Teaching Young Adults with Intellectual Disability Grocery Shopping Skills in a Community Setting Using Least-to-Most Prompting

Vanessa Gil¹ · Kyle D. Bennett¹ · Patricia M. Barbetta¹

Published online: 11 February 2019
© Association for Behavior Analysis International 2019

Abstract

Using a multiple probe design, we examined the effects of least-to-most prompting to teach young adults with intellectual disability (ID) to locate and select items using a grocery list presented on an iPad. Sessions were conducted entirely in a community grocery store. The results indicated that participants learned to use an initial grocery list, with one participant demonstrating the ability to use a re-sequenced grocery list and a list with novel items. These results are discussed along with implications for practice.

Keywords Least-to-most prompting · Moderate intellectual disability · Young adults · Grocery list · iPad

Interventions focused on teaching grocery shopping skills have involved simulated instruction in classrooms paired with community-based instruction (CBI; Goo, Therrien, & Hua, 2016) and instruction based entirely in community grocery stores (Burckley, Tincani, & Fisher, 2015). Given the importance of generalized outcomes for students with disabilities, Burckley et al. (2015) called for additional research to examine teaching strategies to develop daily living skills (DLS) exclusively in community settings. Some skills, they argued, are best taught in the community (e.g., walking in aisles to find grocery items) as opposed to simulations in non-community settings (e.g., classrooms). Moreover, Bates, Cuvo, Miner, and Korabek (2001) found that instruction

in the community was instrumental for students with moderate ID developing DLS.

Multiple teaching strategies can be used to teach DLS to individuals with disabilities, including prompting and fading systems such as most-to-least prompting, graduated guidance, and time delay (Duker, Didden, & Sigafoos, 2004). Another effective teaching strategy is least-to-most prompting, which involves practitioners starting with the least intrusive prompt to evoke behavior and gradually adding more intrusive prompts until the student emits the correct response. A typical, although not exclusive, prompt hierarchy involves verbal, gestural, model, and physical prompts. As teaching sessions progress, these prompts are faded such that the student independently emits the behavior(s) in the presence of natural antecedent stimuli (Cooper, Heron, & Heward, 2007). Duker et al. (2004) reported that least-to-most prompting tends to be a simple procedure to implement and that it is effective for teaching a variety of DLS.

Therefore, the primary purpose of this study was to examine the effects of least-to-most prompting to teach young adults with intellectual disability (ID) to grocery shop using a list on an iPad exclusively in a grocery store. The secondary purpose was to investigate the effects of generalization programming on participants' ability to follow re-sequenced and replacement grocery lists for those participants meeting pre-determined mastery criteria.

Implications:

- Least-to-most prompting paired with an iPad improved the grocery shopping skills of individuals with moderate ID.
- Programmed generalization strategies helped one student follow re-sequenced and new grocery lists.
- Instruction in community skills might require educators and related service providers to use a combination of simulated and community-based instruction.
- Some individuals with moderate ID may require additional instruction in the community.

✉ Kyle D. Bennett
kyle.bennett@fiu.edu

¹ Department of Teaching and Learning, Florida International University, 11200 S.W. 8th Street, Miami, FL 33199, USA

Method

Participants, Setting, and Materials

Three individuals participated in this study. Jesus was a 19-year-old Hispanic male with moderate ID, Logan was a 21-year-old Hispanic male with moderate ID, and Ivis was a 19-year-old Hispanic female with moderate ID and autism spectrum disorder (ASD). Each participant could (1) communicate using vocal verbal behavior, (2) read words associated with aisle signs and grocery items, and (3) match grocery item words to photographs of the items as well as the actual objects. Sessions were conducted in a grocery store (approximately 35,900 square feet with 17 aisles). The materials used during the study were an iPad 2 with the First-Then Visual Schedule application, version 1.4 (Good Karma Applications, Inc., Valley Center, CA, USA), a grocery cart, grocery items, and shopping lists. The shopping lists, using the First-Then Visual Schedule application, consisted of pictures of the items paired with the item names that were taken directly from the aisle signs and presented according to the layout of the grocery store.

Variables and Measurement

The dependent variable was the number of task analysis steps completed independently, including the number of items selected from the shopping list (see Table 1). The independent

Table 1 Grocery shopping according to task analysis steps

Grocery shopping tasks in sequential order

1. Enter supermarket
2. Get shopping cart
3. Open baby seat
4. Place iPad on seat
5. Read list aloud
6. Point to the item on the list
7. Read item aloud
8. Walk to the aisle sign (located in the middle of the aisle)
9. Read aisle sign aloud
10. Locate item
11. Take item from shelf
12. Place item in cart
13. Check off the list
14. Go to the beginning of the aisle to exit
15. Point to and read the next item on the list
16. Walk to the beginning of the next aisle
17. Point to the checkout area or say, "It's over there."
18. Walk to checkout area
19. Remove iPad from cart and return to researcher
20. Leave store

Note: Task steps 6–16 were repeated for each item on the list

variable was least-to-most prompting (the hierarchy was verbal, gesture, partial physical, and full physical prompts).

Frequency data were collected on the number of task analysis steps completed (including the number of items correctly selected). A plus (+) was scored when participants completed a correct step on the task analysis without prompting. A minus (–) was scored for topographical errors (i.e., did the step wrong), latency errors (i.e., took more than 10 s to start a task step), and duration errors (i.e., took longer than 60 s to complete a step not including finding items or took longer than 180 s to complete a step that involved finding items).

A second observer collected interobserver agreement (IOA) data during 39.6% of sessions for all participants and across all conditions and phases of the study. Point-by-point agreement was calculated by dividing the number of agreements by the number of agreements + disagreements and then multiplying by 100 (Ayres & Ledford, 2014). The IOA data equaled 96.7% (range 90–100%).

Treatment fidelity (TF) data were collected during 39.6% of all sessions and across all participants, conditions, and phases of the study by the secondary observer. A plus (+) was recorded when the researcher implemented a step correctly, and a minus (–) was recorded when the researcher implemented a step incorrectly or omitted the step. The TF data were calculated by dividing the number of correctly implemented steps by the total number of possible steps that could be completed and multiplying by 100 (Gast, 2014). The TF data equaled 100%.

Lastly, social validity data were collected at the end of the study by interviewing the participants' teacher (Gast, 2014). The teacher was asked to rate her opinion on the following issues using a 5-point Likert-type scale:

1. The intervention focused on an important behavior,
2. The target behavior is of sufficient concern to warrant the use of this intervention,
3. I understood the intervention steps,
4. I enjoyed the procedures used in the intervention,
5. The intervention produced a positive effect on grocery shopping skills,
6. I feel that I would be able to use this intervention in the future,
7. I would be willing to use this intervention with my students in the future, and
8. The intervention was socially stigmatizing for participants.

The teacher indicated that she strongly agreed with issues 1–7 and that she strongly disagreed with issue 8.

Experimental Design and General Procedures

We used a multiple probe design across participants (Richards, Taylor, & Ramasamy, 2014) to examine the effects

of least-to-most prompting on using grocery lists to shop in a community setting. The first author conducted 20-min sessions 2 days a week with participants individually. The experiment consisted of a baseline condition, in which no assistance was given, followed by an intervention condition that consisted of three phases. Phase one consisted of teaching participants to follow an initial six-item grocery list, phase two involved teaching participants to follow that same list with four of the six items re-sequenced, and phase three comprised teaching participants to follow a replacement grocery list whereby four of the six items were new. The criteria to advance to subsequent phases of the intervention were completing 85% of the task steps correctly and selecting five out of six items from the list over three to five consecutive sessions. Our rationale for including the re-sequenced and replacement grocery lists was to assess participants' ability to follow a grocery list rather than completing a routine (see MacDuff, Krantz, & McClannahan, 1993). Baseline probes were conducted between intervention phases to measure generalized effects of following new grocery lists; subsequent intervention sessions were conducted to teach these alternative grocery lists in the instance that generalization did not occur.

Procedures

Baseline Once at the store, the researcher gave the participants an iPad with the application open displaying the grocery list. The researcher gave the directions, "*Find the items on the list.*" No assistance was given. If the participant correctly emitted a step, they proceeded to the next step. Participants could have completed the steps out of order relative to the task analysis when applicable (e.g., find item two on the list before item one), and they were not scored as incorrect when doing so.

iPad and Application Training Before the intervention, participants' ability to operate the basic functions of the iPad (e.g., turn on and swipe) and to use the application (e.g., press the touch screen to check off items on the list) was assessed. The researcher used didactic instruction and least-to-most prompting to teach any missing steps when using the device. Participants demonstrated their ability to use the iPad and the application with 100% accuracy for at least one session before the intervention.

Phase One: Initial Grocery List Upon entering the store, the researcher gave participants the iPad with the application open, thereby displaying the list. The researcher gave the direction, "*Find the items on the list.*" Participants were taught the steps of grocery shopping (see Table 1) using least-to-most prompting. Verbal praise statements were given for each step completed independently. The least-to-most prompt sequence was implemented by the researcher contingent on

topographical, latency, or duration errors (see [Variables and Measurement](#) section for descriptions of each error type). Each prompt was followed by 5 s of wait time. On the steps where the participants had to read as part of the response requirement, verbal prompting with a progressive time delay (0–8 s) was used.

Phase Two: Re-Sequenced Grocery List For the participant who met the eligibility criterion to move to phase two (see above criteria in [Experimental Design and General Procedures](#)), the study was designed such that baseline data were collected on the re-sequenced list using procedures identical to the initial baseline. The research plan was to (a) transition participants meeting the phase two criteria to phase three baseline, or (b) instruct participants not meeting phase two criteria to use the re-sequenced grocery list using procedures identical to those implemented during phase one of the intervention.

Phase Three: Replacement Grocery List For the participant meeting the criteria to move to phase three (see above criteria in [Experimental Design and General Procedures](#) section), the experiment was designed such that baseline data were collected on the replacement grocery list using procedures identical to those used for the initial baseline. The research plan was to (1) conclude the study for participants meeting the criteria for phase three, or (2) instruct participants not meeting the criteria to use the replacement grocery list using procedures identical to those implemented during phases one and two of the intervention.

Results and Discussion

The data for percentage of task analysis steps completed independently are shown in Fig. 1. During the initial baseline, Jesus completed an average of 42.6% (range 40–45.3%) of the task steps. Moreover, Jesus selected an average of three items from the list during baseline (range 3–4). Logan completed an average of 28.6% (range 14.4–36%) of the task steps correctly, and he selected an average of two items from the list (range 2–4) during baseline. Ivis was able to complete an average of 34.1% (range 29.3–38.6%) of the task steps during baseline, selecting an average of two items from the list (range 1–3) during this condition.

During phase one of the intervention, Jesus completed an average of 70.8% (range 42.6–88%) of the task steps. He also selected an average of five items (range 2–6) from the list. During the final three sessions of this phase, Jesus met the criteria for mastery for both percentage of task analysis steps completed and number of grocery items selected from the list.

During the baseline for phase two (the re-sequenced grocery list), Jesus met the criteria for mastery. He completed an

Fig. 1 Percentage of grocery shopping task steps completed correctly. *BL* Baseline, *Int* Intervention

average of 84.6% of task steps (range 78.6–88%) and selected six items during each session. Therefore, phase two intervention was not implemented, and he was transitioned to the

phase three (replacement list) baseline where he did not meet the performance criteria. He selected an average of five items from the list (range 5–6); however, he only completed 69.9% (range 57.3–78.6%) of the task analysis steps.

During phase three intervention, Jesus completed an average of 87.6% (range 82.6–90.6%) of the task steps using the replacement grocery list. Additionally, he selected six out of six items from the list each session and met the criteria for this phase.

Logan completed an average of 78.8% (range 62.6–86.6%) of the task steps correctly, and he selected an average of six items from the grocery list during phase one of the intervention. Although he met part of the criteria for mastery to move on to the next phase of the intervention, he was slightly below the criterion of his overall performance on the task analysis. Given these results, he did not move on to phases two and three.

Ivis completed 71.5% (range 57.3–81.3%) of the task steps correctly during phase one of the intervention. Additionally, she selected an average of four items from the list (range 3–6). She did not meet either mastery criteria; therefore, she did not move to phases two and three.

The results of the current study contribute to the limited literature on teaching individuals with disabilities entirely in a community setting. Our data suggest that least-to-most prompting may help learners with ID locate items from a shopping list in a grocery store when instruction is conducted exclusively in the community. Furthermore, generalization of following different lists was observed with the participant that advanced to those phases of the intervention.

Despite participants' progress, two participants did not move beyond following the initial grocery list. It is possible that the density of the instruction was too low; that is, perhaps they needed additional in-store sessions. This raises a complication, however. Schools serving this population might have limited resources available to conduct CBI at higher densities (Burckley et al., 2015). Moreover, students could have other community settings which they have to visit, limiting instructional time in any one setting. As an alternative for those students requiring additional instruction, teachers and related practitioners can supplement CBI with simulated experiences in classroom settings (e.g., Goo et al., 2016). Nevertheless, the matter of instruction density in authentic environments remains an issue as opportunities for CBI can decrease due to factors such as scheduling and cost. Yet, as Bates et al. (2001) reported, instruction in authentic community settings is critical for students with moderate ID.

There are several limitations to the current study that warrant consideration. This study took place in one supermarket using one type of mobile device with one application. Thus, the extent to which skills would generalize to other settings using other devices and applications is not known, warranting additional research in these areas. Relatedly, some individuals might not have access to tablet computers or smartphones;

accordingly, additional research is needed using least-to-most prompting when individuals use written grocery lists. Finally, the lists were constructed using items located on the aisle signs; therefore, we encourage future research on the performance of participants using a list comprised of items not displayed on those signs.

Acknowledgements The authors thank Mashal Salman Aljehany for assisting with data collection. This study is based on the doctoral dissertation of Vanessa Gil.

Compliance with Ethical Standards

Conflicts of Interests The authors declare that they have no conflicts of interests.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

- Ayres, K. M., & Ledford, J. R. (2014). Dependent measures and measurement systems. In D. L. Gast & J. R. Ledford (Eds.), *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed., pp. 124–153). New York: Routledge.
- Bates, P. E., Cuvo, T., Miner, C. A., & Korabek, C. A. (2001). Simulated and community-based instruction involving persons with mild and moderate mental retardation. *Research in Developmental Disabilities*, 22, 95–115.
- Burckley, E., Tincani, M., & Fisher, A. (2015). An iPad-based picture and video activity schedule increases community shopping skills of a young adult with autism spectrum disorder and intellectual disability. *Developmental Neuropsychology*, 18(2), 131–136. <https://doi.org/10.3109/17518423.2014.945045>.
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River: Pearson.
- Duker, P., Didden, R., & Sigafos, J. (2004). *One-to-one training: Instructional procedures for learners with developmental disabilities*. Austin: Pro-Ed.
- Gast, D. L. (2014). General factors in measurement and evaluation. In D. L. Gast & J. R. Ledford (Eds.), *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed., pp. 85–104). New York: Routledge.
- Goo, M., Therrien, W. J., & Hua, Y. (2016). Effects of computer-based video instruction on the acquisition and generalization of grocery purchasing skills for students with intellectual disability. *Education and Training in Autism and Developmental Disabilities*, 51(2), 150–161.
- MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis*, 26(1), 89–97. <https://doi.org/10.1901/jaba.1993.26-89>.
- Richards, S. B., Taylor, R. L., & Ramasamy, R. (2014). *Single subject research: Applications in educational and clinical settings* (2nd ed.). Belmont: Wadsworth.