Increasing Speed and Accuracy of Grocery Bagging for a 35-year-old Male with an Intellectual Disability

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A thesis submitted to the School of Community Services
in partial fulfillment of the requirements for
the degree of
Bachelor of Applied Arts in Behavioural Psychology

St. Lawrence College
Kingston, Ontario
Canada.
April, 2015
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Abstract
It is essential that humans learn daily living skills to maximize productivity and satisfaction. Accurate grocery bagging is an example of a critical, but often overlooked, living skill. Proper bagging is important to ensure the safety and quality of food product during transportation. The present study evaluated the use of a task analysis sheet, paired with praise and prompts to increase accuracy and decrease duration of grocery bagging in a 35-year-old male with an intellectual disability. The study is a single subject ABC design, in the setting of a local grocery store. Data was collected for time and accuracy using duration and number of incorrectly placed items based on the task analysis sheet. Data was recorded for three days of baseline, five days of treatment, and two days of fading. Results were analyzed using visual analysis of descriptive statistics, which included mean, median, standard deviation. Graphs with trendlines were used to display both variables tested (duration and accuracy). The results supported a decrease in number of errors during bagging, indicating success for improved accuracy. Contrary to expectations the speed of bagging increased during intervention, although it began decreasing enough by the end of the intervention and through the fading sessions to support the idea that the intervention may be considered successful for speed in the long-term. Overall, the intervention was considered successful for increasing the accuracy of bagging groceries, but would need more time and data collection to be considered successful in improving duration. The study unexpectedly generalized to correctly putting grocery items away in the individual’s home. There is little research focusing on grocery bagging, even though it is a significant life skill. Future studies are recommended to increase the number of sessions for both intervention and fading. It is also suggested to investigate which treatment variable (task analysis, praise, or prompt) could have had the greatest impact in treatment or if it was a combination of all three strategies.
Acknowledgements

I would like to take this opportunity to thank and appreciate my wonderful boyfriend Stanislav Robinson for his dedication, support, and efforts throughout the process of this study. I would also like to thank my cousin, best friend, and fellow classmate Tanisha Flaro for her assistance and late night discussions that inspired and supported me. My wonderful parents who raised me, and have been there for me from day one, I want them to know that I could not have made it this far without them. Lastly, I would like to acknowledge my gratitude towards the BAA Behavioural Psychology staff for their efforts and commitment in teaching, as they have made a tremendous impact on my life.
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Table of Contents
Abstract.............................................................................................................................. ii
Acknowledgements.......................................................................................................... iii
Chapter I: Introduction..................................................................................................... 6
Main Chapters................................................................................................................... 6
Chapter II: Literature Review .......................................................................................... 7
Intellectual Disability....................................................................................................... 7
Importance of Life Skills.................................................................................................. 7
Praise................................................................................................................................. 8
Prompts............................................................................................................................ 9
Task Analysis Paired with Prompts and Praise................................................................. 10
Gaps in Literature............................................................................................................ 11
Relationship between Literature Review and Problem Statement................................. 11
Chapter III: Method ......................................................................................................... 13
Participant ....................................................................................................................... 13
Reason for Referral ......................................................................................................... 13
Consent ........................................................................................................................... 13
Design/Measures.............................................................................................................. 14
Setting and Materials ...................................................................................................... 14
Procedures....................................................................................................................... 15
Chapter IV: Results......................................................................................................... 16
Data Analysis of Baseline Results .................................................................................. 16

Table 1: Summary of Statistics for Baseline Data for Duration in Minutes and Number of Errors of Grocery Bagging........................................................................... 16

Interpretation of Baseline Analysis Results..................................................................... 16
Intervention Results ......................................................................................................... 16

Table 2: Summary Statistics of Baseline, Treatment and Fading for Duration in Minutes of Bagging Groceries......................................................................................... 17

Figure 1: Graph of Duration of Grocery Bagging .............................................................. 17

Table 3: Summary Statistics of Baseline, Treatment and Fading for Number of Errors of Bagging Groceries......................................................................................... 18

Figure 2: Graph of Number of Errors for placed Grocery Items .................................... 19
Chapter V: Conclusion/Discussion .................................................................................... 20
Strengths ......................................................................................................................... 20
Limitations ....................................................................................................................... 20
Meaning of the results in the context of the current literature ......................................... 21
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Chapter I: Introduction

There are many different kinds of disabilities, but regardless of the type of disability, it is important for individuals to learn independence with daily living skills because it is a critical component in life. According to Bouck (2010), learning life skills is viewed as significant in order for success to occur in individuals with disabilities. Cronin (1996) as cited in Bouck describes life skills as “skills or tasks that contribute to the successful, independent functioning of an individual in adulthood”. Life skills can vary from person to person, but one important life skill is learning how to independently bag groceries fast and efficiently to ensure the quality and safety of groceries during transportation. This may seem like a simple task, but according to Pearce (2013), people diagnosed with an intellectual disability are more likely to need extra support at certain activities such as grocery bagging. Items need to be placed properly in bags to avoid damage and contamination. This task needs to be done quickly to avoid holding up lines or mixing groceries on the conveyer belt with other customers. Proper grocery bagging means putting similar items together in bags, while packing heavy items first, but making sure not to over fill the bag.

Assistance can be required in different aspects of the skill of grocery shopping, but every separate task, such as bagging, is important in order to complete the whole task. There are many ways to teach skills for proper bagging, but the use of professional judgement and understanding of the learner’s personal needs are important when selecting a suitable implementation strategy (Szidon & Franzone, 2010). The present study was designed to demonstrate the effectiveness of task analysis paired with verbal prompts and verbal praise to increase appropriate accuracy and speed for bagging groceries in an individual with a developmental disability. It was hypothesised that the use of the visual sheet (i.e., written task analysis), verbal prompts and praise would help improve the knowledge of where each grocery item belongs in the bag and how to properly group groceries (i.e., improve accuracy), which in turn would increase the speed of the task.

Mechling and Gast (2003) note that attention to the daily living skills of grocery shopping has decreased over the last decade, but the value of the skill for individuals with intellectual disabilities has not (Bouck, Satsangi, Barlett, & Weng, 2012). The significance of learning how to properly bag groceries is that it brings an individual one step closer to independence.

Main Chapters

The thesis includes a literature review of empirical research supporting the effectiveness of task analysis paired with verbal prompting and verbal praise for skill development in individuals with developmental disabilities. Following the literature review is a description of the method used in intervention and the data collection procedures. The method is broken down into sub topics describing the participants, design, setting, materials and procedure. The results section provides an overview of the data collected and an interpretation of the data. Finally, the discussion section provides a discussion of the results of the present study, the applicability and usefulness of those results for the individual, agency and the field of Behavioural Psychology, the strengths and limitations of the study and provides recommendation for future research.
Chapter II: Literature Review

This chapter provides an overview of the research literature on the use and combination of verbal praise, verbal prompts, and task analysis in teaching essential living skills. The chapter includes an overview of intellectual disability, as well as the importance of life skills including grocery skills. Treatment procedures are evaluated and explained with a focus on support through empirical evidence. Gaps in the literature are identified by a description of the relationship between the literature and problem statement.

Intellectual Disability

The American Association of Intellectual and Developmental Disabilities (AAIDD) (2010) describe intellectual disabilities as disabilities that have major limits in both intellectual functioning and adaptive behaviour. An intellectual disability is a type of developmental disability that affects the cognitive abilities of an individual. It is not uncommon for individuals with an intellectual disability to also be diagnosed with an alternate type of disability. According to Community Living Ontario (2014) there are over 200 known causes of intellectual disability, which is a condition that is usually present early in childhood, and lasts a lifetime. Community Living Ontario also states that, people who have an intellectual disability are capable of many achievements and a happy lifestyle.

People with intellectual disabilities may need assistance in life, but promoting independence is an important part of the assistance. Duttlinger, Ayres, Bevill-Davis and Douglas (2012) believe that self-determination is an essential part of learning independence. Wehmeyer and Palmer (2003) as cited in Duttlinger et al. (2012) support the concept that when people who have an intellectual disability learn self-determination, they can achieve control over their lives and have increased opportunities to control financial security, employment and independent living. Horn, Miltenberger, Weil, Mowery, Conn and Sams (2008) state that in order to live as independently as possibly, individuals with disabilities need to learn functional skills such as hygiene, preparing meals, washing clothes, bagging items, and mopping the floor.

Importance of Life Skills

Independence in any individual can be attained by learning appropriate life skills related to the specific person’s life. Life skills are critical skills that are important regardless of age, gender, ethnicity, or developmental level. The definition of life skills is broad, but UNICEF (2013) defines life skills as “psychosocial abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life.” It is believed that life skills can be loosely divided into three categories, which consist of (1) cognitive skills for analysing and using information, (2) personal skills for developing personal activity and managing oneself, and (3) inter-personal skills for communicating and interacting effectively with others (UNICEF, 2012). Even though life skills are important, learning them may be a challenge for certain individuals.

Learning certain life skills can be difficult for people who have an intellectual disability. Pearce (2013) states that any person regardless of age who has not learned living skills can take steps towards their independence with the proper supports. Individuals with intellectual disabilities may require more time and effort to complete or learn a task, and it is important that they receive the opportunity to practice the skill because practice is key to retaining and maintaining a skill (Pearce, 2013). Lancioni, O’Reilly, and Campodonico (2002) view fluency as
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

another key aspect when performing tasks. For tasks to be performed with fluency, the task should have full attention and focus, without any irrelevant interruptions.

Although research relevant to life skills for individuals with intellectual disabilities is limited, Miller and Chan (2008), as cited in Bouck (2010) found a medium effect size for the relationship between life skills and life satisfaction. People who learn and use life skills appear to be more content and fulfilled with life. Bouck (2010), notes that despite the importance of life skills for daily functioning and life satisfaction, emphasis on life skills has decreased over that last few decades, especially in schools when preparing students for independence in the community.

There are many life skills to be learned and one major life skill is grocery shopping. Grocery shopping is a weekly task that relates to self-sufficiency, health and nutrition (Morse & Schuster 1996). Grocery shopping is an applicable lifelong skill that is part of most people’s lives. As such there appear to be benefits for individuals with intellectual disabilities who acquire the functional skill of grocery shopping (Morse & Schuster, 1996).

Grocery shopping consists of multiple activities that can create a challenge for individuals with intellectual disabilities (Bouck et al., 2012). One major component to grocery shopping is to understand how to accurately bag the groceries after purchasing them. Improper grocery bagging can create problems with both the quality and safety of grocery items during transportation. Strategies for improving bagging start with “thinking one step ahead” according to Andrew Borracchini winner of National Grocers Association Best Bagger Championship (Schroering, 2013). Examples of thinking ahead for grocery bagging are reading and understanding the task analysis sheet before packing the groceries and having the next item chosen in advance. This allows the bagger to better coordinate where each item will be placed in the bag.

There are many strategies that can be successfully used to teach different kinds of tasks and skills to individuals with and without disabilities. This chapter will review some of the strategies that have been empirically supported across a wide variety of tasks.

Choosing the appropriate practical skill to teach, and selecting the procedures for teaching them is a critical decision in a program designed for a person with a developmental disability (Lancioni, Klaase, & Goossens, 1995; Singh, Oswald, Ellis, & Singh, 1995; Trask-Tyler, Grossi, & Heward, 1994). There is a number of research articles published regarding the effectiveness of task analysis when teaching skills or a task. Many articles support the use of verbal prompts and verbal praise paired with task analysis, or alone, when learning or improving skills.

Praise

Verbal praise is a type of external reward expressing approval and commendation, which has been shown to be an effective treatment for improving life skills in some studies and literature reviews. Hancock (2000) found mixed results reviewing articles supporting the use of verbal praise. However, Hancock (2000) indicated that most researchers agree praise can be effective if it is delivered directly after the behaviour in a believable manner. The praise should also clearly specify the behaviour being reinforced. Hancock (2000) demonstrated the impact of verbal praise to motivate students to spend more time on homework. His study found that those who received verbal praise studied more and achieved more than those who did not. In contrast, some studies have found that verbal praise alone can be ineffective. A research study by Good (1987) reported that older students ignored praise and felt it was invalid. Potential variable such
as age can affect the impact of praise. However, the impact of these variables may be reduced by pairing praise with alternate interventions such as prompting.

**Prompts**

According to Inge, Hendricks, and Palko (2013) a prompt is a cue of instruction that is given to a person to increase the likelihood of a correct response, while limiting the possibility of errors. People use prompts to teach or show others new skills in many contexts. There are different kinds of prompts including verbal, modeling, gestural and/or physical prompts. Deciding which prompt to use depends on the skill level of the participant, the activity being performed, and the amount of support needed to complete the activity (Inge, et al., 2013). Inge, et al. (2013) describes a verbal prompt as an instruction that is verbally given to an individual either indirectly or directly. Indirect verbal prompts give cues, but little information as to the next step. An example of an indirect verbal prompt would be “What do you do next?” A direct verbal prompt is detailed and specific. An example of a direct verbal prompt would be “put the milk in that bag”. All other forms of prompting consist of demonstrating to a specific level the task to be completed. Regardless of what form of prompt is being used, fading a prompt is essential to avoid individuals becoming dependent on prompts (Duttlinger, et al., 2012; Inge, et al, 2013). Therefore, prompts will be faded out in the current study to promote independence.

Although the effectiveness of prompts is supported in research, few studies have compared prompts to determine which prompt is most useful. Collier and Reid (1987) showed that extra-stimulus prompts which included the extensive use of physical, visual and verbal prompts, was more effective than within-stimulus prompts, which used minimal prompts, when teaching a bowling task to children with autism. Extra stimulus prompts use the prompting methods to guide the learner through the task, while within-stimulus prompts use the minimal prompt methods to keep the student on task (Collier & Reid, 1987). The study used a 14-level task analysis of bowling in which both forms of prompts were used and compared. This study also found no difference in results if reinforcement (e.g., praise) was received.

Lancioni, Klaase, and Goossens (1995) compared the use of pictorial versus auditory prompts when teaching independent tasks to adolescents with multiple handicaps. The results indicated that both types of prompts were equally effective in promoting independent performance in this population.

Visual and verbal prompt packages consisting of signs, flyers and verbal prompts have been previously used to increase safety-belt use in a study by Ferrari and Baldwin (1989). Ferrari and Baldwin’s (1989) study found that the use of safety-belts increased from 1% to 14% after the visual and verbal prompt packages were given. Barker, Bailey, and Lee (2004) furthered Ferrari and Baldwin’s (1989) research by conducting a similar study using verbal prompts alone to increase safety-belt use in shopping carts by 51% in two locations. A research assistant stood in a store uniform welcoming shoppers and passed carts to customers at the store entrance. If a child was placed in the shopping cart without doing up the seat-belt, the research assistant would wait two or three seconds than deliver the verbal prompt to buckle their child up (Barker, Bailey, & Lee, 2004). In the second store, the prompts were delivered in the exact same way, but by a security officer. The results in both locations demonstrated an increase in safety-belt use once prompts were implemented. Barker, Bailey and Lee (2004) believe that the effectiveness of verbal prompts could have been affected by the manners and attitudes of the individual delivering the verbal prompts because of their status. The security officer is viewed as an
authority figure, and thus is viewed as powerful, while the store clerk is viewed as simply an employee with not much authority.

Prompts and reinforcers such as praise have been shown to have some success when used alone, but when paired together they may be more effective. Incorporating praise with prompts means that a reward is being added to increase the effectiveness of the prompt being implemented. Lancioni, O’Reilly, and Campodonico (2002) used verbal prompts combined with songs to successfully decrease the duration of performance of self-help tasks in a young man with multiple disabilities. When tasks were successfully completed, the individual received verbal praise. The results showed the intervention successfully reduced the time it took for the individual to perform his tasks (Lancioni, O’Reilly, & Campodonico, 2002). The verbal prompts and songs were done together and not individually, therefore lacking evidence as to whether or not it is more effective to combine the two strategies.

Further evidence supporting the use of prompts paired with praise is provided in a study by Volker, Piazza, Vaz and Frese (2013). Two studies were completed to increase chewing in children with feeding disorders. The results from the first study were used to improve the second study. The children in both studies were prompted to chew their food, and when food was chewed to a size smaller than a grain of rice, praise was delivered. In the first study, the individual received least-to-most prompting paired with praise, which was effective in increasing chewing. Least-to-most prompting requires using more than one prompt; in order from the least invasive prompt to the most invasive prompt (Fields, 2013). Volker, et al. (2013) used three prompts in the study, starting with verbal, then gestural and lastly physical prompts. According to Volker, Piazza, Vaz and Frese (2013), it was unclear whether the prompting, the praise or both combined increased the chewing. In the second study, prompts were reduced to only verbal prompts paired with praise which was also effective in increasing chewing. Interestingly, the study is one of the first to demonstrate the effectiveness of prompting with praise without shaping or fading as treatment for chewing (Volker, et al, 2013).

Although praise and prompts together have been shown to be effective in changing behaviours, there is also evidence that prompts and praise combined with task analysis may further improve results.

**Task Analysis Paired with Prompts and Praise**

Many individuals can succeed at learning a skill when it is broken down into steps. When these steps are described it is called a task analysis. The systematic use of visual, verbal and physical prompts through task analysis has been widely employed for teaching motor skills to individuals with disabilities (Collier & Reid, 1987). While some people may be able to observe a task in order to complete it, some adults with intellectual disability may require step by step methods to help them learn a task (Pearce, 2013). Task analysis can be used to teach and improve many different skills by breaking the task down into smaller, more achievable, steps. Pearce (2013) cautions that when teaching the task, it should be taught in a place where the task will usually be completed.

Task analysis can be used with a variety of behaviours such as brushing teeth or bagging groceries at a store. Szidon and Franzone (2010) categorized the use of task analysis into three categories consisting of self-help tasks, life skills and even academic skills. There are also different ways to implement task analysis such as in picture format or for people who can read, the steps may be written out. No matter what format is used, the steps should be delivered efficiently, clearly and require full attention from learners (Szidon & Franzone, 2010).
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Horn, et al. (2008) used a videotaped task analysis to teach laundry skills to individuals with developmental disabilities. The authors note that some individuals cannot acquire a skill by watching the entire skill being performed at once, but need the task to be broken down into manageable steps. The laundry task consisted of 10 steps. The entire task was shown first, and then the video was shown in shorter segments (i.e., halves, thirds, quarters and so on) until each step was shown individually. The first individual was able to learn the task in two video segments, while the second individual took three video segments to learn the task. Video prompting with the use of task analysis alone may not work for everyone. The third participant in Horn and Colleagues study needed least-to-most prompting in order to learn the skill as task analysis alone was not effective for him. Every individual is different and may require programs to be adapted to them specifically.

Although task analysis can be effective, it is rarely used alone. A study by Maeser and Thyer (1990) demonstrated the effectiveness of task analysis to teach three adolescents to serve themselves in nine steps during family-style meals. Maeser and Thyer paired task analysis with verbal prompts, physical guidance, praise and correction. The students could not perform the correct steps at baseline, but learned quickly once the intervention was implemented. During follow up, all three individuals could complete most of the steps with limited verbal prompting.

Gaps in Literature

Bouck (2009) as cited in Bouck (2010) believes that current curriculum models fail to meet the needs of individuals with mild ID in regards to learning important life skills. Based on a review of the literature Morse and Schuster (1996) suggested that future research regarding grocery shopping skills should not only evaluate the effectiveness, but also the relativity to efficiency. Many studies including some described above such as Lancioni et al. (2002) and Hancock (2000) focus on promoting fluency (both speed and accuracy) in academic skills. However, there are very few studies that focus on fluency in self-help skills. Fluency is an essential skill, as it is important to develop the ability to perform self-help skills both accurately and quickly.

Relationship between Literature Review and Problem Statement

There is an assortment of strategies that have empirical evidence supporting their use for skill development among individuals with an ID which can be applied to teaching grocery shopping skills. According to Morse and Schuster (1996) these strategies include verbal instructions, modeling, role-play, videotape, and backwards chaining. Several prompting strategies such as verbal, physical, and least intrusive prompting have also been identified as effective to teaching life skills (Morse & Schuster, 1996).

Task analysis as well as prompts and praise have been shown to be effective in improving and teaching life skills in many different settings. All three treatment procedures have been demonstrated individually and in combination for people with and without intellectual disabilities. Since the research has shown that prompts, praise and task analysis are effective whether independent or combined, it was decided to combine the three strategies due to insufficient time to study each treatment strategy independently. The intent of the present study was to improve grocery shopping skills, namely bagging speed and accuracy, in a 35-year-old male with an intellectual disability. The intervention was designed to increase accuracy and speed of grocery bagging with the use of task analysis paired with verbal prompts and verbal praise. Implementing treatment in a grocery store has challenges, especially when it all takes
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

place at the conveyer belt after check out. The intervention cannot be time consuming or space consuming as other customers are in the store. Grocery check outs are usually congested and busy. The three techniques of task analysis, verbal prompts and verbal praise have been identified as effective, low-cost, reasonable, straightforward procedures that require little effort and that can be implemented in a restricted environment.
Chapter III: Method

Participant

The participant was referred to work with the Behavioural Psychology student by the agency facilitators and coordinator because he was new to the specific residence, and appeared to need assistance with bagging groceries. Observations of the participant clearly showed that the individual needed support with independent grocery shopping. Grocery shopping consists of many individual tasks. Direct observations and identification of food issues, such as cleaning products leaking onto fruit, from packing groceries revealed that the individual would benefit if his speed and accuracy was increased when packing the groceries. The participant was a 35-year-old male diagnosed with an intellectual disability. The participant was considered capable of providing informed consent to participate in the study. He currently lives in an apartment building supported by the agency. He lives independently, but does have a roommate who is also supported by the agency. The participant is considered independent because he can function in society with little support from others. The participant can read and write, as well as work a job in the community. Although the participant is independent, he should be accompanied by another person when in the community because he has a seizure disorder.

Reason for Referral. The participant is very familiar with groceries as he works at a local grocery store and was responsible for going grocery shopping once a week. When the participant did his weekly grocery shop, he was accompanied by a staff or student and occasionally another individual who is supported by the agency. The participant completed the grocery shop with little assistance, but staff and observations confirmed he needed assistance bagging the groceries. For example, the participant would spend a large amount of time opening the bag and trying to fit the items in the bag. He would grab any item he saw on the conveyer belt and attempt to squeeze it in the bag. When items would not fit, he would try and rearrange the bag and focus all his time and attention on the one bag until it was completed. Once the bag was full, he would repeat the process with the next bag. A few issues would arise such as bread being damaged by cans or the dish soap leaking onto the fruit. Additionally, other customers in the store would be scanned through by the cashier, causing limited space on the conveyer belt and mixing of grocery items between different customers. The participant needed to learn how to properly bag groceries more accurately and more quickly in order to be closer to independently grocery shopping.

Consent. Written consent was obtained by the participant on two separate occasions. The first consent form was an agency consent form signed on September 30th 2014 (Appendix A). This was a mandatory form the agency required which broadly explained what kind of information was being collected and who it was being shared with. The second consent form, required by St. Lawrence College (SLC), was signed on October 15th, 2014 (Appendix B). The SLC consent form was drafted from the St. Lawrence College consent form template. The consent form explained the details of the program, what information was being collected, who it was going to be shared with, as well as the risks and benefits of participating. Both consent forms were signed by the participant after he and the placement student read them over and he had the opportunity to have any questions answered. The SLC consent form, as well as a thesis proposal and research ethics application, was reviewed and approved by the St. Lawrence College Research Ethics Board (REC-P) before the signature was obtained. The agency consent form was placed in the individual’s personal folder, and will be stored by the agency for 10 years.
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

years. The SLC consent form will be stored in a locked cabinet at SLC for 10 years, as required by law.

Design/Measures

The design of the study was a single subject ABC design with baseline, treatment and treatment fading phase. The participant was observed, and data was collected before treatment, during treatment and fading treatment (Appendix C). The independent variable was the intervention, which included a task analysis sheet (Appendix D), verbal prompts, and verbal praise. Verbal prompts include verbal directions such as, “do you think the cheese should be put in that bag”, or “put the eggs in before the bread”. Verbal praise included phrases like “that’s correct, good job”. The dependant variables were the speed and accuracy of bagging groceries. Speed of grocery bagging was defined as how long it took the individual to bag the groceries from the third item to the 20th. The recording started on the third item to allow for choice when bagging, as well as to help the individual think one step ahead when choosing which item to pack next. The participant’s speed of bagging was recorded using total duration. The timer was started when the third grocery item was placed on the conveyer belt after being scanned, and ended once the 20th item was placed in the grocery bag. Accuracy of bagging groceries was defined as and recorded by the correct items placed in the appropriate bags based on the task analysis sheet (Appendix D). All items listed together on the task analysis sheet were expected to be bagged together such as meat products with other meat products. Errors were identified by any missed or incomplete steps on the task analysis sheet, such as putting two glass jars together. Errors were also identified when any item was miscategorised in a specific bag, such as the individual putting cheese in with a meat bag. For every unfollowed step or miscategorised item, one error was recorded.

Data was collected for both of the dependent variables (speed and accuracy) on a chart (see Appendix C). The data was collected in a fast paced environment with very little space. Recording observations as a data collection method was selected because it is simple to do, and does not require a lot of space, time, and effort in a pressured environment. Data was collected on a paper at the grocery store. The data would later that same day be transferred to an electronic document on a locked computer, and the original paper was destroyed. The document that the data was transferred to is the data collection sheet.

Setting and Materials

The intervention and data collection took place every Wednesday around 6:00 p.m. at a local grocery store. The local grocery store was not the store the individual worked at. The intervention took place at the same location for consistency. A drive to and from the grocery store was provided for the individual.

Reusable bags were used, but if forgotten, plastic bags were obtained from the cashier. All other materials needed for the participant were grocery items that were purchased at the grocery store. The individual did a grocery shop before the intervention; following a grocery list designed by the staff. During intervention, the participant required the task analysis sheet for reference during the grocery bagging. Materials the researcher needed consisted of a pen, data sheet, and a timer. The task analysis sheet was also used by the placement student as a guideline for the recorded errors.
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Procedures

The participant was observed for three grocery sessions naturally, during which baseline was collected. The participant was instructed to bag the groceries how he would normally with no additional direction or prompts. Data was collected during these three sessions on the speed and accuracy of bagging. The student timed the participant, and counted the number of misplaced items based on the task analysis sheet.

Twenty minutes before the first treatment session, the participant received the task analysis sheet with step by step instructions to read over. The twenty minutes was given to make sure that the individual understood the instructions, asked questions, and processed how he would use it. There was a total of five treatment sessions. During the five treatment sessions, the task analysis sheet was provided as a reference, and verbal prompts and verbal praise were implemented. Data was collected during all five treatment sessions for both accuracy and speed of grocery bagging. The data was collected in the same method of observation as the baseline was collected.

During the first treatment session, every step on the task analysis sheet was verbally prompted for the participant. Verbal prompts were then only given when required during session’s two to five. Required verbal prompts meant that they were only used if the individual skipped a step, or misplaced an item.

Verbal praise was also used during all five treatment sessions, but was slowly faded out during treatment. If a step was successfully completed without any need for prompts, the individual received verbal praise. The verbal praise consisted of reminders that the participant was doing well and was correctly following the sheet. Verbal praise was naturally faded out by reducing the praise to occasional praise. This was done by praising the individual every time he completed a proper step like putting the bread products in the same bag. As treatment sessions increased, the amount of praise delivered after every correct response decreased. This happened by giving praise after every few correct steps, and decreasing the amount of praise between correct steps until no praise was given.

Once the participant completed the five treatment sessions, data was collected during an additional two fading treatment sessions. The two fading sessions consisted of removing all verbal prompts, praise and the task analysis sheet. Data was also collected for speed and accuracy of bagging, in the same method as treatment and baseline.
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

Chapter IV: Results

Overall, the participant displayed a significant decrease in number of errors while grocery bagging. However, there was a slight increase in the duration of bagging groceries before a decrease throughout baseline, treatment and fading. Interpretation of the data validates that the treatment was successful which will be explained below. The use of task analysis paired with praise and prompts was shown to be effective in increasing speed and accuracy of bagging groceries.

Data Analysis of Baseline Results

1. Duration of grocery bagging: The baseline data indicated that the participant took an average of 7 minutes and 6 seconds to bag groceries from the third scanned item to the 20th item before the intervention was implemented (see Table 1). The raw data (see Appendix C), as well as the graphed data (see Appendix E) reflected an increase in time from day one at 6 minutes and 17 seconds to day two at 9 minutes and 9 seconds, then decreasing on day three to 7 minutes and 40 seconds. However, the graphed data (see Appendix E) suggested this was an almost stable trend with little increase or decrease. Given the minimal differences the baseline was considered stable allowing treatment to begin.

2. Number of Errors: The baseline data indicated that, the participant was averaging 13.7 errors of misplaced grocery items from the third to the 20th grocery item before the treatment was implemented. Similar to duration, the baseline data for number of errors showed an increase in errors from day one at 12 errors to day two at 16 errors, then a decrease to day three at 13 errors. However, as the graphed data displayed a close to stable line with a slight increase in trend for the number of errors the baseline was considered stable, allowing treatment to begin.

Table 1: Summary of Statistics for Baseline Data for Duration in Minutes and Number of Errors of Grocery Bagging

<table>
<thead>
<tr>
<th></th>
<th>Baseline Duration</th>
<th>Baseline Number of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>7.7</td>
<td>13.7</td>
</tr>
<tr>
<td>Median</td>
<td>7.7</td>
<td>13</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.4</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Interpretation of Baseline Analysis Results

As mentioned above, both data from duration and number of errors during bagging groceries displayed a slight increase then decrease from day one to three. It is felt that this is likely attributable to a change in the items purchased at the store. For example, common items such as milk, butter, and bread are easily bagged, but unique items may take longer to determine where they should go and have higher chance of error when packing the item. However, the change in duration and errors was considered slight and overall the data was considered stable across the three days.

Intervention Results

1. Duration of grocery bagging: Data showed that the participant had an average duration of 9 minutes and 23 seconds of packing groceries throughout intervention. Table 2
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

displays an average increase from baseline to intervention, which indicated that the goal to improve speed was unsuccessful. However, when observing Figure 1 and Appendix E, the trend and data points display an overall decrease in duration from day four to day eight. There appeared to be an immediate increase on the first day of treatment, which was expected due to time consumption in reading, learning and understanding the new task analysis sheet. Day five through seven showed a decrease in duration, which was then maintained between days seven and eight.

The trend line (see Appendix E) and data points on the graph indicate that there was stability in duration of grocery bagging by the end of treatment.

Two days of fading were included in the intervention during which there was an immediate increase in duration. The increase was expected given the task sheet was removed during fading and the participant was required to remember all steps on his own. Table 2 shows a large reduction in standard deviation score, which indicates great stability during fading sessions for duration of bagging groceries. The data and trend line as shown in Appendix E and Figure 1 display an overall decrease from beginning of the intervention, however, there would need to be more time and sufficient data post intervention to provide evidence of long term stability. The data supports declining duration over time, although an overall increase in duration over baseline. Possible explanations for this will be reviewed in the discussion.

Table 2: Summary Statistics of Baseline, Treatment and Fading for Duration in Minutes of Bagging Groceries

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Treatment</th>
<th>Fading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>7.7</td>
<td>9.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Median</td>
<td>7.7</td>
<td>9.8</td>
<td>9.5</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.4</td>
<td>1.7</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Figure 1: Graph of Duration of Grocery Bagging
2. **Number of errors:** Data revealed improvement in decreasing the number of errors from baseline to post-intervention. Table 3 shows a drop in average number of errors from 13.7 at baseline to 3.8 during intervention. There was a continuous decrease across the intervention. Day seven had a slight increase for unknown reasons, but errors dropped to zero on the last day of treatment. The median improved from thirteen errors during baseline to three errors during intervention, suggesting the intervention was effective at reducing errors.

Two days of fading was included in the intervention, which is represented in Table 3, showing a decrease from intervention to fading in both the average and median number of errors. Table 3 also displays a drop in standard deviation scores which suggests increased stability during the fading sessions for number of errors. The trend line and graphed data also indicated a decrease in number of errors during fading. More time and data would be required to confidently conclude there is long term stability, but the overall analysis of the data supports success in decreasing the number of errors while grocery bagging during and following intervention.

Although data for duration had a slight increase from baseline through intervention and fading, the overall trend for both duration and number of errors throughout treatment and fading for both variables was a decrease. Fading for both variables also supported preliminary stability (see Appendix E and F). The increase in duration during day one of treatment was expected given the requirement to refer to the task analysis sheet. The fading session data remained similar to the treatment data for both variables. Unfortunately, for the duration variable fading session times were slightly higher than baseline, which was not originally anticipated. However for errors in bagging fading sessions demonstrated a reduction of errors that did not return to baseline levels. Overall, visual analysis indicates success in improving accuracy and speed of grocery bagging for the participant.

<table>
<thead>
<tr>
<th>Table 3: Summary Statistics of Baseline, Treatment and Fading for Number of Errors of Bagging Groceries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
</tbody>
</table>
Figure 2: Graph of Number of Errors for placed Grocery Items.
The current study combining task analysis with verbal praise and verbal prompts was effective in increasing accuracy of bagging groceries in a 35-year-old male with an intellectual disability. While speed in the bagging showed an overall increase over baseline, speed improved over the period of the intervention and fading. In retrospect, it is considered likely that the participants increased attention to accuracy in bagging resulted in a reduction in speed. As mentioned, however, speed improved across the days of the intervention. It is hoped that with continued practice speed will continue to improve to baseline levels or better without a concurrent decrease in accuracy. Therefore the first hypothesis was supported and the second hypothesis was partially supported. However, the slight decrease in speed is considered a reasonable cost for improved safety and preservation of the food that results from more accurate bagging.

Through the increase in speed and accuracy of grocery bagging, the entire task of grocery shopping is improved. The participant can now better categorize grocery items, which can generalize to the entire grocery shop task, as well as putting away the groceries more safely and quickly in the home. This study provides additional support for the use of task analysis, praise, and prompts as an effective intervention for improving or teaching life skills.

Strengths

A strength of the current study is the single-subject design, which allowed the focus of the program to directly benefit the participant. The study was designed to fit the abilities and address the deficits of a specific individual, creating a greater potential for success. For example, this individual is capable of reading, but benefits more from visual cues such as pictures. It was, therefore, valuable to have a visual chart for the task analysis, to assist the individual in speed and create a greater understanding of which item is to be placed in which category. The use of task analysis, prompts and praise were easily implemented in the limited space and time during check out at a public grocery store. Another strength of the study was using praise and prompts both of which are amenable to fading, so that the participant could be prepared to maintain benefits post intervention. A final strength of the study was that the intervention was implemented in the natural environment, making follow up flow much easier and making long term stability more likely. Implementing in the main environment allows the individual to better understand the task and perform it at a better level in the future.

This intervention could be useful with other individuals who need to learn or improve grocery packing skills. Although the intervention would possibly need to be modified to fit a different individual’s needs. The critical piece for the organization was to have a copy of the task analysis sheet post study, which could be modified for other clients. Praise and prompts are easily modified to fit different individuals. It was considered a strength of the study that all materials could be left with the agency for potential implementation with other clients.

Limitations

A limitation was the length of the study. To better determine the long-term stability and effectiveness of the intervention, more time and data collection would be needed post intervention. The fading session consisted of two data collection sessions. Additional sessions of data collection would provide a more accurate trend line across a longer period of time. A delayed follow up session of a few weeks to months would provide information as to whether the treatment was maintained long term.
Another limitation to the study was that the subject’s behaviour could have been impacted by changes to the grocery list of that week, depending on whether the items were familiar to the individual or not. If the participant had purchased the same list of items every session data would likely have been more stable. However, having different items on the list was more reflective of reality.

Although the design was a benefit to this current participant this necessarily limits the ability to generalize the results to different individuals. The task analysis sheet, the prompts, and the praise would potentially need to be modified for different individual use depending on the participant. The task analysis sheet was beneficial to the specific participant because he is high functioning, whereas some individuals may need extra information or more defined food products on the sheet. The task analysis sheet is also limited due to space. The individual may only buy one item of a specific category, which could be placed in a bag with similar foods under a different category. The food items may also not be displayed on the chart. This could be a limitation if an individual does not have the capability to generalize to categories of objects without specific direction.

Finally, because all three procedures (task analysis, prompts and praise) were used in combination, the data does not allow conclusion about which, if any, specific procedure(s) contributed to the success of the study, or if it was the combination of all procedures.

Meaning of the results in the context of the current literature

The results of the study are consistent with previous findings. It is believed that some of the success of the intervention could be partially attributed to regular practice, which is an important part of learning and maintaining a skill (Pearce, 2013). Further, the study takes place in the natural grocery environment, which is considered an important aspect of teaching a skill. According to Morse and Schuster (1996), practitioners should teach grocery shopping skills while actually doing the task of grocery shopping.

The findings of the present study were consistent with Collier and Reid’s (1987), which demonstrated the effectiveness of using extensive prompts, opposed to minimal prompts to teach bowling, a gross motor skill. In the present study, extra-stimulus prompts were found to be effective at teaching grocery bagging, which is also primarily a gross motor skill.

Maeser and Thyre (1990) suggested more flexibility in the criteria for task analysis. In the present study, if the participant did not complete step of the task analysis, he could still carry on the task. In typical task analysis designs, the entire 9 steps of the task analysis would be considered incorrect if one step is wrong. Maeser and Thyre (1990) suggested that flexibility in the correct steps could result in more accurate data because all the correct steps are recorded as opposed to correct steps being considered incorrect due to one or two incidents. In the current study it is felt that the data was more accurately reflected the participant’s abilities because all the steps were recorded. Maeser and Thyre (1990) also proposed that subjects may experience an increase in self-image with the mastery of social skills, allowing them to perform better with other skills. It is hoped that the individual in the present study will experience an improvement in self-image, ultimately resulting in better performance of the skill.

Multi-level Challenge Report

Client Level: Many challenges can arise when working with people who have intellectual disabilities. Despite the differences between individuals, one universal quality that could be difficult and challenging to overcome is non-compliance. Every individual is capable of
displaying non-compliance, which is a difficult situation to deal with. At the beginning of treatment the participant in the current study felt that he did not need to use the task analysis sheet, which could have resulted in inaccurate data and non-compliance with that aspect of treatment. Ultimately the participant agreed to use the task analysis sheet and compliance was not an issue in the present study. However, compliance is an issue that may need to be considered when conducting research with this population.

**Program Level:** Within the agency, there are different programs such as the one in the current study, which is residential. Grocery bagging was a natural target at this site because it is a weekly task for the individuals in the home. The current study was implemented over a ten week period. Unfortunately, this meant that the participant was the only individual learning to bag groceries, so other individuals in the home did not get the chance to bag groceries for ten weeks. The other individuals did know how to bag groceries, which also creates challenges when they wanted to help during baseline. However, the positive aspect of this situation was the participant may be able to teach his housemates how to properly bag the groceries in the future.

**Organization Level:** The participant in the study attends other parts of the organization when he is not at his residence. Other staff working for the agency may also take him grocery shopping, such as the day programs, and could be unaware of his involvement in the current study. This could have resulted in inconsistency as he may have been learning to pack food differently with other staff. This could also have caused confusion for the individual when participating in the treatment, particularly if he had recently done a shop without the use of the task analysis, prompts and praise.

**Society Level:** The issues on the societal level are large and quite difficult to avoid. Although many people in society understand that people with disabilities have the same rights and are capable of living an independent life, not everyone behaves in a manner that supports this. Some people stigmatize people with disabilities. This can create challenges for implementing recommendations included in reports in the community, as well as challenges for the individual themselves, such as feelings of incompetence and sadness. Problems can arise when society will not allow recommendations to be properly implemented, such as limiting individuals with disabilities even when they have been assessed as capable of doing things. Challenges such as discouragement can also arise when individuals feel they may not be accepted in the society. This was a challenge specific to this intervention because other customers were often waiting in line for the participant to finish bagging.

**Implications for the Behavioural Psychology Field**

The current study contributes in small ways to the behavioural psychology field. The study further supports existing research on interventions to improve daily living skills. It supports the efficacy of task analysis, praise, and prompts for improving grocery skills; specifically grocery bagging. Professionals in the field of behavioural psychology are expected to develop, implement, and support effective programs that contribute to impacting human behaviour.

There is limited research focusing on grocery bagging, even though it is an essential task for the safety of the food. An unexpected outcome that resulted from the intervention was the generalization of putting groceries away correctly.
Recommendations for Future Research

As mentioned, it is unclear which procedure was the most effective in increasing grocery bagging as they were combined during the intervention. In future research the procedures should be evaluated separately, and then combined to better understand if any specific procedure is more effective or if it is the combination of all three strategies. Any future studies should extend the length of the baseline, intervention and fading sessions to gather more data. This is beneficial for more secure and accurate data. Collecting more data can also help determine the resulting stability of duration when bagging groceries. The studies should also include a follow-up session at 2 weeks and 4 weeks after treatment to gather evidence of long term stability for the effectiveness of treatment.

Future research should include more subjects and subjects from different populations to assess applicability of the intervention to different people. The study was done in the same grocery store to assist the individual with grocery shopping, but future research should assess generalization of these skills to other settings.
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

References


Fields, C.J. (2013). Using the system of least to most prompts. Tips for Home or School,


doi:10.1002/bin.101


doi:10.1002/bin.2360050403


INCREASING SPEED AND ACCURACY OF GROCERY BAGGING


Appendix A: Agency Consent Form

Collaborative Access Process to Services South East Region
CHILDREN’S SERVICES AND ADULT DEVELOPMENTAL SERVICES

Common Consent to Share Information

Release of Information

Consumer’s Name: [Redacted]  Given Name: [Redacted]  Address: [Redacted]

hereby consent to the sharing of information ☑ to ☐ from the following:

Name of Agency, Facility or Private Practitioner: 

Name of Agency, Facility or Private Practitioner: St. Lawrence College

Name of Agency, Facility or Private Practitioner: 

Name of Agency, Facility or Private Practitioner:

In respect of ☐ Child/Youth  ☑ Adult with a Developmental Disability

Consumer’s Name: [Redacted]  Date of Birth: [Redacted]

for the purpose of: Behavioural Project

Description of the information to be shared is as follows:

☑ Any pertinent information

☑ Specifically the following information: (listed below)

any thing related to groceries

This consent is valid for the following period: ☑ One year from signing date

(specify time frame) from signing date

I understand that I may revoke this consent in writing at any time.

Signature: [Redacted]  Date: [Redacted]
Witness: [Redacted]  Date: [Redacted]
Appendix B: Consent Form

Increasing Speed and Accuracy of Grocery Bagging for a 35-year-old Male with an Intellectual Disability

Principal Investigator: Brittany Christie
Phone Number: 613 – 929 – 8186
E-mail: bchristie02@student.sl.on.ca

Name of supervisers: Yolanda Fernandez
Name of Institution: Community Living

Invitation
You are being invited to take part in a research study. I am a student in my 4th year of the Behavioural Psychology program at St. Lawrence College. As a part of my placement, I am doing a research project. I would like to ask you for your help to complete this project. The information in this form will help you understand my project. I will read the information to you and you can read the information and ask all the questions you might have before you decide if you want to take part.

Why is this study being done?
This study is being done to help you improve your grocery shopping skills. It is hoped that you will be able to improve how fast you are at bagging groceries, and that you get better at putting the groceries in the right bags. This is important so the food that you just bought will not be damaged. How fast you are at bagging groceries is important so that the line will not be held up, and your food will not be mixed with other peoples groceries.

What will you need to do if you take part?
If you agree to take part, you will be asked to bag the groceries once a week on Wednesday at Fresh Co. for 10 weeks. If you are busy one Wednesday, we can switch to another day the same week. We will go grocery shopping after supper, around 6:00 p.m. You will be bagging the groceries as usual for three grocery shops so I can see how fast you are, and if you put the groceries in the right bags. Before the fourth grocery shop, I will give you a piece of paper to read before we leave for the store. The paper will tell you how to bag the groceries better. Once we get to the checkout, you will be asked to start bagging the groceries by doing what it says on the paper. I will tell you if you have made a mistake or if you have done the right thing. In the last two grocery shops I will stop telling you when you have made a mistake or done things right so that you can do it on your own.

What are the potential benefits of taking part?
Hopefully this study will help you grocery shop independently, which is a task that will be needed for the rest of your life. Another possible benefit is that learning this skill can be useful at your current job. If you finish the groceries faster, you may have extra time to get home earlier to relax or finish other things you would like to do.

What are the potential benefits of this research study to others?
I hope that is this project helps you it can help other people. Other people that come shopping with you can learn by watching and following your steps when bagging.

What are the potential disadvantages or risks of taking part?
Risks from taking part in this research study are minimal, but you might feel frustration or sadness if you find the task hard to do.

**What happens if something goes wrong?**
If you have any problems, you can always talk to agency staff members or the placement student (me) in confidence. You can also stop taking part in the study at any time and it will not affect the service you use at the agency.

**Will my information you collect from me in this project be kept private?**
Your name will not be on anything related to the study so no one will know you took part. Any information will be kept locked up on a computer. The consent form will be locked in a file cabinet at St. Lawrence College for at least 10 years as required by law.

**Do you have to take part?**
Taking part is voluntary. It is up to you to decide whether or not to take part in this research project. If you want to take part, you will be asked to sign this consent form. If you do not want to take part, you can stop at any time, without giving any reason, and it will not affect the service you use at the agency. All data will be kept confidential unless required by law. If you withdraw from the study, you can also ask for the data collected to not be used.

**Contact for further information**
This project has been approved by the Research Ethics Board at St. Lawrence College. The project will be developed under the supervision of Dr. Yolanda Fernandez, my supervisor from St. Lawrence College. Feel free to ask me any questions or I can help you contact my College Supervisor Yolanda or the Research Ethics Board at 613-544-5400.

**Consent**
If you agree to take part a copy of this signed form will be given to you. Another copy will be stored at St. Lawrence College for 10 years.

By signing this form, I agree that:
- The study has been explained to me.
- All my questions were answered.
- I understand what I might get out of this study and that I might get frustrated or upset.
- I understand that I have the right to say no or to stop at any time.
- I know I can ask any questions I have about the study.
- I know my name will not be on any documents.
- I know my name will never be used without asking me first.
- I know I get a copy of this consent form.

I hereby consent to take part.

---

**Participant Name**

**Signature of Participant**

**Date**

---

**Student Printed Name**

**Signature of Student**

**Date**
# Appendix C: Data Collection Sheet

## Baseline Data

<table>
<thead>
<tr>
<th>Baseline Sessions</th>
<th>Duration of Bagging (min)</th>
<th>Number of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>One – day 1</td>
<td>6.3</td>
<td>12</td>
</tr>
<tr>
<td>Two – day 2</td>
<td>9.0</td>
<td>16</td>
</tr>
<tr>
<td>Three – day 3</td>
<td>7.7</td>
<td>13</td>
</tr>
</tbody>
</table>

## Treatment Data

<table>
<thead>
<tr>
<th>Treatment Sessions</th>
<th>Duration of Bagging (min)</th>
<th>Number of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>One – day 4</td>
<td>10.8</td>
<td>8</td>
</tr>
<tr>
<td>Two – day 5</td>
<td>11.4</td>
<td>6</td>
</tr>
<tr>
<td>Three – day 6</td>
<td>9.8</td>
<td>2</td>
</tr>
<tr>
<td>Four – day 7</td>
<td>7.9</td>
<td>3</td>
</tr>
<tr>
<td>Five – day 8</td>
<td>7.7</td>
<td>0</td>
</tr>
</tbody>
</table>

## Fading Treatment Data

<table>
<thead>
<tr>
<th>Fading Sessions</th>
<th>Duration of Bagging (min)</th>
<th>Number of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>One – day 9</td>
<td>9.9</td>
<td>3</td>
</tr>
<tr>
<td>Two – day 10</td>
<td>9.2</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix D: Task Analysis Sheet

**How to Properly Bag Groceries**

1. Grab and open grocery bag
2. Place bag at the end of the conveyer belt.
3. Put items that are alike together in bags (see second page for help)
   - Glass items should be separated by a non-glass item, or put into different bags.
4. Pack heavy items first and breakable items last
5. Do not over fill the bag
6. Large items do not need to be bagged (such as bags of potatoes, toilet paper, and paper towel).
   These items just go directly onto the cart.

*If you are unsure where it belongs, just try your best and pick a bag.*
INCREASING SPEED AND ACCURACY OF GROCERY BAGGING

<table>
<thead>
<tr>
<th>Meat/Seafood</th>
<th>Dairy/Juice</th>
<th>Boxes/Cans</th>
<th>Produce</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Meat/Seafood" /></td>
<td><img src="image2" alt="Dairy/Juice" /></td>
<td><img src="image3" alt="Boxes/Cans" /></td>
<td><img src="image4" alt=" Produce" /></td>
</tr>
<tr>
<td><img src="image5" alt="Frozen Food" /></td>
<td><img src="image6" alt="Bread/Eggs" /></td>
<td><img src="image7" alt="Other" /></td>
<td><img src="image8" alt="Cleaning Products" /></td>
</tr>
</tbody>
</table>

Photo’s above retrieved from Microsoft 2010.
*Some photos were altered or removed due to copyright issues. The original sheet used by the participant needed detailed name brand photos for his personal use.
Appendix E: Graph Displaying Duration

![Graph of Duration of Grocery Bagging](image-url)
Appendix F: Graph displaying Number of Errors