema, & Austin, 1999). Most recently, Vanstalle et al. (2012) reported over a three-decade period, 65% to 71% of articles in the *Journal of Organizational Behavior Management* were empirical studies including feedback.

The use of performance feedback is well documented, along with its ability to impact change. Previous research has demonstrated the effectiveness of feedback in improving staff performance in various settings such as, early childhood settings (Casey & McWilliams, 2011), school settings (Solomon, Klein, & Politylo, 2012), sports (Anderson, Crowell, Domen, & Howard, 1988), business (Andrasik, 1979; Petty, Singleton, & Connell, 1992; LaFleur & Hyten, 1995), and human services (Hawkins, Burgio, Lanford, & Engel, 1992).

The research, while frequently showing feedback to be effective, has not defined feedback in a way that makes it easy for practitioners to apply in consistent practice. Previous research has defined feedback in many ways, such as: information that is given to persons regarding the quantity or quality of their past performance (Prue & Fairbank, 1981), information transmitted to the responder following a particular performance (Sulzer-Azaroff & Mayer, 1991), information that tells performers what and how well they are doing (Rummler & Brache, 1995), and information about performance that allows an individual to adjust his or her performance (Daniels, 1994). Each of these definitions identifies key points including, a performance event, information collected about that performance event, and the communication of that information to the participant engaged in the performance event. These definitions, while consistent, fail to define feedback in a technological manner to improve efficient application. One example would be whether feedback is more effective when given directly prior to the next

performance or directly after the current performance. Baer, Wolf, and Risley (1968) identify technological as one of the seven dimensions of applied behavior analysis. In order for research to be technological, the techniques making up a particular intervention must be completely defined and described. Feedback is so frequently used that its status has almost become equivalent to a principle of behavior when it should be defined by the principles of behavior making it effective (Peterson, 1982). This is not a specific area addressed in this paper, as in many cases it can serve multiple functions such as a consequence (e.g., reinforcement or punishment) and an antecedent (e.g., discriminative stimulus or establishing operation) and idea important to understand when evaluating whether it is effective or not in a specific situation.

Prue and Fairbank (1981) reviewed five parameters of feedback presentation: evaluating the recipients, mechanisms, content, temporal characteristics, and source of feedback. Their evaluation of these components urged future researchers to not only look at the reinforcement parameters that feedback affects, but also how these different parameters affect that reinforcement.

The first area the authors discuss is the public nature of the feedback - whether the individual alone sees it or whether it is publicly posted. It is important to consider potential adverse responses from staff to public feedback, time and resources available for private feedback, as well as the ability of those presenting the feedback to present either type. Prue and Fairbank stated to consider private feedback when baseline performance is low and publicly displayed feedback might be too aversive; supervisors are interpersonally skilled to deliver feedback on a one-to-one basis; resources exist for the expenses incurred in delivering individual feedback; workers are in close proximity to

their supervisors; and an individual performance is being compared with baseline performance or a designated standard.

The second parameter discussed is the mechanism with which the feedback is delivered; feedback can be presented vocally, written, mechanically, or as self-reported. Verbal feedback typically occurs as face-to-face interactions. It is important to consider in this context the proximity of the supervisor and the supervisee as well as their previous relationship giving and receiving feedback. If previous feedback from a specific supervisor has been poorly received by a supervisee this can further be an issue if verbal feedback is again presented by that supervisor. Written feedback can consist of personal communication (Weitz et al., 1954); memos (Kreitner, Reif, & Morris, 1977); and public posting (Quilitch, 1975). Written feedback has the benefit of being able to facilitate long term assessment of performance and can then be displayed by the employee in a more public manner if desired. It is also easily monitored by the manager and likely to be maintained as most organizations already have written feedback procedures such as appraisals and personnel files. Mechanical feedback consists of the use of mechanical devices such as videotapes (Bricker, Morgan, & Grabowski, 1972) and electromechanically operated tape printouts (Parsons, 1974) to deliver performance data. Mechanical feedback is beneficial as it is usually low cost, continuous, and immediate and once established are likely to be maintained. Drawback to this type of feedback include needing a great deal of resources, time, and money to develop initially. In some cases it can also be inconvenient to move equipment from one location to another if needed to ensure immediate feedback is presented. Furthermore, the research has not given a clear answer to whether performance can be maintained over extended periods of

time using only mechanical feedback. The last of the four types identified, self-recorded feedback, is beneficial as Greller (1980) reported that employees prefer feedback systems over which they exert control, when compared to externally administered systems. It can further be useful when there are no physical products of the behavior of concern or when work process variables play a role in the employee's overall productivity.

The content of feedback is another parameter outlined as an area to evaluate when determining a feedback intervention to use. It could compare an individual's performance with his/her previous performance, the performance of a larger group, or the percentage of the group's performance. It could also compare a group's performance with its previous performance or a standard objective criteria. Regardless of which form of feedback is used it should be clear and understandable while specific to the target behavior and the performance of the recipient (Hamner & Hamner, 1976). It should focus on supportive statements (Nemeroff & Wexley, 1979), social praise (Runnion, Johnson, & McWhorter, 1978), constructive criticism (Alpander, 1980), and modeling (Walter, 1975) while avoiding referencing personal characteristics of the employee (Fletcher & Williams, 1976). Prue and Fairbank's (1981) evaluation of temporal characteristics notes the importance of the topography of the behavior being changed, organizational constraints that might be experienced, or schedules of feedback. They noted that easier tasks may not require immediate feedback because completion of the task would potentially occur naturally even in the absence of feedback whereas a more difficult task is dependent on that reinforcement in the form of feedback in order for the task to occur.

Lastly, the source of the feedback needs to be considered. Considerations include whether the feedback will be provided by supervisors (Chandler, 1977), supervisees

(Hegarty, 1974), co-workers (Greller, 1980), outside consultants (Komaki Waddell, & Pearce, 1977), the targeted employee themselves (Lamal & Benfield, 1978), or a variety of mechanical devices (Ford, 1980; Parsons, 1974). It is not clear that any one source is better than another; however, it is important to consider the competence of the person, the amount of control the person has over reinforcers and punishers, the sincerity of the person, and the past history of the person's interactions with the employees receiving the feedback. Evaluating feedback research and how the intervention fits into these parameters will help us to better define how managers can use feedback to fit their specific need as the treatment of feedback as a reinforcer is insufficient at explaining all the effects upon an employee's behavior.

Some have argued that feedback is an antecedent, such as a discriminative stimulus (Balcazar, Hopkins, & Suarez, 1984) or motivating operation (Daniels, 1994); others suggest that it functions as a consequence, such as a reinforcer (Komaki, Barwick, & Scott, 1978); while others argue that it may serve multiple functions such as a reinforcer, punisher, or discriminative stimulus (Sulzer-Azaroff & Mayer, 1991). It might also act as an establishing operation, and/ or evoke rule-governed behavior (Agnew, 1998; Agnew & Redmon, 1992). Agnew (1998) described feedback as an establishing operation, in conjunction with goal setting, indicating withholding positive feedback until a goal is met increases the value of that feedback as reinforcement. If viewed as rule-governed behavior, notification to the person that their performance will be evaluated and feedback will be presented based on that evaluation, impacts their performance even without the actual presentation of feedback (Agnew & Redmon, 1992). While looking at

these arguments it is possible that its function depends on the conditions under which the feedback is implemented.

Annett (1969) has argued that because feedback is provided between two behaviors, its location prior to one behavior is just as important as the location following the initial behavior. Much of the previous research has evaluated the temporal location of feedback in relation to the performance on which the feedback is based, however, not in relation to the future performance it is meant to affect (Bechtel, McGee, Huitema, & Dickinson, 2015). Location of feedback has been evaluated most notably as it relates to schedules of feedback (Hantula, 2001). This includes immediately following the behavior (Coulter & Grossen, 1997; Sheeler et al., 2012), five to fifteen minutes later (Scheeler et al., 2012), or several days later (O'Reilly, et al., 1992; O'Reilly et al., 1994). Evaluations of feedback as utilized as an antecedent event, versus a consequence, have attempted to further analyze the effect of temporal location (e.g., Cook & Kendler, 1956; Day, 1987; Krumhus & Malott, 1980; Bechtel, McGee, Huitema, & Dickinson, 2015; Aljadeff- abergel, Peterson, Wiskirchen, Hagen, & Cole, 2017).

Cook and Kendler (1956) first evaluated the temporal location of feedback by using a 2 X 2 analysis of variance to compare prompting (presenting the stimulus before the next opportunity to respond) and confirmation (presenting the stimulus after the response) across two learning levels: early (no previous practice) and late (four previous neutral pre-training trials). The study had 10 letters that were each paired with a pattern of lines between dots. When shown a letter participants of the study were asked to draw lines between a set of dots to recreate the pattern paired with the letter presented. For the prompt condition the letter was shown prior to the participant attempting to draw the lines

and for the confirmation condition the letter was shown after the participant attempted to draw the lines. They were able to demonstrate the prompt condition yielded more correct patterns drawn for the letter presented than the confirmation condition.

In 1987, Day further concluded that a prompt given prior to the subject's response was more effective than delivering the same prompt directly following the subject's response. Day used a single subject, concurrent-schedule design to evaluate the temporal location of prompts. The before condition led to initial large step gains, more rapid progress, minimal errors, and higher overall levels of acquisition.

At this point in the research there was an acceptance that prompts presented prior to a task were more effective than the prompts presented following performance; however, the terms "prompt" and "feedback" while sometimes used interchangeably, may differ in content. Tosti (1978) has discussed how feedback differs from that of a prompt. A prompt outlines what future performance should look like whereas, feedback, provides information about the present level in addition to the direction of future performances.

In 1980, Krumhus and Malott first evaluated the temporal location of feedback plus modeling in staff training. They examined the different effects on training tutors in a remedial education program. The training program was designed to teach the correct use of descriptive social reinforcers to these tutors. A multiple baseline design was used to evaluate these effects. During this study modeling and feedback were presented either directly following completion of a tutorial session or immediately prior to the next tutorial session. Feedback was shown to be effective but the high response to modeling and a lack of counterbalancing made it difficult to determine how effective it was.

Bechtel et. al. (2015) evaluated the temporal placement of feedback on correctly entering numerical data into a computer from slides presented as well as the rate of completion during a session. Participants consisted of 45 undergraduate students from a mid-western university. Researchers used a two-factor mixed design. The first factor was a between groups analysis for which each of three groups received a different order of conditions, and the second was a within subjects analysis of three experimental conditions: (A) baseline, during which time no graphic feedback was provided; (B) feedback immediately after, during which feedback was provided immediately after the performance on which it was based; and (C) feedback immediately prior, during which graphic feedback was provided immediately prior to the next performance of the task where feedback was based on the previous session's performance. Researchers found when feedback that was presented prior to performance it yielded the highest total average of correctly completed slides per session (214.9 slides of data entered), followed by no feedback delivered (with 206.8 slides of data entered), and lastly feedback that was presented after performance (202.6 slides). When evaluating overall performance, there was not a substantial change from baseline to the feedback conditions. Any differences appear to be the result of performance improvements throughout the study, due to practice effects. These results indicate that when feedback is presented as an antecedent, it is not effective at impacting behavior change, or that the task was easy enough for participants and practice was the only necessary intervention needed to impact behavior change. This demonstrates the need for more research with more difficult tasks to determine whether that is a confounding variable within the current research.

Aljadeff-bergel, Peterson, Wiskirchen, Hagen, and Cole (2017) evaluated the temporal location of feedback on implementation of a Direct Instruction (DI) curriculum, *Language for Learning* (Engelmann & Osborn, 1999). Implementation of DI allowed for a more complex sequence of events for staff to implement. Direct Instruction consists of fast-paced instruction, controlled introduction of new content, frequent feedback (positive or corrective), and often containing scripted content (Marchand-Martella, Slocum, & Martella, 2004). Aljadeff-bergel and colleagues evaluated two behaviors associated with DI, including accuracy of error correction procedures and rate of specific praise. Data were collected using direct observation either from videos or on-site, frequently occurring on site for behaviors being evaluated for the immediate feedback condition. Participants included three female and one male psychology student in a practicum course to learn to work effectively with children in an educational setting.

Due to the likelihood of carry over effects from one training method to another, an adapted alternating treatment design (AATD; Sindelar, Rosenberg, & Wilson, 1985) was implemented. This design starts with a baseline condition, during which the researcher and an observer observed the participant but did not provide any feedback. Following baseline, two independent variables were implemented, a feedback-before condition and a feedback-after condition. In the feedback-before condition, the researcher collected data on a session, however, then withheld the feedback until just before the next session. Directly prior to the start of the next session the researcher reviewed the previous session's feedback. In the feedback-after condition, the observer collected data and then, immediately following the session, reviewed the feedback. Each condition was applied to a separate dependent variable. The feedback-after condition was applied to one of the two

dependent variables and the feedback-before condition was applied to the other dependent variable. The implementation of two separate independent variables on two dependent variables concurrently is an adaptation from a typical alternating treatment design which would implement alternating treatments on a single dependent variable. This is necessary as once this skill has been practiced it would have carry over effects onto any subsequent interventions implemented. During each session, data were collected for both dependent variables. Regardless of condition, feedback sessions were 10-15 minutes, starting with the researcher stating the dependent variable for which feedback was being provided. The researcher then reviewed the current data and how it compared to previous observations. Each session ended with a review of the operational definitions for each behavior and whether the participant's current behavior was satisfactory or needed improvement. Once steady responding occurred with both dependent variables, the condition that resulted in the greatest improvements was applied to the other dependent variable to show that it was the result of the independent variable and not the specific task.

Results indicated the feedback-before condition was more effective at increasing performance when compared to the feedback-after condition. For three of the four participants, the data indicated a clear improvement from baseline to the feedback before condition but little change from baseline to the feedback after condition. When comparing the two independent variables, those same three participants had 100% of non-overlapping data points. The fourth participant also showed improved performance in the feedback-before condition compared to the feedback-after condition; however, when initially implemented, the feedback-after condition demonstrated variable effects.

This suggests that feedback is likely effective, not due to its proximity to the preceding behavior, but due to its proximity to the immediately following behavior. This could potentially be important for behaviors that have long inter-response times. Social validity was evaluated with a questionnaire provided at the conclusion of the study asking about the appropriateness and acceptability of the different feedback types. All the questions were open-ended or multiple choice followed by an open ended opportunity to explain the choice made. Three out of the four participants, expressed preference for receiving feedback prior to the teaching session over feedback after the session. One participant noted that while they felt feedback presented prior was effective it did not allow for preparation and planning before the lesson like feedback presented following the session did.

Wine et. al. (2019) continued to evaluate feedback as an antecedent with similar results to those found by Betchel et al. (2015) and identified a similar limitation when evaluating task difficulty. This study evaluated the temporal placement of feedback with and without goal setting on engaging a locking mechanism on a door in a school. The study was implemented in a private school in the Southeastern part of the United States. Due to 38,500 violent incidents in schools between 2015 and 2016 (Diliberti, Jackson, Kemop, Hanson, 2017) the school implemented a new policy requiring the use of a new locking mechanism. While preparing a school wide training researchers took the opportunity to evaluate the effects of pre-performance and post-performance feedback both with and without goal setting.

Seventy-seven teacher assistants and 13 classroom teachers participated in the study, with varying degrees of tenure and various ages. Researchers developed a task

analysis detailing the steps of implementing the locking device and the time (in seconds) required to assemble the locking device was recorded twice. The dependent variable was the difference, in seconds, between the first and second trials. If a participant reached 60 s without installing the locking mechanism they were stopped and 60 s was recorded.

This study used a group design in which participants were split into four groups: feedback after performance no goal, feedback after performance with a goal, feedback prior to performance no goal, and feedback prior to performance with a goal. Participants started by watching a five-minute video depicting a close up view of the mechanism with voice over describing how to assemble it step by step. Participants then were taken to a different room where they were given the opportunity to assemble the locking mechanism. Once completed approximately 24 hours later the participant returned to complete their second trial. A Kruskal-Wallis H test was used to evaluate the change in time between the two trials. The goal was set at 13s for both temporal locations.

The results of this study demonstrated an improvement in performance across all groups. Group 1, the feedback after performance no goal group, improved by an average of 11.5 s. Group 2, the feedback after performance with a goal group, improved by an average of 12.8 s. Group 3, the feedback prior to performance without a goal group, improved by an average of 9.6 s. Group 4, the feedback prior to performance with a goal group, improved by an average of 13 s. A Kruskal-Wallis H test determined that there was no statistical significance between the conditions ($H = 1.50, p = .68$). Further evaluation of social validity yielded a higher preference for the feedback after conditions compared to feedback prior conditions. Participants indicated they felt the goals were beneficial to helping them improve performance.

This study was able to demonstrate an improvement similar to that of Betchel et. al. (2015) however the results do not align with those of Aljadeff-bergel, Peterson, Wiskirchen, Hagen, & Cole (2017) since it did not show a definitive improvement over feedback after performance. This could be the result of the task being too easy as similarly hypothesized in Betchel et. al. (2015). This further outlines the necessity to evaluate feedback as an antecedent in different applications so that it can be applied in the most effective way possible. It also increases the necessity to verify the findings of Aljadeff-bergel, Peterson, Wiskirchen, Hagen, & Cole (2017). The current research has not been able to definitively identify whether it is effective or not; as a result it is important to identify limitations of the current research and attempt to eliminate those limitations, for example, evaluating more difficult tasks.

Komaki and colleagues (1978) found that when feedback focused on safe behaviors in a food preparation factory, and was presented following performance, the number of work related injuries decreased. The current research will evaluate securing a wheelchair in a mock van. This behavior is a socially significant behavior as the results of completing the task incorrectly can be detrimental to the well-being of clients. The presentation of feedback as an antecedent and verification of its effectiveness as such can present a method for training new staff in this task. With the goal of preventing future incidents from occurring, this technique if effective can increase the safety of clients in the care of various facilities.

Continued research that evaluates the effectiveness of different forms of feedback will allow practitioners to better understand the characteristics of feedback and modify its use to improve results. Bechtel, McGee, Huitema, & Dickinson, 2015, Alajadeff-Abergel,

Peterson, Wiskirchen, Hagen & Cole (2017) and Wine et. al. (2019) have published research evaluating feedback presented prior to completion of a task but with varying results. As a result of these findings the proposed study will look to create a stronger foundation for future research by first evaluating whether feedback presented as an antecedent improves performance over a baseline condition, as there is not a large body of research to suggest this type of feedback is effective. A multiple baseline design will be used to evaluate the following research questions: (a) Does feedback, based on a previous performance, when presented prior to the completion of a task improve the successful completion of that task? (b) Do staff acknowledge this form of feedback as a socially acceptable presentation and if not, why?

CHAPTER 2

METHOD

Participants

The study was conducted at a facility for children and adults diagnosed with developmental disabilities and severe behavior disorders. Participants were staff recently hired for employment at this facility. Requirements for hire within the various departments include, a High School Diploma, a valid United States Driver's License, and a minimum age of 21 years old. After initial hire they had to be capable of attaining approved driver status at the facility (i.e., pass a training course in driving and have no record of traffic violations), provide clearances from the Federal Bureau of Investigation as well as the Department of Public Welfare, and successfully complete employer provided certification in CPR, First Aid, and Crisis Intervention.

New employees were recruited as participants. Researchers used a script (Appendix A) to ask if they were interested in participating in a study to help evaluate the best way to improve their ability to complete an assigned work task. This opportunity was offered across several days in order to recruit enough participants for the research design used. Veteran staff were not used in this study to minimize confounds associated with previous exposure to using the Q-STRAINT system (the mechanism used at this facility to secure a wheelchair to a van for transporting individuals) in a van and previous instances of feedback associated with it. It was noted that it was not required to participate and would not impact their standing within the company or program if they chose not to participate. Once they agreed to participate, they were given a questionnaire to exclude any participants who had prior experience securing a wheelchair in a van using

the Q-STRAINT system (Appendix B). If the questionnaire indicated the participants did not have this experience, the consent form, outlining the purpose and expectations, risks, and benefits of the study (Appendix C), was reviewed with them and they were asked to sign it.

Participants were four employees at the agency with no prior experience using Q'STRAINTs to secure a wheelchair in a van. There were no participants who volunteered to participate which met exclusionary criteria or dropped out prior to the end of the study. Participants were comprised of full time employees working in various capacities within the agency including: nurse, administrative assistant, assistant director, and behavior analyst. Of the four participants 3 were female and 1 was male. Participants came from various socioeconomic and ethnic backgrounds, were 21 years of age or older and 3 had Bachelor's degrees and one had a Master's degree (see Table 1).

Participant	Age (years)	Gender	Ethnicity	Level of Education	Position
Phoebe	35	Female	African American	Bachelor Degree	Nurse
Clark	31	Male	Caucasian	Bachelor Degree	Asst. Director
Doris	27	Female	Caucasian	Bachelor Degree	Admin Assistant
Rony	25	Female	Caucasian	Master Degree	Behavior Analyst

Note: This table describes the demographic information for each of the four participants including age, gender, ethnicity, education level, and position.

Materials

This study evaluated the ability to properly complete the skill of securing a wheelchair in a van with three staff. This study however used a contrived device in order to ensure availability of materials and minimize extraneous variables. This device is a 4ft by 4ft board with tracks, designed for Q'Straint wheelchair tie downs, oriented perpendicular to the direction of the van and a sign indicating which direction is the front,

four Q'Straint wheelchair tie downs, and a wheelchair (see Appendix D). The Q'Straint system is the system currently used by the agency to secure all of their wheelchairs when traveling in a van. It consists of two metal tracks perpendicular to the orientation of the wheelchair that get bolted to the floor of the van. The tracks have an indentation through the middle in which one inserts the Q'Straint wheelchair tie down and then locks it into place. The Q'Straint wheelchair tie down consists of a base which lines up with the tracks for insertion, a handle attached to the base to release the device after it has been locked in, a swivel point to ensure secure positioning, a spring resistant restraining belt with locking mechanism and attached hook, and a lever to release the locking mechanism on the restraining belt.

Researchers used the Securing Wheelchair Checklist Form (see Appendix E), a pen, and a clipboard in order to take data. A timer was used to time each session and an iPad was used to video record each session for taking procedural integrity and inter-observer agreement (IOA) data. A room approximately 10ft by 15ft or larger was required to ensure enough room for all the materials as well as the participant and researcher. The first seven sessions completed during baseline were completed in one office however became unavailable for the remainder of the study so all sessions following that were completed in a different office of similar dimensions and available space.

Procedure

Dependent Variable

This study evaluated the effects of feedback, when used as an antecedent, on the staff performance of the procedure for securing and then un-securing a wheelchair in a

vehicle using the Q'Straint system (see Appendix E). This task if completed incorrectly has the potential to put a client in an unsafe situation and lead to serious injury. The task was chosen in part for this reason in order to address a far too common issue. It was also chosen for the ability to initially complete the sessions in a controlled environment with minimal external confounding variables. The facility in which this task was completed has reported staff failing to ensure the brakes are properly secured, the Q'STRAIN being positioned incorrectly or failing to properly check that each strap is secured.

The process, for securing a wheelchair, used in this study encompasses 37 steps. Each step was measured as completed correctly or incorrectly. First the participant must ensure the wheelchair is facing the front of the board. Then they must ensure the wheelchair is positioned in between the tracks. Once the wheelchair is positioned correctly the participant must ensure the brakes are engaged. Once the wheelchair is properly positioned and the brakes are engaged the participant secures one Q'STRAIN by pulling up the t-handle placing it in the track, to the outside of the wheelchair if securing the front or between the wheels of the wheelchair if securing the rear, shifting it until it locks into place. Once the Q'STRAIN is secured to the track the participant will take the J-Hook and pull it to the appropriate hook on the wheelchair. The participant will then check that the placement is correct and that it is secured. The participant will then repeat these steps 3 more times until all 4 restraints are properly placed and secured. Once the wheelchair is secure the participant will press the red release lever on the Q-STRAINT and remove the J-Hook from the wheelchair and let it retract. Once the J-Hook has been removed the participant will then use two fingers to lift up on the t-handle on the Q-STRAINT, shift the Q-STRAINT in the track and lift to remove it. Participants will

complete these steps for all four Q-STRAINTs. Once this has been completed they release the brakes and remove the wheelchair from the mock van floor. The dependent measure will be the percentage of steps of this task analysis completed accurately for each trial.

Data Collection

Data were collected by the student researcher five times per week. When the participant entered the room, the wheelchair, board, and four Q'Straints were set out in the same orientation in front of them. The researcher had a timer set for 5 min on a nearby desk. The researcher held an iPad to record the session adjusting its position to record all appropriate steps of the task. The researcher then told the participant "You have 5 minutes to secure the wheelchair to the mock van set up and unsecure the wheelchair from the mock van set up properly. If you have completed it prior to the 5 minutes you can say 'done' and your performance will be evaluated." The researcher then started the timer. After the participant left the room, the researcher took their clipboard, pen, and Securing a Wheelchair Competency Checklist Form (see Appendix E) and reviewed the video to collect data. For each step completed correctly the researcher marked an "X" in the "Correct" column and for each step completed incorrectly or not completed at all the researcher marked an "X" in the "Incorrect" column. Once the Wheelchair Competency Checklist Form (see Appendix E) was completed the researcher calculated the percentage of accuracy by dividing the number of "correct" responses by the total number of opportunities (37) and multiplying by 100 for each day. All raw data sheets were submitted to the first author which were then entered into excel sheets and then stored in a locked cabinet in a locked office. The excel sheets which were used to

track progress and trends were stored on a password protected drive that was only accessible to the student researcher.

Baseline

Once all participants were recruited, the researchers began to collect baseline data. During the first baseline session, the participants watched two videos modeling the process for staff. One video modeled how to secure a wheelchair which was 1-min and forty-six sec long; while the other modeled how to unsecure the wheelchair which was 1-min and 9-sec long. Then the researcher brought the participant into the room with the wheelchair, mock van set up, and four Q'Straints set out in front of them. The researcher had the timer set to 5 min on the desk to the side. The researcher was holding the iPad so that the entire process is visible for recording. The researcher turned the iPad on and stated the participant's name and session number. The researcher then told the participant "You have 5 minutes to secure the wheelchair to the mock van set up and unsecure the wheelchair from the mock van set up properly. If you have completed it prior to the 5 minutes you can say 'done' and your performance will be evaluated." The researcher then started the timer and observed the participant on their current performance of each step. Once the five minute timer went off or the participant stated "done," the researcher would say thank you and let them know they are able to leave. No feedback was provided during baseline. If the participant asked how they performed, the researcher would respond "I cannot discuss your performance at this time."

Intervention

The intervention phase was similar to the baseline phase with the researcher observing the participant completing the dependent variable and then following

completion of the task reviewing the video of the session and completing the Securing a Wheelchair Competency Checklist (see Appendix E) to measure the dependent variable. Different from baseline, however, feedback based on the previous session's performance was reviewed prior to the start of the current session. When the participant entered, the wheelchair, board, and four Q'Straints were set out in front of them in the same orientation as during baseline sessions. The researcher had the timer set to 5 min on the desk to the side. The researcher was holding the iPad so that the entire process is visible for recording and could be adjusted to ensure each step was captured. The researcher turned the iPad on and stated the participant's name and session number. The researcher had the clipboard, pen, and Securing a Wheelchair Competency Checklist (see Appendix E) from the previous session. The researcher will then say "To start we will review your performance from the previous session." The researcher then reviewed each step of the task analysis reading the expectation and stating whether it was completed correctly or incorrectly during the previous session. If it was completed incorrectly the researcher would state why it was marked as completed incorrectly and what needed to be done differently in order for it to be completed correctly. Feedback was presented in two forms the feedback as an antecedent condition and the Modified Antecedent Feedback condition. For example, initially feedback was presented by stating "Secure Q'STRAIN (retractor) to track on floor (secured; release away from chair)? This was incorrect, the release was facing toward the chair, and in order to complete this correctly ensure the release is facing away from the chair." Due to the first participant continuing to place the Q-STRAINT incorrectly even with feedback it was determined that the initial feedback presented was not detailed enough. For the Modified Antecedent Feedback condition

feedback was presented by stating “This was incorrect, the release, which is the t-handle section of the Q-STRAINT, needs to be rotated so that when locked in, faces away from the centerline of the wheelchair as opposed to facing toward the centerline of the wheelchair.” This intervention was applied to Phoebe after eight sessions of just the feedback as an antecedent condition, and the remaining three participants moving forward. The researcher would then tell the participant “You have 5 minutes to secure the wheelchair to the mock van set up and unsecure the wheelchair from the mock van set up properly. If you have completed it prior to the 5 minutes you can say ‘done’ and your performance will be evaluated.” The researcher would then start the timer and observe the participant on their current performance of each step. Once the five minute timer went off or the participant stated “done,” the researcher would stop the video say thank you and let them know they are able to leave. No feedback was provided following the performance of the task. If the participant asked how they did the researcher would respond “I cannot discuss your performance at this time.” Aside from the first baseline session for two of the four participants, all other sessions were finished, prior to the 5 minute timer going off, by stating “done.”

Design

This study used a multiple baseline across participant design (Kazdin, 1982). Baseline data were collected until the last three data points fall within a 30% range of the median. Once stable responding was observed, the intervention phase was implemented for Phoebe (the participant with the lowest performance). Researchers completed the observations and provided feedback, in accordance with the description above, to that

participant. Using the data collected from each observation, the intervention performance was graphed and the researchers reviewed each participant's data for stability (as described above). Once stable responding and mastery criteria (which consisted of 3 consecutive trials at 100% accuracy) was met for Phoebe, the intervention phase was applied to the next participant. This process continued until all participants received the intervention phase and stable responding had been achieved.

Inter-Observer Agreement

The research assistant was trained on the data collection procedure for observations. She is a current employee at the agency completing graduate course work in the field of applied behavior analysis. She was trained by the student researcher on the Securing a Wheelchair Checklist, and how to collect data prior to the start of the study using behavioral skills training. One other member of the research team (research assistant) participated in collecting IOA and procedural fidelity data. They were trained on the procedures using a behavior skills training model (Reid & Parsons 2006). The research assistant was told what they would be learning about and expected to complete. Then both the securing a wheelchair checklist (Appendix E) and procedural fidelity checklist (Appendix F) were provided for review. The forms were then verbally reviewed followed by a physical demonstration of the both tasks. The research assistant was then given an opportunity to practice with feedback from the student researcher until they were able to complete the tasks at 100% accuracy. This only took one practice trial for IOA of measuring the depending variable and two practice trials for high fidelity of conducting a session as the researcher before the research assistant demonstrated proficiency in both tasks. Between the student researcher and the other member of the

team, Inter-observer Agreement (IOA) was conducted for 31% of the observations randomly selected across all phases and all participants reviewing the video recordings. IOA was calculated by comparing the primary researcher's datasheet who conducted the session and took the initial data, with the datasheet of the research assistant who collected data for IOA purposes. For each session the number of agreements (defined as the student researcher and secondary member of the team recording the same response) was added and then divided by the total of agreed items plus disagreed items and then multiplied by 100. IOA across averaged 97.72% across all participants and all phases. IOA for Phoebe averaged 98.8% (range, 97%-100%) across all sessions. Baseline IOA for Phoebe averaged 97% (range, 97%-97%), intervention averaged 99.4% (range, 97%-100%) and maintenance had 100% agreement. IOA for Clark averaged 98.4% (range, 89%-100%) across all sessions. Baseline averaged 95.2% (range, 89%-100%) agreement, intervention averaged 100% agreement, and maintenance averaged 100% agreement. IOA for Doris averaged 94% (range, 92%-100%) across all sessions. Baseline averaged 90.6% (range, 84%-97%) agreement, intervention averaged 99% agreement (range, 97%-100%), and maintenance averaged 100% agreement. IOA for Rony averaged 99.67% (range, 95%-100%) across all sessions. Baseline averaged 99% (range, 95%-100%) agreement, intervention averaged 100% agreement, and maintenance averaged 100% agreement.

	Phoebe		Clark		Doris		Rony	
	Average	Range	Average	Range	Average	Range	Average	Range
Overall	98.8%	97%-100%	98.4%	89%-100%	94%	92%-100%	99.67%	95%-100%
Baseline	97%	97%-97%	95.2%	89%-100%	90.6%	84%-97%	99%	95%-100%
Intervention	99.4%	97%-100%	100%	100%-100%	99%	97%-100%	100%	100%-100%
Maintenance	100%	100%-100%	100%	100%-100%	100%	100%-100%	100%	100%-100%

Note: This table describes the IOA for each participant and condition

Procedural Integrity

Procedural integrity data was collected during 31% of the sessions (selected randomly across participants and all phases) to ensure feedback was delivered as described above. Both the student investigator and the research assistant conducted sessions, implementing the baseline and intervention procedures. Based on their previous demonstration of the procedure as described in the procedures section, the research assistant observed the student researcher and completed a procedural fidelity checklist (see Appendix F), marking yes if the step was completed correctly or no if implemented incorrectly. Once a procedural fidelity checklist was completed, the research assistant completing the form would tally up the number of “yes” responses and divide it by the total of “yes” and “no” responses and multiply that number by 100 to get the percentage of the procedure steps implemented correctly. The research assistant then met with the member of the team which they were evaluating and reviewed the areas that were completed correctly as well as the areas that were not completed correctly and what needed to be done differently to be completed correctly. The procedural integrity scores never dropped below 100% across all participants and phases.

Social Validity

Social validity was measured using a questionnaire given to each participant following completion of the study (see Appendix G). The questionnaire consisted of seven questions utilizing a likert scale of 1-5, 1 being strongly disagree and 5 being strongly agree, and one open ended section to write any additional comments or concerns. The questionnaire was designed to evaluate whether participants felt feedback presented prior to performance impacted their performance and how they felt about

receiving that feedback. The first question asked whether they felt the feedback helped improve their performance. The second question asked if they felt when feedback was presented prior to completing the task it was more difficult to complete the task. The third question asked if they enjoyed receiving feedback prior to completing the task. The fourth question asked did they not enjoy receiving feedback prior to completion of the task. The next question asked if they felt feedback presented prior to their performance was more effective at improving their performance compared to receiving feedback following performance. The next question asked whether they preferred receiving feedback prior to completion of the task. The final likert scale question asked if they prefer receiving feedback following completion of the task. Following the likert scale questions there was an open ended section asking if there were any questions or comments. Once each participant completed the survey following their last session they were given the gift card and thanked for their participation.

CHAPTER 3

RESULTS

Following the application of the feedback in the intervention phase all participants showed an immediate improvement from baseline. For the first three participants, 100% of the data points were non-overlapping, while 97% of data points were non-overlapping for the fourth participant. Duration data was also collected for all sessions and participants (see Figure 1). This data failed to show any meaningful change as a result of the implementation of feedback. It did however demonstrate the effects of practice on performance. All participants showed a decrease in duration over time although Phoebe showed variable durations during each condition reflective of her attempts to learn the task. While the duration showed no significant relation from baseline to intervention the study was able to demonstrate a clear improvement of steps completed correctly (see figure 2).

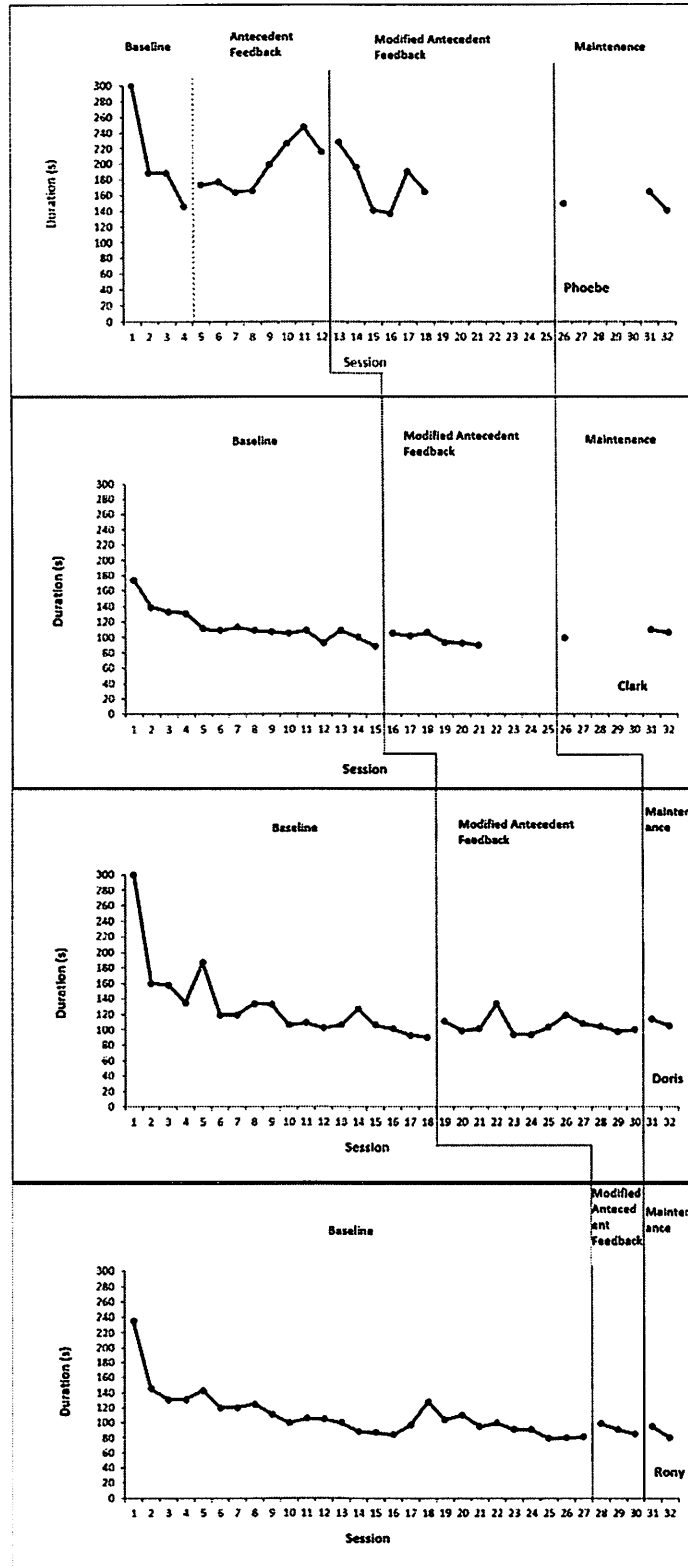


Figure 2. This graph shows the duration in seconds per session for each participant across each participant and condition.

Phoebe

Across all phases Phoebe performed with a median of 97% and a mean of 87% (range, 49%-100%). During the baseline phase Phoebe performed with a median of 50% and a mean of 50% (range, 49%-51%). Upon implementation of the feedback as an antecedent condition, Phoebe performed with a median of 95% and a mean of 91% (range, 73%-97%). She immediately increased from 49% to 73% of steps performance correctly. Within 3 sessions, performance was above 95%. Phoebe continued to make the same mistakes for five sessions, which included the release on the rear Q-STRAINTs facing toward the center line of the wheelchair. This was occurring on one or both sides and feedback presented, while led to overall increases in performance, did not lead to completing that portion of the task correctly. Feedback was modified to describe the behavior itself more clearly in the Modified Antecedent Feedback condition which immediately led to 100% correct completion of the task analysis with a median of 100% and a mean of 100%. She was able to maintain this for 6 more sessions meeting mastery criteria. The percentage of non-overlapping data points was 100%. During maintenance Phoebe continued to perform with 100% accuracy with a median and mean of 100%.

Clark

Across all phases Clark performed with a median of 89% and a mean of 91% (range, 78%-100%). During the baseline phase, Clark's performed with a median of 87% and a mean of 86% (range, 78%-91%). Initially, Clark performed the task at 81% with some variability before stabilizing between 86% and 89% during baseline. Upon implementation of the Modified Antecedent Feedback, all sessions remained at 100% with a median of 100% and mean of 100%. Clark immediately increased from 89% to

100% which he was able to maintain to meet mastery criteria. From baseline to intervention Clark's data demonstrated 100% of non-overlapping data points. Clark was able to maintain the level of performance maintaining 100% in the maintenance phase with a median of 100% and mean of 100%.

Doris

Across all phases Doris performed with a median of 83% and a mean of 87% (range, 57%-100%). During the baseline phase, Doris performed with a median of 78% and a mean of 78% (range, 57%-84%). Initially Doris performed the task at 57% however that quickly increased variably to a range of 70% to 84% before stabilizing between 76% and 84% before the intervention phase was implemented. During the Modified Antecedent Feedback condition Doris performed with median of 100% and a mean of 99% (range, 95%-100%). Once the intervention condition was implemented, Doris immediately increased to 100% for two sessions. On the third session she incorrectly placed one of the rear Q-STRAINTs so that the release was facing towards the outside of the chair as opposed to towards the center or inside of the chair. Following feedback the participant tried to correct this, however, changed it so that both releases were facing toward the outside. The next session they adjusted one so that it was correct, however, the second one was left incorrect. They indicated following that session they understood what they were doing incorrectly. During the next session they were able to complete the positions for both rear Q-STRAINTs correctly; however, they missed a different step when they failed to position the Q-STRAINT so that it is fully to the outside of the wheelchair. The following three sessions Doris was able to complete all the steps correctly with a median of 100% therefore meeting mastery criteria. From baseline to

intervention Doris's data demonstrated 100% of non-overlapping data points. During maintenance Doris continued to maintain a median and mean of 100% with no sessions falling below 100%.

Rony

Across all phases Rony performed with a median of 96% and mean of 96% (range, 84%-100%). During the baseline phase Rony performed with a median of 95% and a mean of 95% (range, 84%-100%). During one session Rony's performance reached 100% of steps performed correctly. Upon implementation of the Modified Antecedent Feedback condition, Rony immediately increased performance to 100% for three consecutive trials. She performed with a median and mean of 100%. From baseline to intervention Rony demonstrated 97% of non-overlapping data points. Following initial intervention Rony was able to maintain 100% accuracy during both probe sessions.

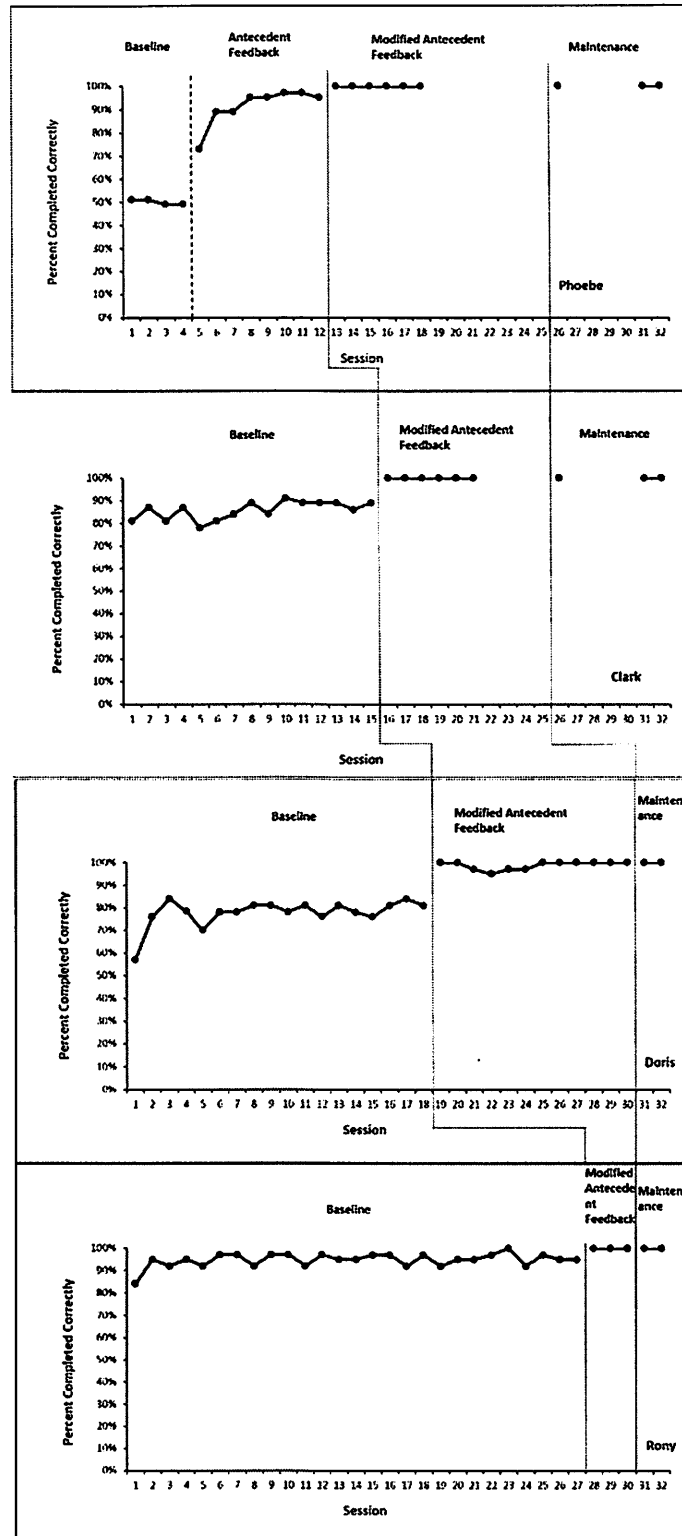


Figure 2. This graph shows the percentage of steps completed correctly per session for each participant across each participant and condition.

Social Validity

All four participants had positive responses in regards to the use of feedback as an antecedent when evaluating the social validity questionnaire results (see table 2). When evaluating the responses to the first question in the social validity questionnaire, which asked whether participants felt the feedback helped improve their performance, three of the participants reported that they strongly agreed (5) with this statement and one reported they agreed (4). The results for the second question which asked if participants felt when feedback was presented prior to completing the task it was more difficult to complete the task, showed three of the participants reported that they strongly disagreed (1) with this statement and one reported they disagreed (2). The results for the third question which asked if participants enjoyed receiving feedback prior to completing the task showed two of the participants reported that they strongly agreed (5) with this statement and two reported they agreed (4). The results for the fourth question which asked whether participants did not enjoy receiving feedback prior to completion of the task showed two of the participants reported that they strongly disagreed (1) with this statement and two reported they disagreed (2). The results for the fifth question which asked if they felt feedback presented prior to their performance was more effective at improving their performance compared to receiving feedback following performance showed one participant strongly agreed (5) with this statement, two participants agreed (4) and one participant was neutral (3). The results for the sixth question asked whether participants preferred receiving feedback prior to completion of the task showed, one participant strongly agreed (5) with this statement, two participants agreed (4) and one participant was neutral (3). The final Likert scale question which asked if they prefer

receiving feedback following completion of the task reported three of the participants responded with neutral (3) and one participant responded disagree (2). The final question was an open ended section asking if there were any questions or comments. Two participants responded to the final open ended comments or questions section writing “I was unsure of the task in the beginning but really enjoyed it after I started receiving feedback and knew what I was doing correctly/incorrectly” and “Great project. Effective way to learn.” Summarizing all of this information most participants responded positively to the process of receiving feedback prior to completing the task and positive responses were not associated with quality of performance when completing the task.

Question	1	2	3	4	5	6	7
Responses	4,5,5,5	1,1,1,2	4,4,5,5	1,1,2,2	3,4,4,5	3,4,4,5	2,3,3,3
Mean	4.75	1.25	4.5	1.5	4	4	2.75
Range	4 to 5	1 to 2	4 to 5	1 to 2	3 to 5	3 to 5	2 to 3
<i>Note:</i> This table describes the response from each participant, the mean, and the range for each question of the Social Validity Questionnaire.							

CHAPTER 4

DISCUSSION

For all four participants, there was an immediate improvement from baseline to intervention, suggesting that feedback when delivered as an antecedent, was effective at improving performance. This addresses the primary research question asked in this study indicating that; feedback based on a previous performance, when presented prior to the completion of a task improves the successful completion of that task. These findings are consistent with the previous research by Aljadeff-abergel, Peterson, Wiskirchen, Hagen, and Cole (2017) further demonstrating the use of feedback as an antecedent.

The second research question of this study wanted to evaluate, do staff acknowledge this form of feedback as a socially acceptable presentation and if not, why? The social validity questionnaire (Appendix G) outlined in the social validity section above was used to evaluate this question. In general the participants in this study responded positively to the use of feedback as an antecedent.

Evaluation of the controlling variables for feedback when used as an antecedent suggest that feedback presented as an antecedent provides the same positive and negative reinforcement characteristics as when feedback is presented as a consequence, previously the most frequently recommended application. The main conceptual difference between feedback presented as an antecedent versus as a consequence is the additional antecedent characteristic which can act as a more specific discriminative stimulus. Participants indicated during baseline sessions of this study that they did not like that they were not provided feedback and did not know whether they were completing the task correctly or incorrectly and didn't want to be doing it incorrectly. This demonstrates a desire to

receive feedback and affirmation that the task was completed correctly and avoid feedback that steps were completed incorrectly whether it is provided immediately or prior to the next time the task is completed. When feedback is presented as an antecedent it can still serve as a reinforcer for that individual's behavior if it increases the likelihood that they will engage in that behavior in the future. Regardless of when feedback was presented (immediately after a behavior or immediately preceding the next opportunity for that behavior), it could serve as a discriminative stimulus. The feedback stating specifically which behaviors were completed correctly could signal to the participant that reinforcement is available for those behaviors. Conversely feedback stating which behaviors were completed incorrectly would act as an S-delta and would not be reinforced. The steps completed correctly the previous time will continue to be reinforced in the future if completed correctly again. The steps completed incorrectly would be positively punished in the way of corrective feedback but can be positively reinforced in the future if completed correctly based on the feedback presented. While this study demonstrates that feedback presented as an antecedent event is effective at improving the performance of a task it does not empirically demonstrate the feedback functions as either a discriminative stimulus or a reinforcer.

The social validity questionnaire showed a generally positive reaction to feedback as an antecedent however there was a limitation identified by Doris. Doris's comment "I was unsure of the task in the beginning but really enjoyed it after I started receiving feedback and knew what I was doing correctly/incorrectly" describes a potential concern with receiving feedback any duration after the immediate opportunity as it can lead to uncertainty. If a participant completing the task correctly is reinforced by receiving

feedback, even the delay of feedback for one day could be a negative punishment. In reference to the current study, this uncertainty was likely exacerbated by the use of a multiple baseline design as Doris had completed 19 baseline sessions prior to receiving feedback in the intervention phase. However, it is important to still consider the delay as a concern for some individuals. Doris's comment can be argued to demonstrate more of a concern with the design of the study than the procedure itself; however, it is in relation to a task of minimal meaning to her (i.e., she is not expected to perform this task in her job). If it was something that was directly related to job performance and retention the slight delay from day to day could have been identified as more of a concern for her.

Limitations

The results in this study have strong implications for future research and further the understanding of the behavioral processes at work during feedback. The current study, however, is not without its limitations. This study was able to evaluate feedback presented as an antecedent from a conceptual basis; however, the participants in this study were staff in administrative positions all with higher level education. These factors have the potential to impact the social validity of this study and its application in a setting more realistic to in the field expectations (as well as the effectiveness of the intervention). Also, as a result of this task not being a typical job expectation for these participants on a daily basis, we did not evaluate long term effects. Probe sessions were completed, which demonstrated continued mastery of the skill for a short time; however, this could be attributed to other variables such as continued practice due to the design. Higher levels of education than staff potentially working in direct care positions and completing this task could impact the validity of these results. Pursuing higher education can be an indication

that a person is able to learn potentially complex concepts an ability someone with a lower education level might not poses and therefore why they have not completed further educational experiences. Participants with previous work experience at higher level positions may also be an indication that they have experience receiving feedback and applying it towards improving performance. Future research could evaluate feedback as an antecedent by targeting specific participant groups (ex. Different age groups, education levels, or positions). This would allow for researchers to determine if these factors have any impact on the application of feedback as an antecedent as a performance improvement technique.

As previously stated, a further limitation is the use of a multiple baseline design, which left participants in baseline for an extended period of time. While this is useful for a clear comparison across conditions, due to participants not receiving any feedback it led to anecdotal reports of frustration to more onto the next phase and receive feedback. The use of a multiple baseline design was also not able compare feedback before and feedback after. Participants reported their preferences for this presentation of feedback based on a comparison to receiving no feedback at all but not in comparison to feedback after their performance. There was a question on the social validity questionnaire asking whether participants felt receiving feedback prior to performance was more effective then receiving feedback after; however without experiencing a direct comparison, it is difficult to determine either is a preferred method of feedback presentation for the participants as shown by Wine et. al. (2019).

Future Research

Several studies have been able to demonstrate the use of prompts as a way to improve performance (e.g., Cook & Kendler 1956; Day, 1987). The evaluation of feedback as an antecedent has only more recently been evaluated (Aljadeff-Abergel, Peterson, Hagen, Wiskirchen, & Cole, 2017; Betchel et. al., 2015; Wine et. al. 2019). Aljadeff-Abergel, Peterson, Hagen, Wiskirchen, & Cole, (2017) demonstrated that feedback presented prior to a task is effective at improving performance; however, Wine et. al. (2019) and Betchel et al. (2015) were not able to definitively show improvement. Wine et. Al. (2019) found that while feedback before improved performance it was not as effective as feedback after while Betchel et. al. (2015) found that it was not much more effective when compared to baseline. Both of these studies cited a similar limitation in that the task was too easy and the current study extended the literature by utilizing a more complex task of securing a wheelchair in a van. More research continuing to evaluate feedback as an antecedent on tasks of varying difficulty can determine the efficacy of this procedure as well as define the types of tasks for which it is beneficial.

One further consideration to evaluate includes the timelines in which feedback is presented. In this study the task was completed during consistent sessions with no more than two days in between sessions. Outside of specific research training scenarios, the likelihood of a task being completed daily, or as consistently as in this study, in certain settings may be low. This could impact the effectiveness of feedback as an antecedent in those scenarios. Future research could evaluate how long a manager could go without providing that feedback before it impacts the efficacy of the procedure at improving performance. If a manager or trainer is unable to provide feedback at every opportunity

the task is completed, would this minimize its effectiveness as either a reinforcer or discriminative stimulus for performing it correctly. Because they are not receiving feedback following their performance, they could potentially complete the task incorrectly for several opportunities prior to receiving feedback, thereby practicing errors. If this were to be the case, the feedback's value as a discriminative stimulus could be diminished as it would compete with their current understanding of the sequence of behaviors to complete the task. This could make it more difficult for the person to learn the task correctly, or lead to other issues if there are significant consequences to completing the task incorrectly. For example, if looking at securing a wheelchair if they secure the Q-STRAINT with the release lever facing toward the inside it could lead to a client being able to accidentally release the Q-STRAINT causing injury. Since participants in the current study were completing the task without feedback for several baseline sessions, it is unclear how detrimental practicing errors might be. This is something that could be further evaluated as part of a group design study where feedback is presented as an antecedent, with sessions in between as compared to feedback presented as a consequence, with opportunities for practice in between. Researchers could then compare the number of errors made on sessions in which feedback was not provided for either condition and see if this would affect the effectiveness of the feedback

Both Clark and Rony increased performance to mastery criteria immediately upon implementation of the intervention. Phoebe and Doris, however, required more time to reach mastery criteria. This study only compared the use of feedback specifically avoiding the use of any modeling to ensure effects were the result of the verbal feedback only. The use of modeling plus the feedback might have been more effective at

improving the performance of Phoebe and Doris. This was most noticeable with Phoebe; because she was the first to receive the intervention, it was determined that she was not making progress in the feedback as an antecedent condition because the feedback presented was not specific enough to address the mistakes she was making. As a result of this the Modified Antecedent Feedback condition was applied and used moving forward for all other participants. Specifically instead of stating "Secure Q'Straint (retractor) to track on floor (secured; release away from chair)? This was incorrect, the release was facing toward the chair, in order to complete this correctly ensure the release is facing away from the chair" they would respond "This was incorrect, the release, which is the t-handle section of the Q-STRAINT, needs to be rotated so that when locked in, faces away from the centerline of the wheelchair as opposed to facing toward the centerline of the wheelchair." This level of feedback was presented to all participants moving forward. Based on this information it is hypothesized that a visual representation could have improved Phoebe's and then Doris's understanding of the specific mistakes they were making. This further highlights the importance of manager's ability to choose the most effective way to give feedback for each supervisee. A good understanding of the individual in addition to the characteristics of feedback identified by Prue & Fairbank (1981) such as the content, in the form of specific and detailed feedback, could have the potential to greatly increase the efficiency of learning for an individual.

Further research using a group design could also compare different types of feedback. This current study evaluated written and verbal feedback. Further research could look at all the different components of research outlined by Prue & Fairbank (1981). This could include the different recipients such as individual vs group

presentation, mechanisms such as video vs written, content such as how specific the information is needed, or the source such as a researcher vs a supervisors who they already have a relationship with in that capacity. In addition to the research completed by Wine et. al. (2019) group designs could be used to address the concerns previously outlined. Researchers could further compare feedback as an antecedent to feedback as a consequence, or no feedback as evaluated by Wine et. al. (2019) but with a task that is potentially difficult enough to benefit from the use of feedback as an antecedent. Further evaluation will continue to tighten our understanding of how to apply feedback in an effective manner by demonstrating any differences in long term compliance across different feedback methods, demographics, and task difficulty.

Feedback has been a part of a significant portion of research published (Balcazar, Hopkins, & Suarez, 1984; Nolan, Jarema, & Austin, 1999; Vanstelle et al., 2012). This research has added to this base by demonstrating the use of feedback as an antecedent is an effective as well as a socially acceptable way to improve a socially significant behavior. As outlined, this study adds to the literature that suggests that feedback may act as an antecedent and can be effective when delivered as an antecedent (Aljadef-Abergel, E., Peterson, S.M., Hagen, K.K., Wiskirchen, R.R., & Cole, M.L., 2017; Betchel et. al., 2015; Wine et. al. 2019) for which further replication and extension of this research can help to address the limitations of this study and better understand the most effective way to utilize feedback as a performance improvement technique.

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*APPENDIX A**RECRUITMENT SCRIPT*

Researcher: “We are working on a study to evaluate the most effective way to help improve staff completion of securing a wheelchair in a van. This task will take approximately 10 minutes per day. During this study you will have up to 5 minutes to properly secure a wheelchair to a mock van. Feedback will be presented to you based on the conditions of this study. Choosing to participate or not participate will not impact your standing within the company or the program, it is completely optional to participate in this opportunity. Participants will have the opportunity to receive a nominal gift for their participation. Do you have any questions or think this would be something you are interested in?”

APPENDIX B

EXCLUSIONARY CRITERIA SURVEY

Name: _____

Have you ever participated in research before?

Do you have any experience working with individuals in wheelchairs?

Have you ever been trained to secure a wheelchair in a van?

If you have been trained to secure a wheelchair in a Van what system did you use?

Does your position require you to become van certified?

*APPENDIX C**PARTICIPATION CONSENT FORM*

Title of Research: An Evaluation of the Use of Feedback as an Antecedent on Securing a Wheelchair in a Van.

Investigator and Department:

Name/Principal Investigator: Amanda Fisher, Ph.D., Assistant Professor of Instruction, College of Education. Temple University.

Location of Research: Melmark, Inc. 2600 Wayland Rd. Berwyn, PA 19312

Why am I being invited to take part in this research?

We invite you to take part in a research study as a staff at Melmark to help evaluate feedback presentation on performance.

What should I know about this research?

- Someone will explain this research to you
 - You volunteer to be in a research study
 - Whether or not you take part is up to you
 - You can choose not to take part in the research study
 - Your decision will not be held against you
 - You can ask all the questions you want before you decide
 - Participation and corresponding study data will not be shared with your co-workers

Who can I talk to about this research?

If you have questions or concerns, please contact me using the following information:

Amanda Fisher, Ph. D
Email: agfisher@temple.edu
Phone: 215-204-6023

This research has been reviewed and approved by an Institutional Review Board. You may talk to them at (215) 707-3390 or e-mail them at: irb@temple.edu for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team

- You cannot reach the research team
- You want to talk to someone besides the research team
- You have questions about your rights as a research subject
- You want to get information or provide input about this research

Why is this research being completed?

Previous research has shown feedback presented in various forms and under various conditions can affect its ability to impact behavior change. Current research has demonstrated varying results when evaluating when feedback is presented in relation to performance. This research is looking to further evaluate when feedback is presented prior to performance and how it impacts that performance.

How long will I be in this research?

We expect participation required can extend up to two months. Participation will not require any time outside of your regularly scheduled hours.

What happens if I agree to be in this research?

If you give consent to participate in this study, each day you will be pulled into a separate room and have up to 5 minutes to secure a wheelchair to a mock van set up using the provided materials. Feedback provided will vary based on the conditions of this study. Each session will be videotaped using an iPad which will be stored on a secure database only accessible to the research team. David Haneman will be in the room with you to collect data, occasionally with a second research team member to also collect data.

Physical data will be stored in a binder identifiable only by the code name you choose. This binder will be stored in a locked cabinet in a locked office so that it is only accessible by the research team. All electronic data will be stored on an external storage device and OWLBox both accessible only to the research team.

All data will be coded to protect any identifiable characteristics. Your name will be changed which will be used when graphing and summarizing data collection.

What happens if I choose not to participate?

If you choose not to participate in this study you will be expected to complete your work tasks in accordance with the program's normal expectations. It will not affect your job placement, job duties, ability for promotion, or performance appraisal reviews.

What are potential risks or discomfort?

This research will require frequent observations from researchers on your completion of work products for which they will provide feedback. This constant feedback plus the potential for co-workers to see researchers providing constant observation and feedback could create discomfort for some participants even though your participation will not explicitly be communicated to any co-workers. This research will not provide any further risk or discomfort than that which could potentially occur as part of any normal workday in your position.

Will being in this research help me in any way?

Participation in this research will provide you with additional feedback and support to help improve performance of job expectations. Improvement in performance now can minimize future presentation of corrective feedback from your supervisors for failing to accurately complete required job responsibilities.

What happens to the information collected for this research?

To the extent allowed by law, we limit the viewing of your personal information to people who have to review it. We cannot promise complete secrecy. The IRB, Temple University and its affiliates, and other representatives of these organizations may inspect and copy your information. ***All data collection will be coded in order to refrain from using any identifiable information, such as employee names. All electronic data will be stored on an external storage device and OWLBox both accessible only to the research team. Once data has been collected it will immediately be transferred onto the external storage device, then uploaded to OWLBox and deleted from the iPad.***

Signature block for Participant

Your signature documents your permission to take part in this research.

Printed name of participant

Signature of participant

Date

Printed name of person obtaining consent

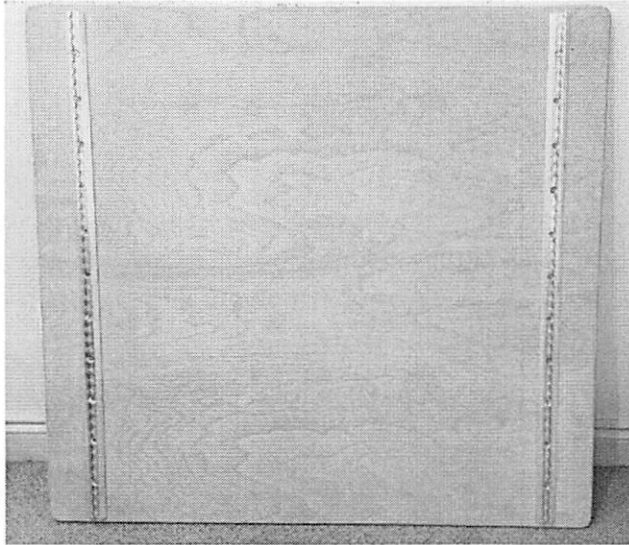
Signature of person obtaining consent

Date

APPENDIX D

GRAPHIC REPRESENTATION OF MATERIALS

Mock Van Floor



Q-STRAINT



Wheelchair Front View



Wheelchair Rear View



APPENDIX E

SECURING A WHEELCHAIR COMPETENCY CHECKLIST

Session: _____

Participant's Designated Name: _____

Condition _____

Researchers Name: _____

Securing Retractors and Wheelchair	Correct	Incorrect	Notes
Wheelchair is facing front of van?			
Wheelchair positioned between tracks?			
Wheelchair breaks engaged (or powered off)?			
Secure Q'Straint (retractor) to track on floor (secured; release away from chair)?			
Secure J-Hook to wheelchair?			
Check location of retractor (outside if in front; inside if in back) and J-Hook (on wheelchair frame or hook)?			
Check securement of 1 st retractor			
Secure Q'Straint (retractor) to track on floor (secured; release away from chair)?			
Secure J-Hook to wheelchair?			
Check location of retractor (outside if in front; inside if in back) and J-Hook (on wheelchair frame or hook)?			
Check securement of 2 nd retractor			
Secure Q'Straint (retractor) to track on floor (secured; release away from chair)?			
Secure J-Hook to wheelchair?			
Check location of retractor (outside if in front; inside if in back) and J-Hook (on wheelchair frame or hook)?			
Check securement of 3 rd retractor			
Secure Q'Straint (retractor) to track on floor (secured; release away from chair)?			
Secure J-Hook to wheelchair?			

Check location of retractor (outside if in front; inside if in back) and J-Hook (on wheelchair frame or hook)?			
Check securement of 4 th retractor			
Duration:			
% Independence			

APPENDIX F

PROCEDURAL INTEGRITY DATASHEET

Participant's Designated Name: _____

Date: _____

Session: _____

Condition: _____

	Topic	Measurement	Comments
1	Was the room set up prior to bringing the participant into the room?	Yes / No	
2	Did the researcher turn on the iPad and state the participants name and the session number?	Yes / No	
3	For the baseline phase did the researcher ensure not to provide feedback at any point during the session?	Yes / No N/A	
4	For the intervention phase did the researcher provide feedback before making the beginning statement?	Yes / No N/A	
5	When providing feedback did the research state "During the previous session you completed X steps correctly" And accurately report the steps from the previous session?	Yes / No N/A	
6	When providing feedback did the research clearly communicate what steps were completed correctly, which ones were not, and	Yes / No N/A	
7	Once ready to complete the next trial did the research state "You have 5 minutes to secure the wheelchair to the mock van set up properly. If you have completed it prior to the 5 minute mark you can say "done" and your performance will be evaluated "	Yes / No	
8	Did the researcher start the timer?	Yes / No	
9	Once the timer ended or the participant said "done" did the researcher say "thank you" and "you can now leave" without providing any additional feedback?	Yes / No	
10	If asked any questions did the researcher respond "I cannot discuss your performance at	Yes / No	

11	Following completion of the session did the participant end the video on the iPad	Yes / No	
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APPENDIX G

SOCIAL VALIDITY QUESTIONNAIRE

Social Validity Questionnaire Participant's Designated Name: _____

1. I feel when feedback is presented prior to completing a task it helps improve my performance.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. I feel when feedback is presented prior to completing a task it is more difficult to complete the task.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

I enjoy receiving feedback prior to performance of an assigned task.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. I do not enjoy receiving feedback prior to performance of an assigned task.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. I feel that feedback presented prior to my performance is more effective at improving my performance compared to receiving feedback following performance.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. I prefer receiving feedback prior to completion of a task.

1	2	3	4	5
---	---	---	---	---

Strongly Disagree Disagree Neutral Agree Strongly Agree

6. I prefer receiving feedback following completion of the task.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. Any additional comments or concerns?

APPENDIX H
SESSION PROTOCOL

1. Set up the room.
 - a. Place the Mock Van Floor Board on so it is flat on the floor with the tracks facing up
 - i. Make sure the sign indicating the front of the Van is located on the board
 - b. Place the Wheelchair next to the Mock Van Floor Board with all 4 Q-STRAINTs tie downs placed on the seat.
 - c. Prop up the iPad on the desk so that the board and wheelchair are in focus.
 - d. Retrieve and set up the participant's binder to the first new Securing a Wheelchair Competency Checklist. (make sure you have a pen to make the necessary documentation)
 - i. Using the Session Log determine which session it is and mark on the first line to the left after "session:"
 - ii. On the same line to the right mark the participants designated name.
 - iii. On the next line to the left fill in which condition is being applied.
 1. Write Baseline if in the baseline condition and
 2. Write Intervention if in the Intervention condition
 - iv. On the same line to the right write your name as the researcher.
 - e. Set the timer to five minutes.
2. Bring the participant in to the room.
3. Start the iPad
4. Once the iPad is running
 - a. State the Participant's designated name
 - b. State the session number
 - c. Adjust the iPad as necessary to ensure the behavior is captured
5. Based on the condition
 - a. Baseline:
 - i. Tell the participant "You have 5 minutes to secure the wheelchair to the mock van set up properly. If you have completed it prior to the 5 minute mark you can say "done" and your performance will be evaluated."
 - ii. Start the timer and provide no feedback. If the participant asks a question state "I cannot discuss your performance at this time."
 - iii. As the participant completes the process for securing the wheelchair complete the Securing a Wheelchair Competency

Checklist form by marking a check in the “correct” or “incorrect” boxes for each line.

1. If “incorrect” is marked write detailed notes for why it was incorrect.

Ex. Front left Q-STRAINT tie down was placed on the inside of the wheelchair instead of outside.

- iv. Once the timer ends or the participant states “done” say “thank you, you can now leave”
 - v. Any steps of the Securing a Wheelchair Competency Checklist not completed mark “Incorrect” and in the notes section write “step not completed”
 - vi. Take the iPad and walk around the finished Mock Van floor Board
 1. Ensure to get a clear view of the wheelchair as it is oriented on the board
 2. Ensure to get a clear view of all four Q-STRAINT tie downs location on the board as well as how they are attached to the wheelchair.
 - vii. End the video on the iPad
- b. Intervention
- i. Open to the checklist from the previous session.
 - ii. Go line by line through the checklist and review with the participant whether the step was completed correctly or incorrectly.
 1. If completed incorrectly review why it was incorrect and what would need to be done in order for it to be marked done correctly.
Ex. “The step Check location of retractor (outside if in front; inside if in back) and J-Hook (on wheelchair frame or hook) was incomplete on the front left side because the Q-STRAINT retractor was secured to the floor on the inside of the wheelchair. For the front of the wheelchair the Q-STRAINT retractor needs to be secured to the floor on the outside of the wheelchair.”
 - iii. Once the feedback has been provided tell the participant “You have 5 minutes to secure the wheelchair to the mock van set up properly. If you have completed it prior to the 5 minute mark you can say “done” and your performance will be evaluated.”
 - iv. Start the timer and provide no feedback. If the participant asks a question state “I cannot discuss your performance at this time.”

- v. As the participant completes the process for securing the wheelchair complete the Securing a Wheelchair Competency Checklist form by marking a check in the “correct” or “incorrect” boxes for each line.
 - 1. If “incorrect” is marked write detailed notes for why it was incorrect.
 - Ex. Front left Q-STRAINT tie down was secured to the floor on the inside of the wheelchair instead of outside.
 - vi. Once the timer ends or the participant states “done” say “thank you, you can now leave”
 - vii. Any steps of the Securing a Wheelchair Competency Checklist not completed mark “Incorrect” and in the notes section write “step not completed”
 - viii. Take the iPad and walk around the finished Mock Van floor Board
 - 1. Ensure to get a clear view of the wheelchair as it is oriented on the board
 - 2. Ensure to get a clear view of all four Q-STRAINT tie downs location on the board as well as how they are attached to the wheelchair.
 - ix. End the video on the iPad
- 6. Ensure the data sheet is logged in the participants binder and return to the secure cabinet
 - 7. Transfer the video on the iPad to OwlBOX.