

*ASSESSING AND TEACHING JOB-RELATED SOCIAL SKILLS TO
ADULTS WITH AUTISM SPECTRUM DISORDER*CAROLYN M. GROB, DOROTHEA C. LERMAN, CHANNING A. LANGLINAIIS AND
NATALIE K. VILLANTE

UNIVERSITY OF HOUSTON CLEAR LAKE

Few studies have evaluated interventions to improve the job related social skills of adults with autism spectrum disorder. In this study, we examined the efficacy of a treatment package for teaching several social skills that are critical to job success, such as responding appropriately to feedback and asking for a task model from the supervisor. Three adults, aged 19 to 27 years, participated. Initial training of each skill consisted of verbal explanations, modeling, and role play with feedback, along with stimulus prompts to promote generalization to a different setting. The trainer introduced additional intervention components as needed. We also evaluated generalization across different social skills and evocative situations. Results indicated that the treatment package was generally effective in improving the targeted social skills, and that stimulus prompts may be necessary for generalization to a job setting. However, generalized responding across social skills rarely emerged. These findings have important implications for preparing individuals with autism to function successfully on the job.

Key words: job skills, social skills, behavioral skills training, stimulus prompts, multiple exemplar training

Autism spectrum disorder (ASD) is characterized by a myriad of social difficulties. For example, individuals with this diagnosis may find it difficult to initiate or sustain conversations, understand implied social rules, respond to nonverbal cues, or take the perspective of others (American Psychiatric Association, 2000). Research has identified a number of effective social skills interventions for young

children with ASD, but relatively few studies have examined interventions for adults with ASD, particularly for those considered “high functioning” (see Palmén, Didden, & Lang, 2012, for a review). This gap in the literature is concerning given the large numbers of individuals with ASD reaching adulthood. Research findings suggest that many adults with ASD do not live independently, have few close relationships, and are considered to have poor quality of life (e.g., Barneveld, Swaab, Fagel, van Engeland, & de Sonnevill, 2014; Howlin, Goode, Hutton, & Rutter, 2004).

The ability to obtain and maintain employment is one likely determinant of independence in adulthood. Only 10% to 50% of individuals with ASD are employed following high school (Barneveld et al., 2014; Shattuck et al., 2012; see also Chen, Leader, Sung, & Leahy, 2015, for a review), and those who are employed earn less and work fewer hours than neurotypical individuals (Burgess & Cimera, 2014). Problems with social-communication skills rather than with job-specific skills likely constitute the

Carolyn M. Grob, Department of Clinical Health and Applied Sciences, University of Houston Clear Lake; Dorothea C. Lerman, Department of Clinical Health and Applied Sciences, University of Houston Clear Lake; Channing A. Langlinais, Department of Clinical Health and Applied Sciences, University of Houston Clear Lake; Natalie C. Villante, Department of Clinical Health and Applied Sciences, University of Houston Clear Lake.

Carolyn Grob is now at Engage ABA in Seattle, WA; Channing Langlinais is now at Summit Behavioral Services in Lafayette, LA. We thank Bridgette White for her assistance with various aspects of this project. This study was completed as partial fulfillment of the master's degree requirements by the first author at the University of Houston Clear Lake.

Address correspondence to Dorothea C. Lerman.
E mail: lerman@uhcl.edu
doi: 10.1002/jaba.503

greatest barrier to employment success for individuals with ASD (Chen et al., 2015; Hendricks, 2010). Job-related social-communication skills include asking for help when needed, responding appropriately to corrective feedback, making confirming statements when given instructions, and notifying the supervisor when a task is completed (Montague & Lund, 2009; Partington & Mueller, 2015). These skills seem critical to success on the job and might foster positive social relations between employees with ASD and their supervisors.

The majority of research on job skills training for individuals with ASD and other developmental disabilities has focused on general vocational skills, such as remaining on task (e.g., Montgomery, Storey, Post, & Lemley, 2011; Watanabe & Sturmey, 2003) and completing specific jobs (e.g., janitorial tasks; Kellem & Morningstar, 2012; Lattimore, Parsons, & Reid, 2008). Individuals with ASD who follow instructions, remain on-task for extended periods of time, and have the job-specific skills necessary for success with a variety of tasks (e.g., office, retail) may still have difficulties with important social aspects of employment. Although a growing number of studies have evaluated social skills training with this population (e.g., conversation skills; Hood, Luczynski, & Mitteer, 2017; Nuernberger, Ringdahl, Vargo, Crumpecker, & Gunnarsson, 2013), the field would benefit from further research on social interactions that are specific to job settings (Anderson et al., 2017; Seaman & Cannella-Malone, 2016).

Further research in this area also might give consideration to certain challenges that practitioners may encounter when providing vocational assessment and intervention services for this population. If the individual has never been employed, practitioners may have limited access to information about the individual's work-related social repertoire. Such information is needed to identify individualized targets for

intervention. In addition, if the practitioner is providing intervention services prior to employment, the effects of those interventions ideally should transfer to the job site once the individual is employed. The practitioner also may encounter barriers when working with individuals who are employed, as on-the-job services would require the cooperation of employers and could be socially stigmatizing to the employee with ASD.

Lerman, White, Grob, and Laudont (2017) recently described a methodology for assessing job-related social skills by arranging a variety of evocative situations in a simulated work environment. An experimenter who served as a "supervisor" instructed the participants to complete a series of tasks while ensuring that the participants encountered situations that set the occasion for targeted social skills, such as asking for help with a problem, responding appropriately to feedback, and notifying the supervisor when a task was completed. For example, the supervisor delivered vague instructions (e.g., said, "Sort these materials," without specifying how to sort them) or arranged for the participant to run out of materials before completing a task (e.g., provided an inadequate number of staples for a stapling task) to assess whether and how the participant asked for help. Participants were eight individuals diagnosed with ASD, aged 16 to 32 years, who were not employed at the time of the study. Results indicated that the assessment was useful for evaluating job-related social skills in a clinic setting. Assessment outcomes identified individuals who would benefit from intervention and specific targets for instruction. However, none of the participants received intervention as part of the study.

As discussed previously, the practitioner may encounter barriers to providing intervention services before and after an individual is competitively employed. Interventions that are not delivered in-situ at the job site would need to impact performance while on the job. When

in-situ intervention is necessary, the practitioner would need the employer's cooperation. In light of these challenges, further research might prioritize efficient, low-cost, nonintrusive interventions that would transfer from a therapy setting to the job site or that on-site supervisors might be readily willing to implement themselves.

Numerous studies have demonstrated the effectiveness of behavioral skills training (BST), consisting of instructions, modeling, and practice with feedback, for teaching skills to individuals with ASD, including vocational skills (see Anderson *et al.*, 2017, for a review). BST is a relatively easy, low-cost method for teaching new skills that practitioners could implement in therapy settings before or after a client has obtained competitive employment as long as the effects generalize to the job site. For example, Dotson, Richman, Abby, Thompson, and Plotner (2013) used a group instruction package to teach six adults with ASD and other developmental disabilities a variety of skills needed to run their own recycling business, including how to complete the recycling task, check the accuracy of work, and enter data into spreadsheets. Training consisted of instructions, role play combined with prompts and reinforcement, and practice with praise and corrective feedback. Results showed that most of the participants acquired the skills in the training location and that the skills transferred to different locations at the site. However, the experimenters and peers continued to provide prompts and "social encouragement" as needed in the different locations, so it isn't clear whether the skills generalized beyond the training setting.

Strategies that might promote generalization to the job site include programming common stimuli (e.g., using similar work materials) and establishing "mediators" of generalization (e.g., stimulus prompts; self-instruction) that can be transported to the job site (Stokes & Osnes, 1989). Results of some studies suggest

that combining BST with stimulus prompts improves training outcomes (e.g., Burke, Andersen, Bowen, Howard, & Allen, 2010), but few of these studies assessed generalization. Stimulus prompts may not only improve the effectiveness of BST but also help bridge the gap between the training setting and the work setting. In Palmen and Didden (2012) for example, six adults with ASD received BST and access to stimulus prompts (a flowchart) to increase task engagement and the frequency of question asking in a sheltered work setting. Results showed reductions in off-task behavior that generalized from a therapy room to a separate work setting, although the authors reported no changes in the number of questions that the participants asked.

The purpose of this study was to extend prior research on vocational training by evaluating the effectiveness of BST plus stimulus prompts for teaching a variety of job-related social skills to adults with ASD. First, we replicated the procedures described by Lerman *et al.* (2017) to identify individualized targets for intervention. Next, we assessed the effects of brief BST plus text prompts on the acquisition, short-term maintenance, and generalization of a small group of social skills targets via a multiple baseline design. If the intervention was not effective for an individual, we sequentially introduced additional components as needed, progressing from those that would require a limited amount of "buy in" from the supervisor (i.e., simple reminders) to those that would require greater supervisor involvement (i.e., immediate feedback, monetary reinforcement).

METHOD

Participants and Setting

Participants were three individuals, ages 19 to 27 years, referred to a university-based clinic for assessment and intervention services by a state vocational rehabilitation agency. All

participants had been diagnosed with autism spectrum disorder (ASD) or pervasive developmental disorder—not otherwise specified (PDD-NOS) by appropriate professionals unrelated to the study. None of the individuals had been employed or had received training focused on job-related social skills. All participants read on at least a fourth-grade level, as indicated in available assessment or educational records.

Arthur was a 19-year-old man who had been diagnosed with PDD-NOS and had received an adaptive behavior composite score of 67 on the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II; Sparrow, Cicchetti, & Balla, 2005). He had graduated from high school and had previously volunteered at a food bank, where he sorted items and stacked boxes. Arthur lived with his parents and siblings.

Jerry was a 27-year-old man who had been diagnosed with PDD-NOS and dyslexia, and had received a full-scale IQ score of 84 on the Wechsler Adult Intelligence Scale—Third Edition (WAIS-III; Wechsler, 1997). He had received an associate of applied science degree in information technology and an associate of arts degree in criminal justice from a local community college. Jerry's speech articulation was poor, and he would often stop abruptly mid-sentence when speaking and struggled to express himself. Jerry lived at home with his parents and had no prior volunteer experience.

Vanessa was a 19-year-old woman who had been diagnosed with ASD, attention-deficit/hyperactivity disorder (ADHD), and borderline intellectual functioning. Vanessa had received a combined general IQ score of 70 on the Wide Range Intelligence Test (WRIT; Glutting, Adams, & Sheslow, 2000). She had graduated from high school and attended one semester of community college before dropping out. She resided with her mother and siblings. At the time of the study, Vanessa volunteered at a church where her mother was employed. Her responsibilities included cleaning, filing, and greeting visitors.

All sessions were conducted in therapy rooms at a university-based clinic. The rooms contained furniture and materials consistent with an office work environment. One room was designated the participant's workroom, and a second room was designated the supervisor's office. The workroom measured 3.6 m by 3.0 m, and the supervisor's office measured 3.6 m by 2.3 m. The workroom was 4.6 m from the supervisor's office. Each room had a one-way observation window, a worktable, and two chairs. The participant's workroom also had a desktop computer, a printer, a computer desk, a clothing rack, a shredder, and a filing cabinet. Each room had a camera mounted on the ceiling. All sessions were recorded for data collection purposes. Generalization probes were conducted in a university secretary's suite of offices in a different building. The secretary served as the generalization supervisor. For the generalization probes, the participant worked in a room similar to the clinic rooms; however, the secretary worked at a desk located in an open reception area. During generalization sessions, a video camera was set up on a tripod in one corner of the participant's workroom.

PART 1: ASSESSMENT OF JOB-RELATED SOCIAL SKILLS

We conducted the assessment across two separate days, with each appointment lasting approximately 3 hr. The assessment consisted of a series of work sessions lasting 10 to 15 min. Tasks relevant to entry-level office or retail positions were used during the assessment. These included folding or hanging shirts, stocking items on shelves, filing papers, folding letters and stuffing them into envelopes, sorting objects, stapling papers, shredding papers, alphabetizing books or files, pricing supplies (e.g., books, groceries, shirts), creating presentations with Microsoft PowerPoint, entering data or creating graphs using Microsoft Excel, counting money in a cash drawer, rolling

silverware into napkins, and cleaning (e.g., vacuuming, wiping table).

Response Measurement, Reliability, and Procedural Integrity

Trained observers used pencil and specially designed data sheets to score the occurrence or nonoccurrence of the following dependent variables, as well as the opportunities for the participant to exhibit them. Data on all dependent variables were converted to a percentage of opportunities. Making confirming statements to an initial task instruction was defined as repeating parts of the instruction delivered by the supervisor, even if in a question format, to confirm that the participant understood the task instruction (e.g., "Okay, fold the shirts." "You want me to sort by color, right?"). Observers recorded an opportunity for a confirming statement when the supervisor delivered an instruction to complete a task. Asking for clear instructions was defined as asking questions that would lead to the supervisor specifying and/or modeling how to correctly complete the entire task (e.g., "Can you tell/show me how?" "How do you want this?"). Observers recorded an opportunity when the supervisor delivered a vague instruction. Asking for help completing tasks was defined as statements that referred to an inability to complete the task (i.e., "I don't know how to make a bar graph.") or asking questions that would lead to the supervisor specifying and/or modeling how to correctly complete the entire task (i.e., "Can you show me what to do?"). Observers recorded an opportunity to ask for help completing tasks when the supervisor gave the participant a task that was not in his or her repertoire. Asking for missing or additional materials or asking for help with nonfunctional (broken) materials was defined as statements indicating that the participant was out of materials or that materials were missing and that assistance was needed (i.e., "I need more

napkins." "Where is the vacuum?"). Observers recorded opportunities to ask for missing or additional materials or to ask for help with nonfunctional materials when the supervisor did not give the participant all or enough materials needed to complete the task, or when the supervisor gave the participant nonfunctional materials.

Observers recorded the following additional components when participants had opportunities to ask for clear instructions, ask for help with tasks, or ask for missing or additional materials: (a) Asked within 1 min of stopping the assigned task or after working unsuccessfully on the assigned task for no longer than 5 min, or searching unsuccessfully for needed materials for no longer than 5 min; (b) knocked on the supervisor's door, defined as using the knuckles to knock at least twice; and (c) waited to enter, defined as waiting for the supervisor to invite entry before entering the office. If a participant did not go to the supervisor's office (i.e., the participant never asked for help, asked for help before the supervisor left the room, or waited until the supervisor re-entered the room before asking for help), observers scored (b) and (c) as "no opportunity," and these opportunities were not included in the data calculation. If a participant did go to the supervisor's office but did not knock on the door before entering, observers scored (c) as "no opportunity," and this opportunity was not included in the data calculation.

Notifying the supervisor of task completion consisted of the following components: (a) Searching for the supervisor within 1 min of task completion, defined as leaving the room and navigating to the location of the supervisor's office within 1 min of completing the task when all necessary materials were present; (b) knocking on the supervisor's door, as defined previously; (c) waiting to enter, as defined previously; (d) stating that he or she had completed the task (e.g., "I'm done."); and (e) asking the supervisor what task should be

completed next or what other tasks needed to be completed. Observers recorded opportunities to notify the supervisor of task completion when the participant completed a task with all of the necessary materials present and available, regardless of whether the task was completed correctly. However, exceptions for scoring the opportunity for (b) and (c) were identical to those described previously.

Responding to corrective task feedback consisted of the following components: (a) Apologizing, defined as expressing some type of remorse (e.g., "Sorry."); (b) asking for clear feedback (if relevant), defined as asking questions or making statements that would evoke an explanation from the supervisor that would lead to accurate completion of the entire task (e.g., "What is wrong about my work?"); (c) making a confirming statement, defined as stating that he or she will fix the mistake(s) (e.g., "I understand. I will fix it."); and (d) correcting mistake(s), defined as the participant fixing all of his or her work in the manner described by the supervisor. Observers recorded opportunities for all components except (b) when the supervisor provided feedback about the participant's task performance. Opportunities to score (b) in addition to the other components were recorded when the supervisor provided vague task feedback (e.g., "This is wrong. You need to fix your work.")

A second observer independently collected data on the dependent variables and on the supervisor's behavior for a minimum of 30% of the evocative situations for each participant for reliability purposes. Interobserver agreement (IOA) was calculated for each dependent variable by dividing the number of agreements by the number of agreements and disagreements and converting to a percentage. Agreement for all responses exceeded 85% for Arthur and 92% for Jerry, and was 100% for Vanessa. Observers also scored the following procedural components as correct or incorrect for each

(relevant) evocative situation: (a) delivery of the task instruction (clear or vague), (b) response to the participant's requests for help or statements of task completion, (c) delivery of feedback (clear or vague), (d) arrangement of broken, missing, or insufficient materials, and (d) termination of a work session. The number of components scored as correct was divided by the number of correct and incorrect components for each evocative situation and multiplied by 100 to get a percentage of correct implementation. Mean integrity was 94% for Arthur (range, 58%-100%), 90.5% (range, 50%-100%) for Jerry, and 95% (range, 71%-100%) for Vanessa. IOA on procedural integrity was calculated by dividing the number of occurrences with agreement by the total number of agreements and disagreements and converting to a percentage. Mean IOA for procedural integrity was 97% (range, 79%-100%) for Arthur, 90.5% (range, 80%-100%) for Jerry, and 91.6% (range, 63%-100%) for Vanessa.

Evocative Situations

Procedures were similar to those described by Lerman et al. (2017), with the exception of the inclusion of two additional evocative situations (broken materials; vague corrective feedback; see description below). During the assessment, an experimenter serving as the "supervisor" delivered an instruction and related materials at the start of each session. After the supervisor delivered the instruction, she waited about 5 s before leaving the workroom to give the participant an opportunity to make a confirming statement and/or ask questions. She then stated, "I will be in my office if you need anything," before leaving the workroom and closing the door behind her. The supervisor returned to the workroom to provide feedback or to end the task when the participant could no longer work on the assigned task (i.e., it was completed; necessary materials were

broken or missing) and had not sought the supervisor's assistance or engaged in any attempts to problem solve for at least 1 min, or the participant had attempted to complete the task without success for at least 5 min.

The supervisor arranged one or more of the following evocative situations during each work session (see Lerman *et al.*, 2017, for additional details): (a) clear task instructions, in which the supervisor described how to complete the task correctly and demonstrated the steps; (b) vague task instructions, in which the supervisor gave the participant a new task that could be completed in multiple ways, did not describe how to complete the task, and did not include a model; (c) task not in repertoire, in which the supervisor gave the participant a task that required a skill that was not in the participant's repertoire and did not provide a model (all participants except Jerry); (d) missing or broken materials, in which the supervisor did not give the participant all of the materials or a sufficient amount of materials to complete the task, or the supervisor gave the participant the materials needed but some of the materials were nonfunctional; (e) work completed, in which the supervisor permitted the participant to complete all available tasks before returning to the workroom; and (f) clear or vague corrective feedback, in which the supervisor explained why the work was incorrect and demonstrated how to fix the mistakes to complete the task correctly or told the participant that he needed to fix his work, but did not specify what was wrong or how to fix the mistake(s).

Results and Discussion

Neither Arthur nor Jerry emitted confirming statements (Figure 1), whereas Vanessa emitted some confirming statements to both types of instructions. Arthur typically did not seek help in a timely manner ($M = 27\%$ of opportunities across all evocative situations), although he was more likely to seek help when he had

completed a task (56% of opportunities). He was also most likely to emit a correct help statement when he had completed a task (73% of opportunities), but he never asked the supervisor what he should do next. He emitted a correct help statement during just 33% of the instances in which the supervisor gave him a task that was not in his repertoire, and during 60% of the instances in which the supervisor did not give him adequate materials. When he sought the supervisor in her office he knocked on the door just one time (7% of the opportunities; data not shown) and waited for the supervisor to invite entry on that opportunity before entering (data not shown).

Jerry sought help in a timely manner about half of the time that it was needed ($M = 62\%$ of opportunities across all evocative situations), and like Arthur, was more likely to do so when he had completed a task (70% of opportunities). He emitted a correct help statement every time that the supervisor gave him inadequate materials and almost every time he had completed a task, but he never asked the supervisor what he should do next when he had completed a task (data not shown). On the other hand, he emitted a correct help statement just 50% of the time when his supervisor gave him vague instructions. When he sought the supervisor in her office (nine instances) during the assessment, he never knocked on the door (data not shown).

Vanessa rarely sought help in a timely manner or emitted a correct help statement when given vague instructions or a task that was not in her repertoire ($M = 21\%$ across those two evocative situations for both response components). On the other hand, she readily sought help when her supervisor gave her inadequate materials and when she completed her task ($M = 81\%$ of the opportunities). Interestingly, she emitted a correct help statement nearly every time that the supervisor gave her inadequate materials (80% of opportunities), but never did so when she had completed a task.

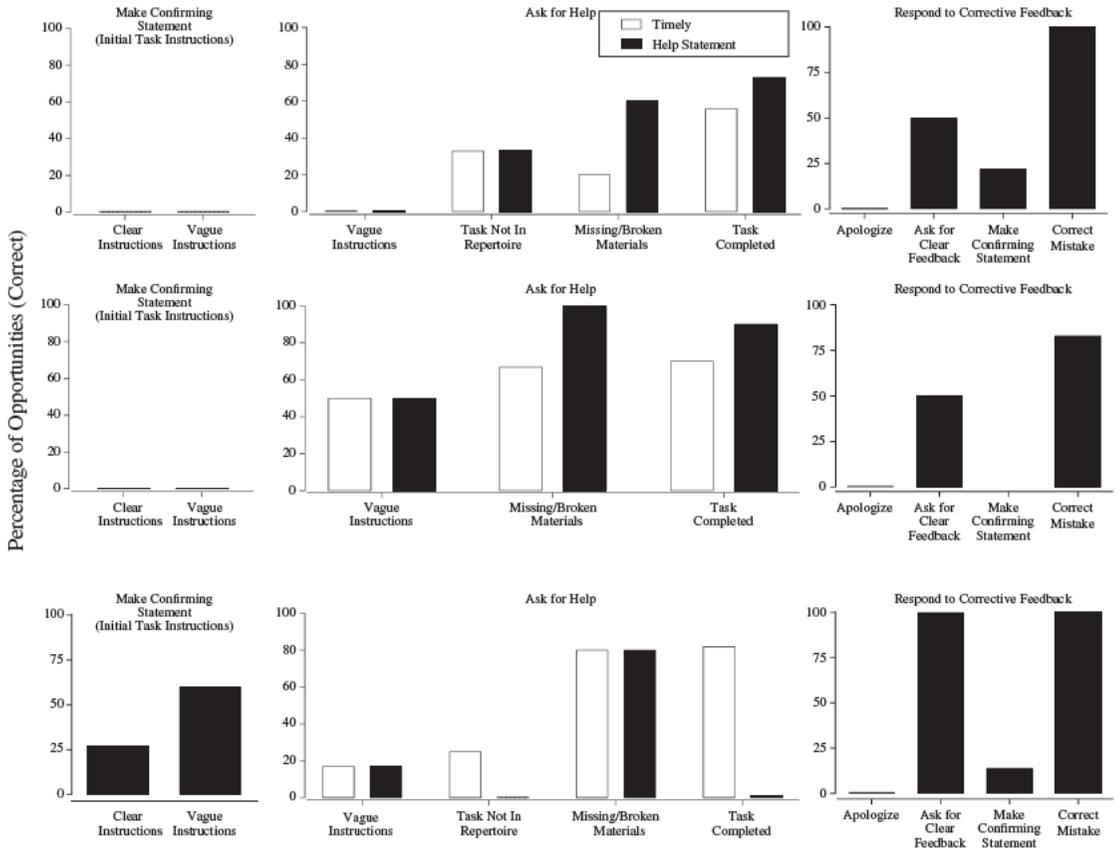


Figure 1. Percentage of opportunities with correct confirming statements (left panel), requests for help (middle panel), and responses to corrective feedback (right panel) during the assessment for Arthur (top panel), Jerry (middle panel), and Vanessa (bottom panel) across evocative situations.

Instead, she typically approached her supervisor and asked, “What next?” (75% of opportunities). She knocked on the door 50% of the times that she sought the supervisor in her office; when she did knock, she waited for the supervisor to invite entry 50% of the time before entering the office (data not shown).

When the supervisor gave Arthur corrective feedback, he never apologized but made a correct confirming statement during 22% of opportunities (Figure 1), and he always corrected his mistakes. When his supervisor gave him vague feedback, Arthur asked for clear feedback during 50% of the opportunities. Jerry (second graph in right panel) also never

apologized or made correct confirming statements. He corrected his mistakes during 75% of the opportunities. When his supervisor gave him vague feedback, he asked for clear feedback during 50% of the opportunities. Finally, Vanessa (bottom right graph) never apologized and rarely made correct confirming statements, but she always asked for clear feedback when given vague feedback and corrected her mistakes.

Results of the assessment identified the participants’ responding across a variety of job-related social skills that we deemed important for job success and designed each participant’s intervention around teaching the skills in which

deficits were identified (i.e., less than 50% of opportunities). Arthur rarely made confirming statements when given task instructions or apologized when he made errors, he often did not ask for clarity after receiving vague feedback, and he often did not seek help or emit appropriate help statements when given vague instructions, tasks that he could not complete, or inadequate materials. On the other hand, Arthur typically responded correctly when he completed his work by seeking his supervisor in a timely manner and indicating that he had finished. He also always corrected his mistakes when given corrective feedback. Jerry never made confirming statements in response to task instructions or feedback, or apologized when he made mistakes. He often did not seek help or emit appropriate help statements when he was given vague instructions or ask for clarity when given vague feedback. However, he typically emitted appropriate help statements when the supervisor gave him inadequate materials, and he corrected his mistakes when his supervisor gave him corrective feedback. Vanessa made confirming statements during less than half of the opportunities. She often did not seek help or emit appropriate help statements when she was given vague instructions or a task that she could not complete, and she did not apologize when she was told that she made an error. However, Vanessa typically sought help with missing or broken materials or when she had completed her work. Vanessa always corrected her mistakes when given corrective feedback and asked for clear feedback when given vague feedback.

PHASE II: TRAINING

We selected a small set of targets for intervention based on the assessment results from Phase 1. For each participant, we considered responses that occurred least often during the assessment, seemed important to success on the job (e.g., asking for help with tasks), and might

improve social relationships (e.g., apologizing). We also targeted a response that occurred across different evocative situations (confirming statements) to assess generalization across evocative situations. The goal of Phase II was to evaluate the effects of brief BST combined with text prompts on the acquisition and generalization of various job-related social skills. If brief BST plus text prompts were not effective for any skill, we sequentially introduced additional interventions that might be implemented by supervisors or job coaches on the job site. We considered the intrusiveness of the intervention and the effort that would be required of the supervisor when determining the order of the additional interventions.

Response Measurement, Reliability, and Procedural Integrity

Observers used pencils and a specially designed data sheet to record the occurrence or nonoccurrence of the following dependent variables, as well as the opportunities for the participant to exhibit them: (a) making confirming statements (Arthur, Jerry, and Vanessa), defined as statements directed to the supervisor within 10 s of receiving an initial instruction or corrective feedback indicating that the participant understood the instructions or feedback and would complete the task or fix the mistake(s) (e.g., "I will do it the way you showed me." "Consider it done"); (b) asking for a task model (Arthur, Jerry, and Vanessa), defined as the participant requesting that the supervisor demonstrate the steps needed to complete the task (e.g., "Can you demonstrate it?" "I need an example.") within 5 min of receiving an initial task instruction; (c) apologizing (Arthur, Jerry, and Vanessa), defined as the participant expressing remorse regarding errors in his or her work (e.g., "I'm sorry," "My mistake."); (d) asking for clear task feedback (Arthur), defined as the participant requesting information about errors in his work

or a demonstration of how to fix the work (e.g., "What is wrong?") within 5 min of receiving feedback; (e) asking for help with materials (Arthur), defined as the participant describing an issue with missing or broken materials and requesting assistance with the issue within 1 min of off-task behavior or 5 min of attempting to complete the task unsuccessfully (e.g., "I need more staples. Can you help me?"). Data on all dependent variables were converted to a percentage of opportunities.

Interobserver agreement (IOA) was collected for a minimum of 35% of sessions for each evocative situation. IOA was calculated using exact agreement by dividing the number of occurrences with exact agreement between observers by the total number of occurrences and multiplied by 100 to get a percentage of opportunities with agreement. Mean agreement was 96% (range, 90%-100%) for Vanessa, 94% (range, 91%-100%) for Jerry, and 97% (range, 92%-100%) for Arthur (IOA for each targeted dependent variable for each participant is available from the first author upon request). Data on procedural integrity were calculated for at least 33% of sessions across all evocative situations. Trained research assistants scored the following procedural components as correct or incorrect for each (relevant) evocative situation: (a) delivery of the task instruction (clear or vague), (b) consequences for correct responses, (c) consequences for incorrect responses, (d) delivery of feedback (clear or vague), and (d) arrangement of broken, missing, or insufficient materials (Arthur only). The number of components scored as correct was divided by the total number of components for each session and multiplied by 100 to get a percentage of correct implementation. Items scored as "no opportunity" were not included in the total number of component steps. Procedural integrity was 100% for Arthur and Jerry, and 97% (range, 95%-100%) for Vanessa. IOA on treatment fidelity was collected for a

minimum of 33% of sessions across all evocative situations. IOA was calculated by dividing the number of occurrences with agreement by the total number of agreements and disagreements and converting to a percentage. Mean IOA on treatment fidelity was 100% for all participants.

Procedures

We used a concurrent multiple baseline design across job-related social skills to evaluate the effects of the intervention. This design also permitted us to assess possible generalization of responding across different but related targets (e.g., asking for a task model and asking for clear feedback) and across different evocative situations (e.g., making confirming statements in response to initial instructions and in response to clear feedback). Participants were exposed to a series of work sessions, each lasting about 10 min, across baseline and post-training phases. Sessions were conducted once per week during appointments that lasted approximately 1.5 hrs. During work sessions, the first author, who served as the "supervisor," asked the participant to complete a task (e.g., fold clothing, sort small objects into bags, stuff envelopes) and established one or more relevant evocative situations as described for the assessment in Phase 1. The supervisor always gave the participant a brand-new task when delivering a vague task instruction. Opportunities to measure each dependent variable were arranged during every weekly appointment, with a minimum of one opportunity for each response in baseline and posttraining work sessions. The participant received noncontingent access to a small snack and a 60-s break between sessions.

Following baseline work sessions, a single job-related social skill was targeted during training sessions until the participant met a performance criterion (see further description below). The outcome of the training was then assessed

via posttraining work sessions. Depending on the participant's performance, the supervisor implemented additional training or intervention components for that social skill, or introduced training on another social skill while continuing to assess all social skills. The mastery criterion for a specific skill was a correct response across three consecutive opportunities. The supervisor introduced additional training or intervention components if the participant did not make a correct response across two consecutive opportunities that occurred during the same weekly appointment. We also assessed generalization of responding to a different setting and supervisor prior to and following the training.

The supervisor implemented the following evocative situations during baseline, posttraining, and generalization probes using identical procedures as those in the assessment in Phase 1: (a) clear task instructions (Arthur, Jerry, Vanessa); (b) vague task instructions (Arthur, Jerry, Vanessa); (c) missing or broken materials (Arthur); (d) clear corrective feedback (Arthur, Jerry, Vanessa), and (e) vague corrective feedback (Arthur). The evocative situation(s) were alternated such that the same situation did not

occur across two consecutive sessions (e.g., the participant did not receive corrective feedback across two consecutive sessions).

Baseline. Procedures were identical to those implemented during the assessment. No stimulus prompts were present in the room. Every time the supervisor delivered vague task instructions, she presented the participant with a new task or new materials.

Behavioral skills training (BST) plus stimulus prompts. The introduction of each targeted social skill began with the supervisor explaining the skill and the rationale for using it correctly on the job. For example, when targeting how to ask for clear feedback, the supervisor first defined corrective feedback, described how the participant should respond when given unclear feedback, and explained why it was important to do so. The supervisor also introduced the corresponding stimulus prompt, which consisted of a single 22 cm by 30 cm sheet of paper with sample responses printed in Ariel with 60 type size font. The responses for each targeted social skill were printed on a different colored sheet of paper and were individualized for each participant, and are listed in Table 1. Multiple responses were displayed for Arthur

Table 1
Statements on Stimulus Prompts for Each Job Related Social Skill and Participant

	Arthur	Jerry	Vanessa
Confirming Statements	"Got it. I will do it the way you showed me." "Got it. I will do it the way you told me."	"I can do that." "Consider it done." "I understand." "I will fix my mistake"	"Got it. I will do it the way you showed me." "Got it I will do it the way you told me."
Asking for a Task Model	"Can you show me how?" "Could you demonstrate it?" "I need an example."	"Can you show me how?" "Could you demonstrate it?" "I need an example."	"Can you show me how?" "Can you model it?"
Apologizing	"I'm sorry." "My mistake." "I apologize."	"I'm sorry." "My mistake." "I apologize."	"I'm sorry."
Asking for Help with Materials	"I need more . Can you help me?"	N/A	N/A
Asking for Clear Feedback	"Can you show me what to fix?" "Can you show me what is wrong?" "What about it is wrong?"	N/A	N/A

and Jerry, and one response was displayed for Vanessa. Vanessa stated that multiple examples would confuse her, and that she preferred just one response for each social skill. Vanessa's stimulus prompts also included pictures below the text (e.g., a sad face emoji for apologizing and a hand-over-hand graphic for asking for a model). When introducing the stimulus prompt, the supervisor asked the participant if he or she understood the phrases, and solicited input from the participant on preferred alternative but appropriate responses. These responses were immediately added or substituted for other responses. For example, the supervisor added the response, "Consider it done," as a confirming statement for Jerry upon his request.

Next, the supervisor and a research assistant modeled three examples of correct responses and three examples of incorrect responses. The supervisor modeled looking at the stimulus prompt before responding. After the supervisor modeled an incorrect response, the supervisor identified and explained to the participant why the response was incorrect and what the participant should say instead. The participant then practiced the targeted social skill with the supervisor in role-play. The supervisor set up the relevant situation (e.g., gave the participant a clear instruction) and delivered praise and immediate feedback contingent on correct responses. If the participant responded incorrectly, the supervisor provided immediate corrective feedback by describing what was wrong and what the participant should have said instead. Training sessions were terminated once the participant exhibited a correct response across six consecutive trials.

Posttraining. Procedures were identical to those in baseline except that the stimulus prompts were present in the room. However, the stimulus prompts were faded and eliminated for one participant (Jerry) because we noticed that he was not referencing them prior to correct responses, and he stated that he did

not need to use the prompts because he had memorized the statements. We began to decrease the brightness of the text on the stimulus prompt when Jerry's responding met the mastery criterion for the corresponding job-related social skill. The brightness was faded from 100% to 50% to 15% following two consecutive correct responses at each fading step. The prompt was then removed from the work sessions. For a second participant (Arthur), we modified the stimulus prompts to make them less conspicuous and more transportable to an actual job site after he stated that he thought the stimulus prompts were helpful. Once Arthur had met the mastery criterion for all targeted social skills, the size of the sheets containing his stimulus prompts were reduced to 11 cm by 14 cm, and the sheets retained the corresponding colors of the full-size prompts. The font size was reduced to fit the smaller size paper, but the text was legible from approximately 0.6 m away. The small sheets were laminated and placed on a key ring that Arthur could wear at his waist. The supervisor gave Arthur the modified stimulus prompts, pointed out that each sheet contained the same responses as the full-size sheets, and instructed Arthur to attach the key ring to his belt loop. He received no additional instructions or training on its use.

Additional training or intervention components. Additional procedures were introduced for a targeted skill if the participant did not exhibit a correct response in posttraining sessions for two consecutive opportunities in the same appointment day (with one exception; see results for Jerry below). For all participants, we first implemented a BST booster session, which was identical to the training described previously. If the participant did not exhibit a correct response in posttraining sessions for two consecutive sessions at any time following the BST booster, we implemented additional procedures, which are described separately for each participant.

Arthur. An additional “problem solving” stimulus prompt was introduced for Arthur after we determined that he had difficulty distinguishing between clear and vague instructions, a discrimination that was necessary for determining when to ask the supervisor for a model. The stimulus prompt consisted of two printed questions (“Have I done this task before?” and “Did the supervisor give me an example?”) with the answers “Yes” and “No” next to each question on a 11 cm by 14 cm sheet of paper. Arthur was told that he should read and answer each question out loud whenever he received a new task instruction and that he should ask the supervisor to demonstrate the task if he answered “No” to any of the questions. If he answered “Yes” to both questions, he should begin working. The supervisor taught Arthur to use the stimulus prompts during a brief BST session. The supervisor then systematically faded the prompt across post-training work sessions by instructing Arthur to whisper the questions and answers and then to silently say them without circling the answers. In the final fading step, Arthur was instructed to ask and answer the questions silently even though the stimulus prompt was no longer present in the room. Each fading step was introduced when Arthur responded correctly across two consecutive opportunities. The supervisor introduced each step by describing what Arthur should do (e.g., “Whisper the question and answer when you are given a task instruction”) and modeling the behavior once.

Vanessa. We introduced additional components that progressively required more involvement of the supervisor for three of Vanessa’s targeted skills that did not maintain following the BST booster. First, we introduced an antecedent prompt. Before the supervisor established an evocative situation (e.g., delivered feedback or a new task instruction), she said, “Remember to use your help sheet” and gestured to the stimulus prompt. The supervisor then left the room and returned after 5 s to

establish the relevant evocative situation. When the prompt was found to be ineffective, we replaced this component with immediate feedback. The supervisor delivered praise when she responded correctly (e.g., “Awesome! Thanks so much for making a confirming statement!”), and reminded her to use the relevant stimulus prompt and emit the appropriate statement when she responded incorrectly. When this intervention was ineffective, the supervisor combined immediate feedback with monetary reinforcement by placing a small monetary reinforcer (i.e., a quarter) in a small cup positioned on a nearby table and delivering praise for responding correctly. Vanessa was given the opportunity to keep the money or exchange it for snacks at the end of each appointment. She always chose to keep the money. The intervention was faded by reducing the amount of each reinforcer (from \$0.25 to \$0.10) and faded the schedule of reinforcement (from every correct response to a fixed ratio-2 [FR-2] schedule to a variable ratio-2 [VR-2] schedule). The supervisor then no longer delivered the monetary reinforcer. At that point, the supervisor faded the schedule of praise and corrective feedback to an FR-2 schedule, and then the intervention was completely removed from the work sessions. Each fading step was introduced when Vanessa responded correctly across two consecutive opportunities.

Jerry. Multiple exemplar training (MET) was introduced when Jerry did not emit correct responses during the generalization probes, even after we introduced the stimulus prompts into the generalization setting. Two additional, novel supervisors conducted work sessions with Jerry in two novel settings (different rooms in a different building). The supervisor instructed Jerry to complete the same types of tasks as those in baseline and posttraining sessions, and provided immediate feedback (i.e., praise or correction) following every opportunity to respond. The stimulus prompts were present in the rooms. Training continued until Jerry

exhibited a correct response across three consecutive opportunities for each of the targeted skills. Training was reintroduced and modified when Jerry again failed to respond correctly during the generalization probes. We noticed that Jerry did not appear to be referencing the stimulus prompts. Thus, during the additional MET sessions, the supervisor taught Jerry how to use his stimulus prompts during interactions with the supervisor. For example, Jerry was instructed to make eye contact with the supervisor while she delivered instructions then orient to his stimulus prompt for 2 to 3 s before reengaging with the supervisor to emit the relevant statement.

Generalization probes. Procedures and evocative situations were identical to those in baseline and posttraining work sessions. A secretary employed by the university who worked in a different building on campus was trained to establish the relevant evocative situations, use materials and tasks that were similar to those in the baseline and posttraining work sessions, and respond to the participant's behavior as described previously. She conducted these probes in an office in her suite (see description of setting above) during baseline with no stimulus prompts in the room, and again after the participant met the mastery criterion for all of the targeted skills. Stimulus prompts were present in the posttraining generalization probes for all participants except Jerry. Initially, we did not include the stimulus prompts for Jerry because they had been completely faded from the posttraining sessions. They were reintroduced into the generalization probes to determine if they would exert stimulus control over responding when Jerry's behavior did not appear to generalize to this setting and supervisor. Additional training, described above, was then conducted to establish this stimulus control when correct responding did not emerge. We conducted additional generalization probes for Arthur after we replaced his full-size stimulus prompts with the reduced size during his

work sessions. He wore the reduced sized prompts on his belt loop during the generalization probes.

Results and Discussion

Arthur did not emit any correct responses prior to training (Figure 2). Following initial training and BST booster with the first skill (asking for task model; top left panel), Arthur continued to respond incorrectly when given vague task instructions. Introduction of the problem-solving prompt was associated with consistent correct responding during posttraining opportunities. Correct responding maintained as the problem-solving stimulus prompt was faded and as we introduced training for the remaining skills. Arthur asked for a model during the generalization probe, and he continued to respond correctly when the full-size stimulus prompts were replaced with the modified prompts during work sessions and during an additional generalization probe.

The introduction of BST for the second skill targeted (asking for help with materials) was immediately associated with correct responding during the posttraining work sessions. Responding maintained as we introduced interventions for other social skills and generalized to the novel supervisor and setting. Despite improvements in the first two skills, Arthur was still not asking for clear task feedback. For this third targeted skill, Arthur met the criterion to receive the BST booster, after which he responded correctly during every opportunity, including those presented during the generalization probes and with the modified stimulus prompts. A similar outcome was observed for the next skill targeted (apologizing). Arthur met the criterion to receive the BST booster after we had begun to target the fourth skill, and responding then maintained following this additional training. We also observed generalization of this skill during the posttraining generalization probes.

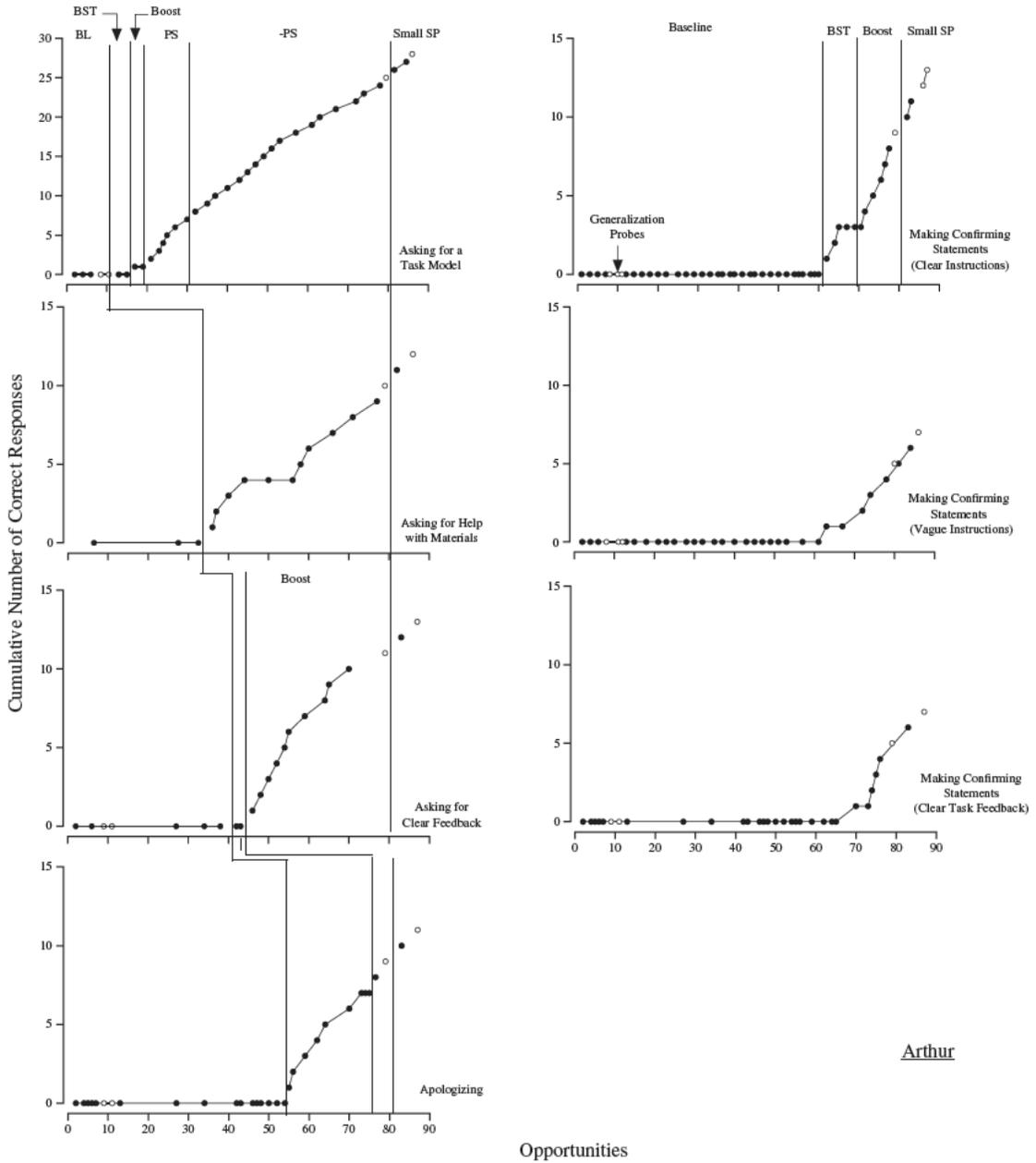


Figure 2. Cumulative number of correct responses for each job related social skill across opportunities during base line, intervention, and generalization for Arthur. BL = baseline; BST = behavioral skills training; Boost = booster BST; PS = problem solving prompt; PS = removal of problem solving prompt; SP = stimulus prompt.

For the final targeted skill (confirming statements to initial clear instructions), Arthur met the criterion to receive the BST booster. After this training, Arthur's responding maintained

and generalized to the novel supervisor and setting. Training was associated with correct confirming statements when given vague task instructions and clear task feedback even

though this response was never targeted within the context of these evocative situations during training.

Jerry rarely emitted any correct responses prior to training (Figure 3). The introduction of BST and stimulus prompts for the first targeted skill (making confirming statements to clear instructions; top left panel) was associated with correct responses during posttraining opportunities. Responding maintained as the stimulus prompt was faded and removed from the work room. During subsequent opportunities, responding became somewhat variable but did not meet the criterion to introduce the BST booster. Responding became more

consistent after the supervisor targeted the same response under a separate evocative situation (i.e., following corrective feedback). Jerry did not emit a correct response on the first opportunity to do so during the generalization probes, although he did so on the second opportunity. He failed to emit a correct response during a subsequent generalization probe on his next appointment even though the stimulus prompts were present in the generalization work room. Following MET, Jerry emitted a correct response on a subsequent generalization probe. However, he did not emit other targeted social skills and never referenced his stimulus prompts. Following the second

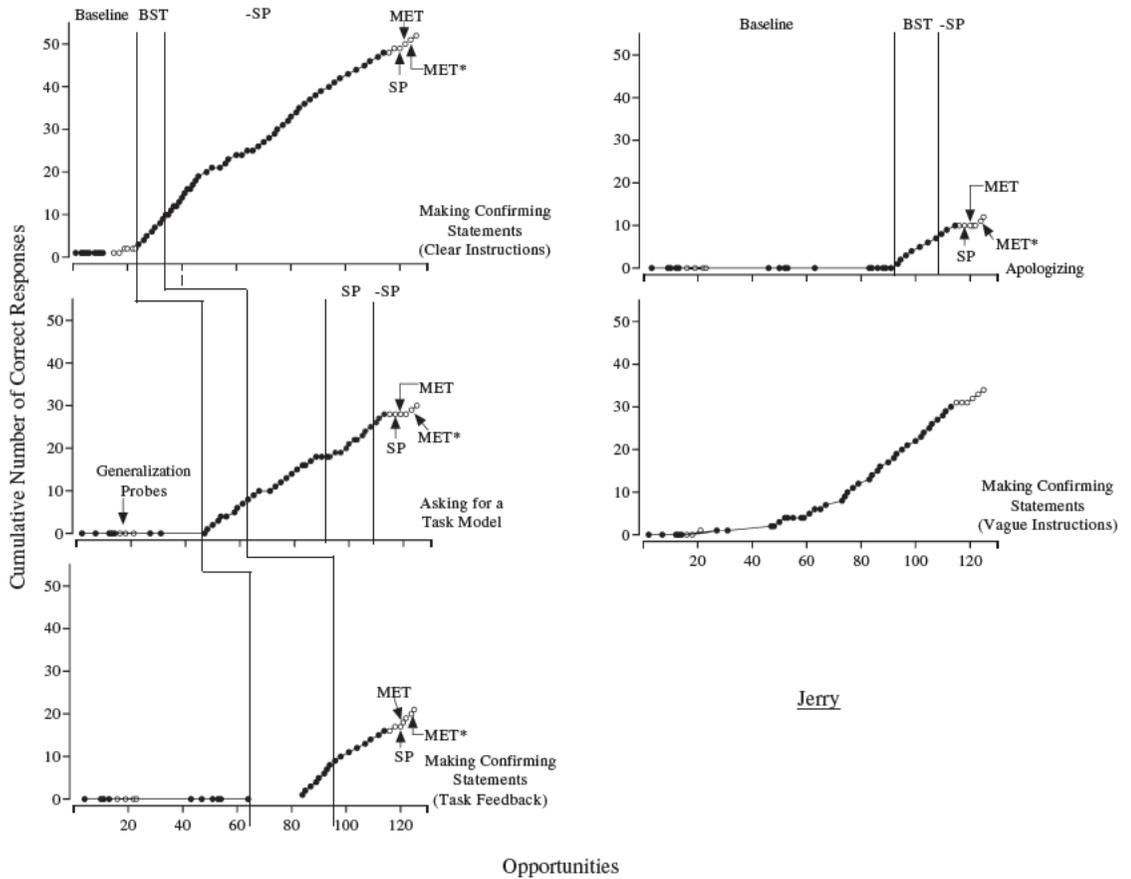


Figure 3. Cumulative number of correct responses for each job related social skill across opportunities during base line, intervention, and generalization for Jerry. BST = behavioral skills training; SP = removal of stimulus prompt; SP = reintroduction of stimulus prompt; MET = multiple exemplar training *trained use of stimulus prompt.

MET intervention, Jerry made confirming statements across both opportunities with the generalization supervisor.

The introduction of training for the second targeted skill (asking for a task model) also was associated with an increase in responding during work sessions. Responding maintained as the associated stimulus prompt was faded and removed from the work room. Rather than introduce a new intervention, the stimulus prompt was reintroduced at the lightest fading step when Jerry did not ask for a task model for two consecutive opportunities. Responding re-emerged, and it maintained when the prompt was removed again from the work sessions. However, Jerry did not ask for a task model during the generalization probe, even when the stimulus prompt was present in the generalization workroom, or following the initial MET intervention. He began to respond correctly in the generalization probes following the second MET intervention.

Training with his third target, making confirming statements in response to corrective task feedback, was initiated because increases in confirming statements in response to initial clear instructions (his first target) did not generalize to this evocative situation. Training extended across several appointments, during which the supervisor also conducted work sessions to provide opportunities to assess the other targeted skills before Jerry met the mastery criterion for this target. Immediately after training, correct responses emerged and maintained when the associated stimulus prompt was removed without an initial fade. Like his first target, Jerry emitted a correct response on his second opportunity to do so, but not on his first opportunity during the generalization probes. He also did not respond correctly when stimulus prompts were present in the generalization work room during his next appointment. Following both MET interventions, Jerry emitted correct responses during generalization probes.

Training for the fourth skill (apologizing) immediately produced correct responding, which maintained as the stimulus prompts were faded and then removed from the workroom. Jerry did not apologize during the generalization probes, even when the stimulus prompts were present both in the workroom and following the initial MET intervention. Following the second MET intervention, Jerry emitted correct responses during generalization probes. Finally, correct confirming statements in response to vague task instructions emerged during work sessions even though this response was never targeted within the context of this evocative situation (Figure 3, second right panel). Changes in this response appeared to correlate with those for confirming statements in the other evocative situations, suggesting the occurrence of generalization across evocative situations.

During initial baseline and generalization probes, Vanessa did not emit any correct responses (Figure 4). Following initial training and BST booster with the first skill (making confirming statements to initial clear instructions; top left panel), Vanessa emitted a correct response across 14 of 18 opportunities. She met the criterion to receive an additional intervention (antecedent prompts) after training had been introduced for a second social skill. Nonetheless, Vanessa's performance did not improve, so the supervisor introduced immediate feedback. Vanessa typically responded incorrectly during the first opportunity of the day, and then responded correctly across the remainder of opportunities during that day. Thus, we combined a monetary reinforcer (\$0.25) with feedback for every correct confirming statement (if Vanessa did not respond correctly, the supervisor delivered corrective feedback). Vanessa immediately began to respond correctly although responding became more variable when another social skill was targeted for intervention. She made confirming statements across 31 of 42 opportunities. Vanessa continued to make confirming

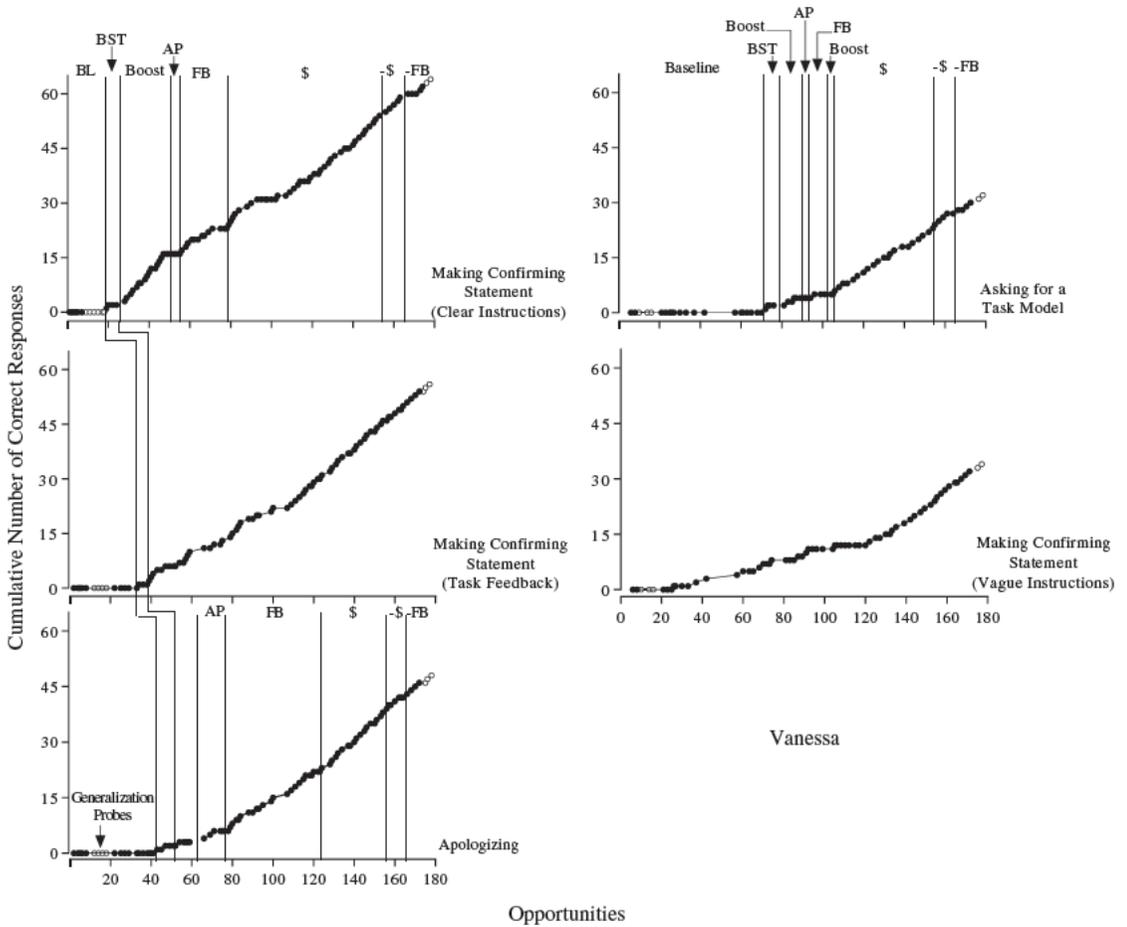


Figure 4. Cumulative number of correct responses for each job related social skill across opportunities during base line, intervention, and generalization for Vanessa. BL = baseline; BST = behavioral skills training; AP = antecedent prompt; FB = feedback; \$ = feedback plus tangible; -\$ = removal of tangible; -FB = removal of feedback.

statements when the monetary reinforcer was reduced to \$0.10, when the schedule was thinned to VR-2, and when the monetary reinforcer was removed from the work sessions. She continued to respond correctly when the schedule of immediate feedback was thinned to FR-2. Following the removal of immediate feedback, Vanessa's responding temporarily ceased to occur across three consecutive opportunities but then persisted across work sessions. She continued to make confirming statements to initial clear instructions during the generalization probes.

Training was initiated with a second target, confirming statements in response to corrective task feedback, because increases in confirming statements when given initial clear instructions (her first target) did not generalize to this evocative situation. Following initial training and the BST booster, Vanessa's performance improved and, although it was somewhat variable (i.e., she responded correctly across 48 of 62 opportunities), her performance never met the criterion to introduce additional interventions. During generalization probes, Vanessa did not emit a correct response on the first

opportunity, but she did so on the subsequent two opportunities.

Training for a third targeted skill (apologizing) was associated with correct responses, but Vanessa's performance subsequently met the criterion to receive the BST booster, antecedent prompts, immediate feedback, and tangible reinforcement. The introduction of tangible reinforcement was associated with more consistent performance. Responding maintained as we reduced the monetary amount and the frequency of reinforcement, and it continued to maintain when the tangible was no longer delivered. Subsequently, her responding became more variable as the supervisor thinned the schedule of immediate feedback to FR-2, but it maintained after the supervisor no longer provided feedback. During generalization probes, Vanessa did not apologize on the first opportunity, but did so on the next two opportunities.

Training on a fourth skill, asking for a task model, was initially associated with correct responses during work sessions but responding then met the criterion to introduce the BST booster, antecedent prompt, immediate feedback, and monetary reinforcement. At this point, Vanessa was often asking, "How?" instead of using the full question on the stimulus prompt ("Can you show me how?"). We were concerned that this question ("How?") would not necessarily evoke a model from a supervisor. Therefore, we changed the text to "Can you model it?" and implemented a BST booster so Vanessa could practice using the new statement. Following the BST booster, Vanessa consistently asked for a task model (i.e., 18 out of 21 opportunities in this phase). Performance maintained as the supervisor faded and then removed the monetary reinforcement and feedback. During generalization probes, Vanessa asked for a task model across both opportunities.

For the final social skill, Vanessa began to make confirming statements when given vague

task instructions even though this response was never targeted within the context of this evocative situation. Improvements in this response appear to correlate with those for confirming statements in the other evocative situations, suggesting the occurrence of generalization across evocative situations.

DISCUSSION

The current study extends prior research on the assessment and training of vocational skills for individuals with ASD. The social skills targeted for assessment and intervention included responses that may be critical to job success (e.g., asking for help) as well as more subtle responses that may positively impact an employee's relationship with supervisors (e.g., making confirming statements; apologizing). A relatively low-cost treatment package consisting of brief BST and stimulus prompts was effective in teaching multiple job-related social skills and promoting generalization to a different location and supervisor for two participants (Jerry and Arthur). One participant (Vanessa) did not perform three of four targeted responses consistently during work sessions until the supervisor introduced immediate monetary reinforcement, although responding maintained and generalized to a different location and supervisor when the consequences were removed.

Pilot work conducted prior to the study suggested that stimulus prompts would increase the likelihood that skills practiced during BST would generalize to work sessions. We included them as part of the intervention not only for this reason, but also because we hypothesized that they might increase the likelihood that the skills would generalize to a nontraining setting. Our results are consistent with this hypothesis because we did not observe generalization for one participant (Jerry) after we had faded stimulus prompts from his work sessions. We observed generalization for Jerry only after he

practiced using stimulus prompts during additional training sessions with the supervisor, and the stimulus prompts were available during the generalization probes. These findings point to the potentially important role of stimulus prompts in promoting generalization. It should be noted that simply making the stimulus prompts available in the nontraining setting was not adequate for Jerry after the prompts had been faded from the work sessions, perhaps because the prompts no longer exerted stimulus control over his behavior. On the other hand, it is possible that the prompts had never acquired stimulus control during the initial BST or posttraining work sessions.

Because stimulus prompts may be important to generalization, practitioners should identify prompt formats that would be easily transferrable to actual job sites. We briefly evaluated an alternative prompt format for one participant (Arthur) by reducing the size of the prompts and positioning them on a metal ring that could attach to his belt loop. Although these prompts would be readily accessible on the job, we did not observe Arthur using these prompts on an actual job (he was not employed at the time of the study), nor did we consider the social acceptability of this format to potential employers or coworkers. Prompts delivered via smart phones or watches may be more socially acceptable.

In addition to generalization across settings and supervisors, we observed possible generalization across evocative situations for a response that we targeted in multiple situations (i.e., confirming statements). However, participants did not always demonstrate generalization (e.g., confirming statements in response to feedback for Jerry and Vanessa). Furthermore, we did not observe generalization across similar responses, such as asking for a task model and asking for clear feedback (Arthur). These findings suggest that trainers should target each social response and include a variety of relevant evocative situations during BST.

We selected the initial intervention (BST plus stimulus prompts) by considering the ease with which practitioners could provide the training either at an off-site clinic or at the job site (e.g., in a conference room or office). Our goal was to identify a relatively nonintrusive intervention that would not require the behavior of others on the job (e.g., supervisors, coworkers). Although this intervention was effective for two of the three participants, Adam required a BST booster session for the majority of his targeted responses. This finding suggests that the criterion for terminating the initial training (six consecutive correct responses) was not sufficiently stringent. It should also be noted, however, that the criterion for adding additional treatment components (two consecutive incorrect responses) may have been overly conservative.

If the initial BST and subsequent booster BST session were not effective, we planned to sequentially introduce additional components that would require an increasing amount of "buy in" from the supervisor (i.e., from simple reminders to immediate feedback to monetary reinforcement). Just one of the three participants (Vanessa) received these planned, additional components. Results appeared to indicate that monetary reinforcement was most critical to the effectiveness of the intervention, although the study was not designed to determine the contribution of each component to the outcomes. Contingent monetary reinforcement is a relatively intrusive intervention, so it was important to evaluate whether Vanessa's responding would maintain once the supervisor removed all intervention components. Her responding maintained and generalized to the nontraining setting and supervisor, albeit for the relatively short duration of this evaluation. Further research is needed to determine the practicality of this approach to intervention, the durability of responding over time, and the acceptability of these procedures to employers. Further studies also might evaluate ways to

modify our initial assessment to identify which, if any, of these additional treatment components would be needed.

Unlike the other participants, Arthur initially had difficulty differentiating between clear and vague instructions. Thus, he did not ask for a task model under the relevant evocative situation. The planned, additional components (as implemented with Vanessa) did not seem well suited for teaching this relatively complex discrimination. Instead, we used stimulus prompts to teach Arthur to ask and answer two simple questions: (a) Have I done this task here before? and (b) Has the supervisor given me an example? This strategy, similar to “self-instruction” as described in prior research (e.g., Agran, Salzberg, & Stowitschek, 1989), produced an immediate increase in correct responding even after the stimulus prompts were faded from the work sessions. Agran *et al.* (1989) taught five individuals with severe to moderate intellectual disabilities how to ask for help when needed (e.g., when the participant ran out of materials or was missing materials). The intervention, which consisted of BST plus self-instruction (vocalizing what he or she should do), not only increased requests for help in the training room but was associated with increases in requests in a separate work setting. Although we could not determine if Arthur continued to ask himself the questions after we faded the stimulus prompts, we noticed a possible public accompaniment to this private event. Arthur independently began to place his finger to his temple after the supervisor had instructed him to read and answer the questions silently. He continued to engage in this behavior even after the supervisor no longer placed the stimulus prompt in the room.

We selected specific social responses for the assessment and intervention by drawing from results of prior research on employees with developmental disabilities (Butterworth & Strauch, 1994; Cheney & Foss, 1984; Greenspan & Shoultz, 1981), surveys of employers

(e.g., Foss & Peterson, 1981; Ju, Zhang, & Pacha, 2012; McConaughy, Stowitschek, Salzberg, & Peatross, 1989; Salzberg, Agran & Lignugaris/Kraft, 1986), and commercially available assessment and curriculum guides (e.g., Montague & Lund, 2009; Partington & Mueller, 2015). However, additional research is needed to evaluate the social validity of some relatively subtle social responses targeted in this study, such as making confirming statements in response to instructions and apologizing in response to corrective feedback. We hypothesize that these responses, as defined and taught in this study, would improve social relationships with employers. However, further research is needed to determine if these particular social responses improve employment outcomes.

Another consideration is that we taught participants to ask for a task model instead of asking specific questions about the task or asking for a verbal explanation of the task when they did not understand how to complete a task. Although this may not be typical of most employees, we took this approach for several reasons. First, we felt that our participants would be more likely to complete tasks correctly if the supervisor demonstrated tasks rather than verbally explained them. Second, in baseline, Vanessa and Jerry typically did not ask the types of questions that would reliably evoke information needed to complete the task correctly (e.g., they asked questions about certain aspects of the task but not critical aspects). Teaching participants how to ask all necessary task-specific questions seemed too complex for brief BST intervention, considering the myriad of possible tasks they might complete in future employment. We also believed that supervisors would find it easier to understand Jerry if he emitted a simple statement or question (e.g., “Can you demonstrate the task?”) due to his speech difficulties.

Although responses generalized to a different location and supervisor, we conducted all training and generalization sessions on the grounds

of a university and within the context of a simulated work environment. Further research is needed to evaluate the outcomes when this training is provided either on or off the job site while an individual is employed, so that performance can be evaluated within the context of an actual job setting. If intervention is provided prior to the employment, the likelihood that skills will maintain until the person is employed also should be assessed in future studies. Unfortunately, none of the participants in the current study had secured employment before the conclusion of the project. Finally, additional research is needed on alternatives to BST, such as video instruction or modeling (Allen, Wallace, Renes, Bowen, & Burke, 2010). Although potentially costly, this may further reduce the need for support services on the job site.

Given the importance of employment to independence and quality of life, more research and clinical services are needed to improve the vocational outcomes of adults with ASD. Programs that target job-related social skills in high school or earlier may give these individuals an even greater advantage. Although job-specific skills may be critical for securing that first job, so-called "soft skills" that pertain to interactions with supervisors and coworkers are likely crucial for maintaining employment.

REFERENCES

- Agran, M., Salzberg, C.L., & Stowitschek, J.J. (1989). An analysis of the effects of a social skills training program using self instructions on the acquisition and generalization of two social behaviors in a work setting. *The Journal of the Association for Persons with Severe Handicaps*, *12*, 131-139.
- Allen, K. D., Wallace, D. P., Renes, R., Bowen, S. L., & Burke, R. V. (2010). Use of video modeling to teach vocational skills to adolescents and young adults with autism spectrum disorders. *Education and Treatment of Children*, *33*, 339-349. <https://doi.org/10.1353/etc.0.0101>
- American Psychiatric Association. (2000). *Diagnostic and statistical manual text revision* (p. 256). Washington, DC: American Psychiatric Association.
- Anderson, A., Moore, D. W., Rausa, V. C., Finkelstein, S., Pearl, S., & Stevenson, M. (2017). A systematic review of interventions for adults with autism spectrum disorder to promote employment. *Journal of Autism and Developmental Disorders*, *4*, 26-38. <https://doi.org/10.1007/s40489-016-0094-9>
- Barneveld, P. S., Swaab, H., Fagel, S., van Engeland, H., & de Sonnevile, L. M. J. (2014). Quality of life: A case controlled long term followup study, comparing young high functioning adults with autism spectrum disorders with adults with other psychiatric disorders diagnosed in childhood. *Comprehensive Psychiatry*, *55*, 302-310. <https://doi.org/10.1016/j.comppsy.2013.08.001>
- Burgess, S., & Cimera, R. E. (2014). Employment outcomes of transition aged adults with autism spectrum disorders: A state of the states report. *American Journal on Intellectual and Developmental Disabilities*, *119*, 64-83. <https://doi.org/10.1352/1944-7558.119.1.64>
- Burke, R. V., Andersen, M. N., Bowen, S. L., Howard, M. R., & Allen, K. D. (2010). Evaluation of two instruction methods to increase employment options for young adults with autism spectrum disorders. *Research in Developmental Disabilities*, *31*, 1223-1233. <https://doi.org/10.1016/j.ridd.2010.07.023>
- Butterworth, J., & Strauch, J. D. (1994). The relationship between social competence and success in the competitive work place for persons with mental retardation. *Education and Training in Mental Retardation and Developmental Disabilities*, *29*, 118-133.
- Chen, J. L., Leader, G., Sung, C., & Leahy, M. (2015). Trends in employment for individuals with autism spectrum disorder: A review of the research literature. *Review Journal of Autism and Developmental Disorders*, *2*, 115-127. <https://doi.org/10.1007/s40489-014-0041-6>
- Cheney, D., & Foss, G. (1984). An examination of the social behavior of mentally retarded workers. *Education and Training of the Mentally Retarded*, *19*, 216-221.
- Dotson, W. H., Richman, D. M., Abby, L., Thompson, S., & Plotner, A. (2013). Teaching skills related to self employment to adults with developmental disabilities: An analog analysis. *Research in Developmental Disabilities*, *34*, 2336-2350. <https://doi.org/10.1016/j.ridd.2013.04.009>
- Foss, G., & Peterson, S. L. (1981). Social interpersonal skills relevant to job tenure for mentally retarded adults. *Mental Retardation*, *19*, 103-106.
- Glutting, J., Adams, W., & Sheslow, D. (2000). *Wide Range Intelligence Test [Measurement instrument]*. Wilmington, DE: Wide Range.
- Greenspan, S., & Shoultz, B. (1981). Why mentally retarded adults lose their jobs: Social competence as a factor in work adjustment. *Applied Research in Mental Retardation*, *2*, 23-38. [https://doi.org/10.1016/0270-3092\(81\)90004-7](https://doi.org/10.1016/0270-3092(81)90004-7)
- Hendricks, D. (2010). Employment and adults with autism spectrum disorder: Challenges and strategies

- for success. *Journal of Vocational Rehabilitation*, 32, 125-134. <https://doi.org/10.3233/JVR.2010.0502>
- Hood, S. A., Luczynski, K. C., & Mitteer, D. R. (2017). Toward meaningful outcomes in teaching conversation and greeting skills with individuals with autism spectrum disorder. *Journal of Applied Behavior Analysis*, 50, 459-486. <https://doi.org/10.1002/jaba.388>
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry*, 45, 212-229. <https://doi.org/10.1111/j.1469.7610.2004.00215.x>
- Ju, S., Zhang, D., & Pacha, J. (2012). Employability skills valued by employers as important for entry level employees with and without disabilities. *Career Development for Exceptional Individuals*, 35, 29-38. <https://doi.org/10.1177/0885728811419167>
- Kellems, R. O., & Morningstar, M. E. (2012). Using video modeling delivered through iPods to teach vocational tasks to young adults with autism spectrum disorders. *Career Development and Transition for Exceptional Individuals*, 35, 155-167. <https://doi.org/10.1177/0885728812443082>
- Lattimore, L. P., Parsons, M. B., & Reid, D. H. (2008). Simulation training of community job skills for adults with autism: A further analysis. *Behavior Analysis in Practice*, 1, 24-29. <https://doi.org/10.1007/BF03391717>
- Lerman, D.C., White, B., Grob, C., & Laudont C. (2017) A clinic based assessment for evaluating job related social skills in adolescents and adults with autism. *Behavior Analysis in Practice*, 10, 323-336. <https://doi.org/10.1007/s40617.017.0177.9>
- McConaughy, E. K., Stowitschek, J. J., Salzberg, C. L., & Peatross, D. K. (1989). Work supervisors' ratings of social behaviors related to employment success. *Rehabilitation Psychology*, 34, 3-15. <https://doi.org/10.1037/h0091703>
- Montague, M., & Lund, K. (2009). *Job related social skills: A curriculum for adolescents with special needs*. Reston, VA: Exceptional Innovations, Inc.
- Montgomery, J., Storey, K., Post, M., & Lemley, J. (2011). The use of auditory prompting systems for increasing independent performance of students with autism in employment training. *International Journal of Rehabilitation Research*, 34, 330-335. <https://doi.org/10.1097/MRR.0b013e32834a8fa8>
- Nuernberger, J. E., Ringdahl, J. E., Vargo, K. K., Crumpecker, A. C., & Gunnarsson, K. F. (2013). Using a behavioral skills training package to teach conversation skills to young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 7, 441-417. [doi:https://doi.org/10.1016/j.rasd.2012.09.004](https://doi.org/10.1016/j.rasd.2012.09.004)
- Palmen, A., & Didden, R. (2012). Task engagement in young adults with high functioning autism spectrum disorders: Generalization effects of behavioral skills training. *Research in Autism Spectrum Disorders*, 6, 1377-1388. <https://doi.org/10.1016/j.rasd.2012.05.010>
- Palmen, A., Didden, R., & Lang, R. (2012). A systematic review of behavioral intervention research on adaptive skill building in high functioning young adults with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 6, 602-617. <https://doi.org/10.1016/j.rasd.2011.10.001>
- Partington, J. W., & Mueller, M. M. (2015). *The assessment of functional living skills vocational skills assessment protocol: An assessment, skills tracking system, and curriculum guide for skills that are essential for independence*. Pleasant Hill, CA: Behavior Analysts, Inc., and Marietta, GA: Stimulus Publications.
- Salzberg, C. L., Agran, M., & Lignugaris/Kraft, B. (1986). Behaviors that contribute to entry level employment. A profile of five jobs. *Applied Research in Mental Retardation*, 7, 299-314. [https://doi.org/10.1016/S0270.3092\(86\)80003.0](https://doi.org/10.1016/S0270.3092(86)80003.0)
- Seaman, R. L., & Cannella Malone, H. I. (2016). Vocational skills interventions for adults with Autism Spectrum Disorder: A review of the literature. *Journal of Developmental and Physical Disabilities*, 28, 479-494. <https://doi.org/10.1007/s10882.016.9479.z>
- Shattuck, P. T., Narendorf, S. C., Cooper, B., Sterzing, P. R., Wagner, M., & Taylor, J. L. (2012). Postsecondary education and employment among youth with an autism spectrum disorder. *Pediatrics*, 129, 1042-1049. <https://doi.org/10.1542/peds.2011.2864>
- Sparrow, S., Cicchetti, D., & Balla, D. (2005). *Vineland Adaptive Behavior Scales 2nd Edition [Measurement instrument]*. Minneapolis: NCS Pearson Inc.
- Stokes, T. F., & Osnes, P. G. (1989). An operant pursuit of generalization. *Behavior Therapy*, 20, 337-355. [https://doi.org/10.1016/S0005.7894\(89\)80054.1](https://doi.org/10.1016/S0005.7894(89)80054.1)
- Watanabe, M., & Sturmey, P. (2003). The effect of choice making opportunities during activity schedules on task engagement of adults with autism. *Journal of Autism and Developmental Disorders*, 33, 535-538. <https://doi.org/10.1023/A:1025835729718>
- Wechsler, D. (1997) *Wechsler Adult Intelligence Scale 3rd Edition [Measurement instrument]*. San Antonio, TX: Harcourt Assessment

Received July 1, 2017

Final acceptance October 5, 2017

Action Editor, Claire St. Peter