

POSITIVE RELATIONSHIP DEVELOPMENT AND THE ACQUISITION OF  
COMMUNICATION AND TASK COMPLIANCE FOR INDIVIDUALS WITH PROFOUND  
INTELLECTUAL DEVELOPMENTAL DISABILITIES

BY

C2010

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Submitted to the graduate degree program in Applied Behavioral Science  
and the Graduate Faculty of the University of Kansas in partial fulfillment of the  
requirements of Master's of Arts

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Date defended: April 13, 2010

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## **Abstract**

Staff members who provide care for people with severe intellectual disabilities often face a number of obstacles because the people they serve may have few communicative skills, may not engage in appropriate behaviors, and frequently display challenging behaviors such as self-stimulation, self-injury, and aggression. The purpose of this study was to evaluate the effectiveness of a “relationship development” procedure in teaching three participants diagnosed with profound intellectual disabilities to approach a teacher, to use manual signs to gain access to highly preferred consequences, and then to follow simple instructions in order to gain access to the highly preferred consequences. The procedures were effective in teaching all three participants all three skills. Although the participants’ challenging behaviors such as self-injury and aggression were not directly addressed, the frequency of the participants’ challenging behavior decreased substantially.

## Positive Relationship Development and the Acquisition of Communication and Task Compliance for Individuals with Profound Intellectual Developmental Disabilities

Working with individuals with intellectual disabilities can be extremely rewarding; direct-care staff, however, also face numerous difficulties when helping this population. Staff members often work long shifts for relatively small salaries. During those shifts, staff not only care for the consumers' general well being, they also cook meals, clean the residence, implement intervention plans, record data, and complete the necessary paperwork. Additional hurdles for staff members include interpreting consumers' needs when they have little or no communicative abilities and dealing with problem behavior that may cause harm to both staff and consumers.

Thus, staff members may experience stress because of the high number of demands placed on them (Rose, Jones, & Fletcher, 1998b) as well as low senses of accomplishment (Stevens & O'Neill, 1983). The consequences of staff members experiencing high levels of stress are that they are less likely to interact with consumers, less likely to have positive interactions with consumers when they do interact, and may engage in fewer personal care tasks for consumers (Rose, Jones, & Fletcher, 1998a).

One approach to improving the satisfaction of both staff members and consumers is to provide an engaging and humane environment (Favell & McGimsey, 1993) in which consumers willingly participate in appropriate activities and learn new skills. Such environments may not only provide multiple opportunities for participation but also frequent opportunities for natural teaching and exploratory play (Favell & McGimsey, 1993). Additionally, it is likely that the challenging behaviors of consumers will decrease not only because the consumers are participating in more appropriate activities, but also because they may be receiving higher rates of positive reinforcement for their participation (Horner, 1980). Although creating and

maintaining engaging environments is not easy, an essential building block of such environments is the relationships between staff members and the consumers they serve.

Rapport or positive relationships has been defined as a relationship that fosters closeness, a mutual liking for both parties, and empathy (Carr, et al., 1994). Researchers have demonstrated that the development of positive relationships is beneficial for both consumers and staff members. First, the development of positive relationships fosters a therapeutic living environment (Singh, et al., 2006). Additionally, researchers have shown that positive interactions with staff members may produce high levels of happiness (e.g., smiling, laughing) and low levels of unhappiness (e.g., crying, whining) in consumers with intellectual disabilities (Favell, Realon, & Sutton, 1996).

There is no exact science or methodology for developing procedures for building positive relationships between staff members and consumers. The artistry involved in the development of rapport makes it extremely difficult to teach and empirically evaluate. Many different investigators have attempted to develop procedures to improve relationships between staff and consumers. The first suggested phase in positive relationship development focuses on identifying consumers' preferences and making those preferences readily available (Carr, et al., 1994). Leaf and colleagues (2008), for example, propose that staff members provide preferred activities such as toys, music, and games noncontingently to build connections with children with autism. Additionally, they suggest that staff members interact with the child while he or she is engaging with these preferred items, show interest in what the child is doing, and even show the child new ways of interacting with preferred items. Delivering preferred items noncontingently may establish staff members as conditioned (generalized) reinforcers. Similarly, Carr et al. (1994) suggest that staff members establish themselves as signals for



reinforcement by identifying preferred activities and items and giving these reinforcers away for free (noncontingently). Consumers learn to associate staff members with positive experiences. Pairing preferred items with staff members may create staff members as discriminative stimuli for social interactions (Magito-McLaughlin & Carr, 2005). If consumers begin to attend to staff members when they are nearby, laugh and smile when staff are present, spend large amounts of time near staff, and engage in spontaneous interactions, it is likely that the staff members have created themselves as conditioned reinforcers (Carr, et al., 1994).

The next step in building positive relationships is to teach consumers that they can affect environmental consequences by appropriately communicating their desire to access preferred items without engaging in problem behavior (Carr, et al., 1994). During this phase of relationship development, consumers must now view staff as not only as a discriminative stimulus for the availability of attention and other reinforcers, but also an opportunity for social interaction and communication.

Increasing staff-consumer interactions increases opportunities to conduct natural teaching in developing effective communication. Many individuals with intellectual developmental disabilities have little or no expressive language (Berkson & Landesman-Dwyer, 1977). As noted by Garcia and DeHave (1974), 75-80% of people with profound intellectual disabilities have little to no expressive vocabulary. Thus, teaching communication is an extremely important and in the relationship development procedures comes immediately after consumers readily seek out and stay in close proximity to staff members. Once consumers are reliably approaching staff, staff should delay briefly before providing the preferred items in hopes of evoking any type of a communication response (e.g., manual sign, gesture, picture exchange). If the consumer does not make a request during the delay, staff members can prompt the consumer to display a

communication response and then provide the preferred item. As the consumer becomes more consistent with his or her communication responses, prompting techniques should be faded as quickly as possible (Carr, et al., 1994), until a consumer approaches staff members frequently, displays a communication response, and receives a preferred item.

Natural teaching interactions such as the ones describe above have been extremely successful in teaching language to individuals with intellectual disabilities. Hart and Risley (1975) described a methodology, called incidental teaching, that uses natural teaching opportunities to increase language. Incidental teaching refers to interactions between staff and consumers that arise naturally in the environment in an unstructured situation. For example, if a child is reaching for an item on a shelf that is out of reach, it can be used as a natural teaching opportunity. In order to gain access to the item on the shelf, the child may be required to vocalize and attend to the adult for several seconds before the adult will remove the item from the shelf. Hart and Risley reported that incidental teaching was effective at teaching language to children by utilizing situations that were initiated by the children. Additionally, Peck (1985) reported that children with intellectual developmental disabilities/autism were more likely to use spontaneous language when they were exposed to naturalistic teaching procedures that consisted of (a) providing choices (b) reacting to child initiations (c) providing cues for communication and (d) elaborating on communicative responses.

Teaching consumers to approach staff members, then, often provides a number of “naturalistic” opportunities to develop the consumers’ “communicative” responses by prompting them, for example, to point to an item they want from a display of available food or items, to vocalize, or make manual signs to indicate activities they might enjoy. If consumers have very high rates of approaching staff members and requesting items, however, this may place a

considerable time demand on staff members. Thus, the next step in the process is to begin to teach consumers not only to approach staff members and request items, but begin to do simple tasks in order to gain access to the items that the consumers requested. The initial tasks that are asked of the consumers need to be ones that only take a short time and are highly likely to be completed, at which time the requested item or items are given to consumers. During continued teaching, the time required to complete each task and the difficulty of the tasks can be very gradually increased.

This teaching sequence is very similar to one implemented by Johnson (2004) with an adolescent with autism and by Magito-McLaughlin and Carr (2005) with individuals living in group homes. Johnson (2004) taught approach and communication responses by placing preferred items that were visible to the participant but out of her reach. When the participant displayed interest in the preferred item and approached the investigator, the participant was prompted to get the investigator's attention and to form the communicative response that matched the preferred item. After the participant was independently forming signs for preferred items, investigators required the participant to complete a task or follow an instruction before accessing the requested preferred item. As the participant independently completed tasks, the difficulty of tasks was slowly increased. A unique aspect to this study was that the participant not only practiced these skills with the investigator, but she also with her mother. Having the mother participating in teaching was essential because the majority of the participant's aggression was directed toward the mother. The investigators reported that the participant was able to communicate or request for over three different types of preferred items and was able to follow a variety of instructions ranging in difficulty before accessing those preferred items.

Most importantly, the participant's problem behavior was significantly reduced after communication and compliance training.

Magito-McLaughlin and Carr (2005) assessed how building positive relationships between staff and consumers living in group homes affected their interactions, consumer communicative responses, rates of problem behavior, and turn-taking opportunities. The investigators had staff members rate their relationships with consumers as good or bad. The investigators then identified staff-consumer dyads who had poor rapport on the basis of staff reports and direct observations and introduced relationship development training. Staff members delivered preferred items noncontingently to consumers in order to evoke an approach response. After consumers were consistently approaching staff members, staff were coached to start acknowledging consumers' communication attempts. Consumers were not taught any new communication skills, but staff were prompted to use environmental clues to assess what the consumers might be requesting and adhere to their requests/needs whenever possible. In addition to acknowledging communication attempts, staff-consumer dyads worked on turn-taking skills in the context of an equally preferred activity. Turn-taking involved the development of a task analysis for participating in a preferred activity and prompting each dyad to equally complete the sequence of steps needed to complete the activity. Magito-McLaughlin & Carr (2004) reported that all consumers made approach responses to previously non-preferred staff members. Additionally, staff members attended to 88-100% of consumers' communicative responses after an approach. All dyads were able to participate in equally preferred activities, taking turns to complete activities on 80-100% of opportunities. Problem behavior was also less likely to occur with staff members during the rapport building sessions. Staff who had participated in rapport building were more likely to be chosen by consumers for work partners

and rated their own interactions with consumers as pleasurable. Additionally, staff who participated in the rapport development procedures were viewed more favorably by other staff members. The authors concluded that rapport building may not reduce problem behavior to zero rates, but may promote more adaptive behavior and less maladaptive behavior.

The two studies described above have produced desirable outcomes. The first is that the consumers have been taught an appropriate way to request items and activities that they want. The second is that the consumers were taught new skills, some of which may be useful in expanding the functional repertoires of consumers. Examples might be taking turns with other people, dressing themselves, doing their own laundry (or part of their laundry), engaging in exercise periods to foster better health, and grooming skills. The third is a possible reduction in challenging behaviors. This outcome was found by both the study by Johnson (2004) and the study by Magito-McLaughlin and Carr (2005). Possibly the reason for the decrease in problem behavior is because consequences that are currently maintaining problem behaviors are now available to consumers when they approach a staff member and request of the items or activities. If this is the case, approaching a staff member and making a request is essentially a functionally alternative behavior and might be expected to reduce problem behavior.

There are, at the same time, some potential disadvantages or risks involved in implementing the procedures of teaching consumers to approach a staff member, request an item or activity, and perform a task to gain access to the item or activity. First, there may be a period of time during which consumers may approach staff members at a very high rate, limiting the ability of the staff members to perform other duties. This may be partially mitigated by implementing the procedures with only one consumer at a time. Second, if the requirements placed on the consumer are too lengthy or stringent early in teaching a communicative response

or a task after the consumer has displayed a communicative response, consumers may often display any of the various challenging behaviors that are already in their repertoires. The occurrence of challenging behavior during the process of teaching typically means that the response requirements for obtaining the desired item or activity have been increased too rapidly and/or there is too lengthy a time between the consumer's request and the delivery of the requested item or activity requested. In this case, the difficulty of the task and/or the item between the consumer's request and the delivery of the requested item or activity needs to be reduced before it is then more gradually increased.

The procedures used in both the Magito-McLaughlin and Carr (2005) and the Johnson (2004) studies provide outlines of procedures that can be used for relationship development for individuals with intellectual developmental disabilities. In these studies, researchers attempted to reduce the occurrence of problem behavior; most participants, however, already displayed some forms of communicative behavior and, thus, required relatively little teaching on the part of the investigators. The researchers in the present study attempted to replicate the findings in the Johnson (2004) study with participants who were diagnosed with profound intellectual developmental disabilities, had no obvious communicative abilities, rarely engaged in appropriate activities, engaged in high rates of problem behavior (e.g., aggression and self-injury), and were living in residential community group homes. We investigated the effects of developing positive relationships on the amount of time participants spent in proximity to the investigator, the acquisition of communicative signs, compliance on tasks of varying difficulty, and the effects on problem behaviors. Additionally, the investigators evaluated whether participants would complete tasks for no reinforcement after he or she had developed a relationship with the primary investigator.

## **Method**

### **Participants**

Individuals were recruited from a not-for-profit organization that serves individuals with severe intellectual developmental disabilities in the mid-western United States. Individuals were asked to participate in the study if they had no formal communication system (spoken, symbolic, or signed) and rarely engaged in appropriate daily activities. Approval from the university and organizational review boards and parental or legal guardian informed consent were obtained before beginning.

At the start of the study, Kara was 49 years old and was diagnosed with profound mental retardation and a seizure disorder. Kara had several additional medical conditions, scoliosis and lymphodema, that did not affect her participation in this study. Kara used some manual signs and gestures to interact with staff members; the frequency in which she engaged in appropriate communication responses, however, was inconsistent. Kara engaged in several topographies of aggression including hair pulling, pushing, biting, hitting, and pinching other people. Ellen was 60 years old at the beginning of the study and was diagnosed with Down syndrome and profound mental retardation. Ellen also had a chronic pulmonary disease that required frequent hospitalizations and eventually lead to her death while participating in this study. Ellen communicated by using gestures and whining until staff members attended to her. Ellen engaged in severe self-injury which included hair-pulling, self-kicking, self-hitting, self-scratching and high frequencies of throwing items when presented with demands. Bob was 56 years old at the start of the study and was diagnosed with profound mental retardation, Intermittent Explosive Disorder, a Pervasive Developmental Disorder, anxiety, and obsessive-compulsive behavior. Bob used eye contact and body positioning to communicate with staff members (e.g., standing in

front of the refrigerator when he was hungry). Bob engaged in high rates of throwing items and pushing others.

### **Setting**

Sessions took place in the participants' homes. Kara lived in a residential group home that served three additional consumers. Kara's sessions were also conducted at a day center located in the community. Ellen and Bob lived in Family Teaching Model homes (Phillips, Phillips, Fixsen, & Wolf, 1974; Phillips, Phillips, Wolf, & Fixsen, 1973) that also served up to three additional consumers. Sessions took place in the participants' kitchens and living areas. Each session last approximately 20 min and was conducted at least three times a week.

### **Measures of Behavior**

**Approach Responses.** The investigator chose approach responses as one measure of rapport because this required the participants to approach and be in close proximity to the investigator and involved a discrete and measurable response. For both Kara and Bill, approach responses were defined as any instance where the participants took at least one step toward the investigator in order to be close enough to tap her on the arm below the shoulder and taped her on the arm. When Ellen began participating in the study, she was able to walk with the assistance of a walker. Shortly after starting the study, Ellen was no longer able to be mobile on her own without assistance. For Ellen's safety, her approach response was to scoot down the length of the couch and tap the investigator on the arm or shoulder.

**Communicative Signs.** An independent communicative sign was defined as any instance where the participants approached the investigator, tapped her on the arm, and independently formed and exhibited a sign (derived from American Sign Language) that matched a visible preferred item within 10 s of the investigator's question "What do you want?" A prompted



communication response was defined as any instance where the participants approached the investigator, tapped her on the arm, but required a physical or model prompt from the investigator in order to form and exhibit the sign that matched a visible preferred item. (See Table 1 for operational definitions of communicative signs).

**Following Instructions.** Following instructions was defined as any instance where a participant approached the investigator, tapped her on the arm, requested an item and then completed a task the investigator asked him or her to initiate within 10 s of the investigator's instruction. A prompted response was any instance in which the participant needed a physical or model prompt to either initiate or complete the entire task requested of him or her.

**Problem Behavior.** An instance of problem behavior was recorded if Kara engaged in or attempted to hit (open-palmed), hair-pull, bite, pinch, or push the investigator. An instance of problem behavior was recorded if Ellen engaged in any form of self-injury, which included hair-pulling, self-scratching, self-hitting, or self-kicking. Additionally, any instance where Ellen threw any teaching materials or pushed items off a surface and onto the floor was scored as problem behavior. Instances of problem behavior were recorded if Bob pushed the investigator with two hands while making a grunting. Bob frequently touched people who were in his home. To distinguish between Bob's frequent touching and pushing, Bob had to grunt while pushing the investigator with two hands forcing the investigator to take at least one step backward. Additionally, throwing any teaching materials or pushing items onto the floor was recorded as problem behavior.

## **Procedures**

**Preference Assessment.** A range of 5-10 preferred items/activities were identified for each participant through direct observation and informal staff interviews. The investigators used

a reinforcer sampling procedure to identify the participants' most preferred items/activities. Participants were given a single preferred item/activity and were able to sample the item/activity for 3 min. Duration of engagement with each item/activity was recorded. Participants were given three opportunities to sample each item/activity presented in a random order for 3 min. For edible items, the investigator either placed a food item on a plate or poured a drink into a glass noncontingently every 15 seconds, if the participant continued to consume the items it was scored as "engagement". The activities/items with which the participants engaged the most (longest duration) were chosen to use during the course of the study. Kara's preferred items included diet soft drinks, listening to music, and spending one-on-one time with the investigator. Ellen's preferred items were snacks (e.g., protein shakes, pudding, etc.) and hugs from the investigator. Bob's preferred items were food (e.g., potato chips, popcorn, etc.) and drinks (e.g., soft drinks, soy milk, etc.) (See Figure 1).

**Task Assessment.** For the tasks to be taught or used as generalization tasks, the investigators identified 16 different tasks and activities for each participant by informally interviewing staff members and reviewing the participants' Quality of Life Plans. The types tasks/activities ranged from completing chores around the house (e.g., folding laundry) to leisure activities (e.g., completing a puzzle). Participants were given 5 opportunities to engage in each of 16 tasks/activities that the investigator randomly presented. Participants were given no instructions on how to complete the task/activity nor were they given feedback on their performance on the task/activity. The investigators calculated the percent of tasks that the participants were able to complete independently across the five trials for each of the 16 tasks/activities. Tasks/activities were then divided into four groups of "difficulty" with four tasks in each group: "A" tasks were ones that participants were able to

complete independently 75-100% of the time, “B” tasks were ones that the participants were to complete independently 50-74% of the time, “C” tasks were those that participants completed independently 20-49% of the time, and “D” tasks were those that participants completed independently 0-19% of the time. Tasks were further divided into teaching tasks and generalization tasks to determine which tasks the participants would be directly taught over the course of the study. Tasks were selected randomly to be teaching tasks or generalization tasks within each group (“A”, “B”, “C”, “D”) such that each group had two teaching tasks and two generalization tasks (see Table 2).

**Generalization Probes.** Prior to each session, four tasks (one from “A”, “B”, “C”, “D” tasks) were randomly selected. Participants’ performance on these tasks was probed at the beginning, middle, or end of each session. The four tasks were presented in a random order and no feedback was provided as to how to complete the task or on the participants’ performance. Additionally, once participants were being taught to engage in tasks in the “Following Instructions” phase of the study, the task that was being taught was also probed during that session. Thus, during the “Following Instructions” phase, five tasks were probed: the four tasks from categories “A”, “B”, “C” task, and “D”, and the task currently being taught. After teaching the final “D” task, 2-week, 5-week, and 10-week follow-up probes were conducted on all 16 tasks. A 2-week follow-up probe was not conducted for Bob, since he was hospitalized during that period. Follow-up probes were not collected on Ellen, since she did not progress further than the “Communication” phase of this study.

**Baseline.** No reinforcers were delivered for participants approaching the investigator or for the use of communicative signs. Baseline sessions were conducted until the frequency of

approach and communicative signs were stable and until at least four generalization probes had been conducted for each of the 16 tasks.

**Teaching Approach Responses.** Teaching periods were 19 minutes in length (excluding all times when participants were in possession of one of their preferred items) and consisted of two alternating conditions: shaping periods and noncontingent reinforcement periods. Each shaping period was 1 min long. During the shaping periods no reinforcers were visible to a participant. If the participant approached the investigator without a preceding prompt or made an unprompted approximation to approaching the investigator (e.g., walked toward or reached for the investigator) the investigator provided social praise (e.g., “Great”, “Wonderful”, “Thanks for coming over”) and delivered a (randomly chosen) item that was preferred by the participant. Because of the difficulty in teaching approach responses with Bob, during the 1 min shaping periods, his preferred items were made visible for him. Each noncontingent reinforcement period was 5 min in length. During noncontingent reinforcement periods, the preferred items for each participant were visible to the participant. Every 30 seconds, the investigator gave the participant one of the participant’s preferred items (chosen randomly) to have for 30 seconds, after which the investigator took the preferred item back (unless it was an edible item and the participant had eaten the item). Then, the investigator gave the participant another of his or her preferred items. The purpose of the probe periods was to evaluate the extent to which unprompted approach responses were being developed. The purpose of the noncontingent reinforcement periods was to increase the likelihood of approach responses by each participant (as has been found by Carr et al., 1994). Participants were required to make at least one independent approach response during 3 of the 4 1-min probes, in order to proceed to the next phase of teaching approach responses.

Once participants mastered the approach response, the investigators no longer delivered preferred items noncontingently. Instead, the preferred items were never visible to the participants, including Bob, and participants had to approach the investigator to gain access their preferred items. Participants could approach the investigator as many times as they wanted during a 20-min session (excluding any time that the participant was consuming reinforcers). After an independent approach response, the investigator provided social praise (“Thanks for getting my attention!”) and a randomly chosen preferred item was given to participants. Mastery criterion for approach responses during this phase was at least 10 independent approach responses (approximately one every 2 min) per session for three consecutive sessions.

**Communicative Signs.** After participants had met mastery criterion for approach responses, communicative signs were taught. The purpose of this was to develop the communicative skills of participants so that they would approach the investigator, and in response to the investigator’s question, “What do you want?”, make a communicative response indicating which one of their preferred items they wanted. Kara’s three communicative signs were for requesting music, attention, and a drink, Ellen’s two communicative signs were for requesting snacks and hugs, and Bob’s two communicative signs were to request food and drink.

Prior to teaching, a baseline session was conducted to determine if participants already could display the chosen communicative signs. During this additional baseline session, one preferred item was made visible to the participants prior to an approach. After an approach, the participant was asked, “What do you want?” The investigator waited for 10 s and then delivered the preferred item regardless of the participants’ response. This procedure was repeated for all preferred items. None of the participants displayed the communicative signs for the preferred items chosen. Next, the investigator taught communicative signs for the preferred items.

The preferred item to which a manual sign was taught was randomly selected for each participant and was different for each participant. Each teaching session had two slightly different conditions: trials only to teach manual signs followed by trials to teach approach responses and manual signs. The purpose of the trials designed to teach manual signs was to concentrate on teaching the manual sign that “labeled” each item selected for a participant. During these teaching sessions, no approach responses were required. Instead, the investigators approached and sat next to a participant, displayed the preferred item chosen, and waited for the participant to indicate interested in the preferred item by looking at the item or reaching for the items. If the participant showed interested in the item, the investigator said, “What do you want?” and waited. If the participant made the correct manual sign for the item being taught within 10 sec, the investigator immediately gave the time to the participant. If the participant did not exhibit any clear manual sign within 10 s, the investigator used the minimum amount of physical guidance to prompt the participant to display the correct manual sign and then immediately delivered the item. If the participant displayed an incorrect manual sign during the 10 s delay, the investigator said “That’s not it. You want (name of item)” and used the minimal amount of physical assistance to prompt the participant to display the correct manual sign, and delivered the preferred item. The investigator continued to use these procedures at the beginning of each session for a maximum of 20 trials, or until the participant responded correctly without a prompt on three consecutive trials before the 20 trials were completed. These type of practice trials continued at the beginning of each teaching session for the first manual sign until all manual signs had been taught to 80% correct responding during the second part of the teaching session, described below. Then the next manual sign was taught in a similar manner until all manual signs had been taught.

In the second part of each teaching session, the investigator did not approach the participant. Instead, the investigator put one of the preferred items in a place so that the item was visible to the participant. If the participant approached the investigator, the investigator asked, “What do you want?” and waited for 10 s. If the participant was being taught the manual sign for that item, or had previously been taught the manual sign for that item, and the participant displayed the correct manual sign for that time that was visible, the participant was immediately given the item. If the participant displayed an incorrect sign, the investigator said, “That’s not it. You want (name of item)”, used physical assistance to prompt the participant to display the correct manual sign, and gave the participant the item (Figure 3). If the manual sign for the item had not yet been taught and a participant approached the investigator, the investigator said, “What do you want?”, and waited for 10 s. If a participant did not exhibit any communicative sign or displayed a correct or an incorrect manual sign, the investigator gave the item to the participant at the end of 10 s (Figure 2). These teaching trials continued until the participants could accurately request and discriminate all preferred items at 80% accuracy.

**Following Instructions.** After participants successfully displayed the correct communicative signs for their preferred items and could accurately discriminate between them, they were asked to complete tasks before being given the preferred items. As previously described, each participant was assigned 16 tasks, separated into four groups (“A”, “B”, “C”, “D”), four tasks per group (two teaching tasks and two generalization tasks). “A” tasks were taught first, and the investigator randomly chose which “A” teaching task to teach first. After participants approached the investigator and exhibited a communicative sign, the investigator said, “Sure, you can have that, let’s do \_\_\_\_\_ first.” The investigator then provided the participant with the necessary materials to complete the task and waited 10 s. If the participant

completed the task, the investigator delivered the preferred item that the participant requested. If the participant did not start the task within the 10-s delay, the investigator used the least amount of physical assistance to prompt the participant to complete the task and then delivered the preferred item. Tasks were considered mastered when the participant approached the investigator, requested a preferred item, and completed the task independently on 85% of opportunities for 4 consecutive sessions. After the first “A” teaching task was mastered, the investigator began teaching other randomly selected “A” teaching task. If the participant completed this task at 100% independence on the first day of teaching and had previously preformed this task independently for no reinforcement during generalization probes, it was considered mastered. The purpose of this criterion was to avoid teaching tasks that the participants could already complete independently. If the participant did not perform the task at 100% independence on the first day of teaching or hadn’t completed the task previously during the generalization probes, the investigator continued to teach the second teaching task until the participant was performing at 85% independence for four consecutive sessions. After both “A” teaching tasks were mastered, “B” teaching tasks were taught in the same manner as “A” teaching task and so on until all teaching tasks in all four groups (“A”, “B”, “C”, “D”) were mastered. Because both Kara and Bob rarely completed “D” tasks for no reinforcement in generalization probes, additional teaching sessions were conducted with “D” tasks after they were mastered to assess whether performance on generalization probes would improve with extended training.

### **Experimental Design**

The current study utilized a within-subject multiple baseline design across skills replicated across three participants. The investigator taught approach responses first with a least



one baseline probe on communicative signs. The second skill taught was communicative signs. The investigator proceeded to teach each communicative signs while continuing to probe on those communication responses not yet taught. For the final phase of the study, the investigators evaluated for each participant separately how task compliance might be affected by teaching and different reinforcement contingencies. An additional multiple baseline across different tasks (“A”, “B”, “C”, “D”) was used for this purpose.

### **Data Collection and Inter-observer Reliability**

The primary investigator recorded data during teaching sessions. Frequency of approaching the investigator was scored all of the time each session. Communicative signs were recorded when the participant approach the investigator and independently displayed one of the communicative signs that were being taught or to be taught. Following Instructions were scored when the participants approach the investigator, displayed a communicative sign, was given and instruction by the investigator, and then independently completed the task required by the instruction. Additionally, independence on generalization probes on tasks was scored as either a “yes” if completed independently or a “no” if the task was not attempted or completed. Inter-observer reliability was evaluated on 32%, 35%, and 32% of sessions for Kara, Ellen, and Bob, respectively. Reliability was collected by two methods: during teaching sessions or from video of teaching sessions (see Table 3). If reliability was collected live during teaching sessions, a second independent observer collected data at the same time as the primary investigator. The primary investigator did not interact with the second observer nor did the second observer interact with the participants. If reliability was scored from videotapes of teaching sessions, the second observer independently scored data from the videotapes. In all cases, the secondary observer’s data was compared to the data collected by the primary investigator. The reliability

calculation was the smaller number recorded by one observer during a session divided by the larger (or equal) number recorded by the other observer during that same session. The total results of these reliability evaluations are shown in Table 3.

### **Treatment Fidelity**

Treatment fidelity was recorded on the teaching procedures used by the primary investigator during sessions. Two independent observers viewed videotapes of teaching sessions in a random order (i.e., observers did not watch teaching sessions in a sequential order). For each approach response made by a participant, the observers scored the primary investigator's behavior or sequence of behaviors. Behaviors scored included if the primary investigator delivered preferred items, asked the participants questions (e.g., What do you want?), presented task demands to the participants, used error corrections for incorrect responses, and used physical guidance to prompt correct responses. One or more of those primary investigator behaviors could have been scored for a single approach response made by a participant. Independent observers scored treatment fidelity on 21% of teaching sessions. After comparing the independent observers data, a point-by-point agreement calculation was conducted to assess their agreement on the primary investigator's behavior. Treatment fidelity was 96.3%.

### **Social Validity**

Social validity surveys were distributed to the caregivers (e.g., direct care staff, Family Teaching Couples, etc.) of each participant. Each survey contained six questions that asked caregivers to anonymously evaluate the acceptability of the teaching procedures and the outcomes of the study on a 5-point Likert-type scale, ranging from 1 (disagree) to 5 (agree) (see Table 4).

## Results

Results for each participant are displayed in Figures 4-11. All participants were able to acquire an approach response through shaping procedures. Kara mastered her approach response on session 30 (Figure 4). Ellen mastered her approach response on session 21 (Figure 5). Due to the difficulty that Bob had acquiring an approach response without visible reinforcers, his preferred items were made visible to him on session 39 and he subsequently mastered his approach response on session 40 (Figure 6).

As shown in Figure 4, Kara mastered all three of her communicative signs after making an approach response. She mastered her first communicative response, “drink”, on session 50, thus requiring 16 teaching sessions. She learned the communicative sign “hug” after 12 teaching sessions, and her third communicative sign “music” after 24 teaching sessions. By session 88, Kara was able to accurately discriminate between all three communicative responses at 80% accuracy.

Figure 5 shows the progress that Ellen made on acquiring communicative signs while participating in the study. Ellen mastered her first communication response, “snacks”, on session 50, requiring 23 teaching sessions. After mastering her first communicative sign, Ellen became extremely ill requiring long hospitalizations. During times when Ellen was not hospitalized, the investigators began teaching her a second communicative sign, “hug”. Due to her poor prognosis, the investigators stopped teaching her second communicative sign and moved onto the final phase of the study.

The data in Figure 6 indicate that Bob learned both of his communicative signs. Bob learned his first communicative sign, “food”, after 48 teaching sessions. He learned his second communicative sign on session 123, after 35 teaching sessions. As of session 127, Bob was able to discriminate between his two preferred items at 85% accuracy for three consecutive sessions.

Figure 7 displays that all participants mastered teaching tasks from all four categories (A,B,C,D) during the Following Instructions phase. Kara mastered all 8 tasks within 48 sessions. After tasks were mastered, she continued to maintain 100% independence on “D” teaching tasks after requesting a preferred item. Ellen mastered both “A” teaching tasks before she was no longer able to participate in this study. Bob learned all 8 teaching tasks in 35 sessions. After he mastered all tasks, he continued to perform “D” tasks at 79% independence after requesting a preferred item.

Generalization probes are displayed in Figures 8-10. Generalization probes are displayed as blocks of 5 probes that are averaged together. The investigators presented the average to reduce the number of points represented on the graph and to more clearly represent the participants’ performance on these probes. Two types of tasks are depicted on the graph. Teaching tasks are those that were directly taught during the Following Instructions phase whereas generalization tasks were not taught to the participants during the course of the study. The investigators measured these tasks during probes that were conducted each session and where no reinforcement was provided for teaching or generalization tasks.

Figure 8 represents Kara’s performance on generalization probes. Kara completed “A” teaching tasks at 85% independence and “A” generalization tasks at 87% independence during non-reinforced probes prior to the Following Instructions phase. Once both “A” teaching tasks had been taught, Kara independently completed both “A” teaching and generalization tasks at 100% during non-reinforced probes. Kara continued to perform at 100% independence during 2-week, 5-week, and 10-week follow-up probes. Kara completed “B” teaching tasks at 73% independence and “B” generalization tasks at 40% independence during non-reinforced probes prior to teaching any “B” tasks during the Following Instructions phase. After teaching, Kara

completed “B” teaching tasks at 95% independence and “B” generalization tasks at 85% independence during non-reinforced probes. Kara performed all “B” tasks at 100% accuracy during 2-week, 5-week, and 10-week follow-up probes. Kara completed “C” teaching tasks at 38% independence and “C” generalization tasks at 31% independence prior to teaching during non-reinforced probes. After teaching in the Following Instructions phase, Kara completed “C” teaching tasks at 81% independence and “C” generalization tasks at 78% independence during non-reinforced probes. Kara performed variably on the 2-week and 5-week follow-up probes, but demonstrated 100% independence on all “C” tasks during the 10-week follow-up probe. Kara completed “D” teaching tasks at 0% and “D” generalization tasks at 6% during non-reinforced probes prior to teaching in the Following Instructions phase. After teaching, Kara completed “D” teaching tasks at 71% independence and “D” generalization tasks at 15% independence. Similar to “C” tasks, Kara performed variably on all “D” tasks during 2-week and 5-week follow-up probes, but performed at 100% independence on “D” teaching tasks during the 10-week follow-up.

Figure 9 displays Ellen’s performance on non-reinforced generalization probes. Prior to teaching, Ellen completed “A” teaching tasks at 69% independence and “A” generalization tasks at 67% independence. After teaching during the Following Instructions phase, Ellen improved her performance on “A” teaching tasks to 88% independence and decreased her performance to 50% on “A” generalization tasks during non-reinforced probes. Ellen did not have the opportunity to acquire the teaching tasks for groups “B”, “C”, and “D”.

Figure 10 shows Bob’s performance on generalization probes. Prior to teaching, Bob completed both “A” teaching tasks and “A” generalization tasks at 83% independence. After teaching in the Following Instructions phase, Bob improved his performance on “A” teaching

tasks to 100% independence and to 96% independence on “A” generalization tasks during non-reinforced probes. Bob completed all “A” tasks at 100% independence during the 5-week and 10-week follow-up probes. There were no 2-week follow-up probes because he was hospitalized. Bob performed “B” teaching tasks were at 72% independence and “B” generalization tasks at 15% independence prior to teaching. After teaching, Bob’s performance on “B” teaching tasks improved to 100% and generalization tasks improved to 37% independence. During the 5-week and 10-week follow-ups, Bob completed “B” teaching tasks at 100% and “B” generalization tasks at 50% independence. Prior to teaching, Bob performed “C” teaching tasks at 25% independence and “C” generalization tasks at 8% independence. After teaching in the Following Instructions phase, percent independence on “C” teaching tasks improved to 73% and “C” generalization tasks improved to 73%. Bob completed all “C” tasks at 100% independence during the 5-week follow-up and he completed 100% of “C” generalization tasks and 50% of “C” teaching tasks during the 10-week follow-up probe. Finally, prior to teaching, Bob completed “D” teaching tasks independently on 33% of opportunities and completed “D” generalization tasks independently on 4% of opportunities. After teaching, Bob completed “D” teaching tasks on 83% of opportunities and “D” generalization tasks on 17% of opportunities. Bob completed all “D” tasks at 50% independence during the 5-week and 10-week follow-up probes.

Frequency of problem behavior per session is represented in Figure 11 for each participant. Kara’s problem behavior was extremely variable during baseline and approach training phases. After communicative responses were taught, Kara’s frequency of problem behavior significantly decreased and remained at zero for the majority of the remaining sessions. Ellen’s frequency of problem behavior was also variable throughout the course of the study; a

slight decline in the frequency, however, occurred as Ellen continued to participate. Bob engaged in relatively high rates of problem behavior during baseline and the beginning of the approach training phase. Similar to Kara, Bob's frequency of problem behavior dramatically decreased throughout the course of the study. A slight increase in throwing materials occurred after beginning the Following Instructions phase, possibly due to the fact that Bob simply had more access to items he could throw.

The investigators also surveyed people (n=10) who work closely with Kara, Ellen, and Bob to assess the acceptability of the procedures used in this study. When asked if the participants developed a positive relationship and enjoyed spending time with the primary investigator, the majority of people surveyed agreed. The people surveyed reported that the new communicative and compliance skills were important for the participants to know, that the teaching procedures were appropriate, and that all participants used their new communicative and compliance skills with other people besides the primary investigator (see Table 3).

### **Discussion**

In the present study we evaluated whether relationship development procedures used by the investigator with the participants increased the amount of time the participant spent in proximity to the investigator, increased the number of teaching interactions that occurred during each session, improved the acquisition of communicative signs and compliance on a number of tasks of varying difficulty. The results clearly demonstrated that the participants increased the amount of time they spent in proximity to the investigator, were able to master several different communicative signs, and complied with a variety of tasks ranging in difficulty.

Rapport is difficult to empirically evaluate and objectively measure. The current study used approach responses to directly measure the development of what we labeled as a positive

relationship. All participants approached the investigator numerous times during each session, although it is important to note that the number of approach responses varied greatly across sessions. The variety in the number of approach responses is most likely attributed to the participant's motivation to gain access to the selected preferred items. For example, if a participant had recently eaten a meal, they would be less likely to approach the investigator to gain access to food but might approach to gain access to one-on-one attention. Due to the fact that it was extremely difficult to control these types of setting events, the investigator attempted to conduct sessions at times where the participants were likely to have not recently accessed any of their selected preferred items. It is also important to note that the overall frequency of approach responses decreased over the course of the study. This decrease may be attributed to several different factors including the possibility that the novelty of the investigator wore off over time and the number of demands increased per approach response as the study proceeded, possibly decreasing the frequency of approaches.

In addition to the large increase in the number of approach responses, the primary investigator anecdotally reported that participants engaged in other behavior indicative of a positive relationship. Participants would often wait at the door and answer the door when the investigator arrived. Participants also engage in high rates of smiling, laughing, and other indices of happiness during session times. Also, participants would frequently hug and kiss the investigator during sessions. Finally, the participants' caregivers all reported on the social validity surveys that they believed that the participants and the investigator developed positive relationships and that the participants enjoyed spending time with the investigator.

In the second phase of relationship development, the investigator taught participants communicative signs so that the participants were able access their preferred items without



engaging in problem behavior. Increases in communicative signs and decreases rates of problem behavior may promote more positive interactions between consumers and staff members. Due to the high number of approach responses the participants were making and the fact that the participants significantly increased the amount of the time the participants were willing to spend near the investigator, these interactions were then used as teaching interactions. During teaching interactions, participants acquired several communicative signs during the course of the study. A time-delay graduated guidance prompting procedure was effective at teaching communicative signs to all participants. Acquisition of communicative signs, however, required many teaching sessions for each participant to acquire all responses. There are several reasons why a large number of teaching sessions were required to teach communicative signs. First, sessions only occurred several times (i.e., 3-4) a week for a total of 20 minutes as compared to several times a day. If staff members were to use these procedures, it is quite likely that participants would have acquired communicative signs much faster if teaching sessions were conducted several times a day. Additionally, the number of teaching trials varied greatly from session to session dependent on the number of approach responses made by the participants. The participants were also only required to use these communicative signs with the investigator and therefore they probably had very little practice outside of sessions. In addition, the participants also had a long history of not using communicative signs to access preferred items. One can hypothesize, however, that the participants may have learned these skills faster if the participants interacted with the investigator more frequently.

The third phase of relationship development assessed the participants' compliance on a number of different tasks after approaching the investigator and requesting a preferred item. During sessions, very little teaching was required for the participants to comply with the

teaching tasks from each group of tasks (“A”, “B”, “C”, “D”), thus, suggesting that the participants had the skills necessary to complete these tasks in their repertoire and their failure to complete these tasks previously was an issue of compliance not skill deficit. Participants also independently completed a variety of tasks during generalization probes without receiving reinforcement. Additionally, participants independently completed both taught and untaught “D” tasks for no reinforcement. This is especially interesting since “D” tasks were tasks that the participants completed on less than 10% of the opportunities prior to teaching. These results suggest that rapport development plays an integral role in task compliance. Thus, simply developing relationships with consumers may improve compliance on household chores and instructions. Both Kara and Bob still independently completed most taught and untaught tasks during the 5-week and 10-week follow-up probes without reinforcement and without seeing the investigator in the interim. It is important to note, however, that participants did not always comply with instructions during teaching or generalization probes. Other researchers have reported similar results. Even when staff members have reported that they have good rapport with consumers, the consumers do not comply with every instruction given (Magito-McLaughlin & Carr, 2005).

Participants had significant reductions in problem behavior while participating in this study. Johnson (2004) reported dramatic reductions in problem behavior after using similar procedures. An interesting aspect of the current study is that significant reductions in problem behavior were noted after the acquisition of communicative signs; the communicative signs taught, however, were not directly based on the function of the participants’ problem behavior. Functional communication training (Carr & Durand, 1985) assesses the function of an individual’s problem behavior and teaches them a functionally alternative response in an attempt

to reduce the occurrence of problem behavior. For example, if the function of the individual's problem behavior is to escape from work demands, a functional alternative behavior may be to ask for a break. The function of each of the participant's problem behavior in this study was not assessed; the frequency of problem behavior, however, was reduced for all participants. It is quite likely that behavioral function of all of the participants' problem behavior was to access preferred items. Since a functional assessment was not conducted in this study, a direct functional relation between the acquisition of communicative signs and reductions of problem behavior cannot be made.

Relationship development appears to be a crucial element when trying to teach adaptive skills and reduce problem behavior. While relationship development may have several different functions, the exact function of relationship development is not known. It is possible that the development of rapport may decrease the aversiveness of staff-consumer interactions and demands because the interactions are consumer-initiated. Relationship development may also create staff members as signals for reinforcement and communication.

The current study extends previous research in several ways. First, the present study recruited participants with profound intellectual disabilities who had long histories of engaging in problem behavior and not engaging in appropriate activities. The results of the current study suggest that these procedures are effective with this difficult population. All participants had profound disabilities in addition to all being over the age of 45, suggesting that it is never too late to teach these skills to individuals with intellectual developmental disabilities, no matter what age.

Additionally, the current study required extensive teaching over a large number of sessions. Previous studies evaluating positive relationship development addressed the aspect of

communication development but used communication responses already in the individual's repertoire (Magito-McLaughlin & Carr, 2005). The current study taught the participants their first communicative signs. Kara had generalized communicative signs such as "more" and "please" in her repertoire at the beginning of the study; she, however, did not have any specific requests, and Ellen and Bob displayed no communicative signs prior to starting this study.

The current study has several limitations. The most notable limitation is that it is unknown if the participants would have been able to acquire these new communicative and compliance skills without using positive relationship procedures. It is quite likely that the participants would have been able to learn new skills without the development of a positive relationship, but it is unknown how long it would have taken to teach the skills. Positive relationship development increased the amount of time the investigator and participant spent together and increased the number of teaching opportunities, perhaps decreasing the number of teaching sessions required to acquire adaptive skills. Additionally, it is also unclear if the participants would have shown such high levels of compliance on generalization probes if a positive relationship was not developed. Another unanswered question is if a positive relationship would have developed even if the investigator did not specifically create herself as a conditioned reinforcer. Clearly, additional research needs to be conducted in this area to identify the exact function of relationship development and how it relates to the acquisition of adaptive skills and reduction of problem behavior.

An additional limitation of this study is that positive relationship development procedures and teaching only occurred with the primary investigator and not with other staff members. Anecdotally, staff reported that the participants used their new communicative and compliance skills with other staff members but no formal training was conducted. Additional

research should be conducted to assess whether these procedures could be used by staff members to create themselves as signals for reinforcement. Additionally, future research should assess the reciprocal relationships that may develop between staff and consumers and whether staff members spend more time with consumers with whom they have developed a relationship.

Although the role of relationship development is unknown; positive relationship development procedures offer some clear benefits. Most importantly, these procedures could be easily used by staff members. Staff and consumers spend a great deal of time together. Staff could use relationship development procedures during these times and therefore the procedures do not require any additional teaching time. Relationship development procedures may make teaching more efficient and effective.

This research project addressed an important issue when providing care for individuals with intellectual developmental disabilities. The procedures used were effective in developing rapport between the investigator and participants and promoted acquisition of adaptive skills. Future research should be conducted on additional ways to develop rapport, to determine if rapport development reduces the amount of teaching required to teach skills, and to assess if staff members are able to successfully use these procedures.

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Table 1

*Operational Definitions of Communication Responses*

Participant	Preferred Item	Definition
Kara	Drink	Making a “c” shape/fist with hand and bring it to mouth
	Hug	Crossing arms over chest
	Music	Reaching with one arm while having the other arm making a back and forth motion over the extended arm
Ellen	Food/Drink	Bringing closed fingers to mouth
	Hug	Crossing arms over chest
Bob	Food	Bringing closed fingers to mouth
	Drink	Bringing two closed fists to mouth

Table 2

*“A”, “B”, “C”, & “D” Tasks*

Task Type	Kara	Ellen	Bob
<b>“A” Tasks (100-75%)</b>			
Teaching tasks	1) Connect Four® 2) Stack Cups	1) Start a timer 2) Eye contact with investigator	1) Connect Four® 2) Shake hands
Generalization tasks	1) High Five 2) Put clothes in laundry basket	1) Take item from another’s hand 2) Open a jar	1) Put clothes in basket 2) Mancala®
<b>“B” Tasks (74-50%)</b>			
Teaching tasks	1) Stack bowls 2) Hand over preferred items	1) Choose between two preferred items 2) Shake hands	1) Chinese Checkers 2) Hand over items
Generalization tasks	1) Carry laundry basket to a specific area 2) Arts and crafts	1) Pour items from cup into a bowl 2) Tolerate items next to her for 5 s	1) Pour drinks 2) Carry laundry basket to specified area
<b>“C” Tasks (49-20%)</b>			
Teaching tasks	1) Sit down 2) Stack blocks	1) Stack bowls 2) Hand over items	1) Transfer clothes out of laundry basket 2) Sort Coins
Generalization tasks	1) Transfer clothes out of laundry basket 2) Sorting utensils	1) Stir a bowl 2) Take a spoon out of cup	1) Close washer lid 2) Open washer lid
<b>“D” Tasks (19-0%)</b>			
Teaching tasks	1) “Follow the leader” 2) Puzzle	1) Tolerate items next to her for 15 s 2) Wear socks for 5 min	1) Placing non-preferred items in bin 2) String beads
Generalization tasks	1) Put dishes in drying rack 2) Fold clothes	1) Hold items for 10s 2) Wear shoes for 5 min	1) Puzzle 2) Sit down

Table 3  
*Inter-observer Reliability*

	<i>Kara</i>	<i>Ellen</i>	<i>Bob</i>
Percent of Sessions Scored	32.0%	35.0%	32.0%
Percent of Sessions Scored <i>in vivo</i>	36.0%	25.0%	55.0%
Percent of Sessions Scored from video	64.0%	75.0%	45.0%
Total Agreement	94.4%	92.6%	90.4%
Percent Agreement on Approaches	95.9%	96.7%	93.5%
Percent Agreement on Communication	90.6%	98.2%	91.3%
Percent Agreement on Following Instructions and generalization probes	93.2%	94.0%	92.7%
Percent Agreement on Problem Behavior	98.0%	81.0%	84.0%

Table 4  
*Social Validity Results*

	<i>Mean Scores</i>		
	<i>Kara</i> (n=4)	<i>Ellen</i> (n=3)	<i>Bob</i> (n=3)
1) The investigator and the participant developed a positive relationship throughout the course of the study.	5	5	4.33
2) The participant enjoyed spending time with the investigator.	5	5	4.67
3) The teaching procedures used in the study were appropriate for the participant.	5	5	4.67
4) The skills taught the to participant were important for the participant to know.	5	5	5
5) The participant used his/her new skills with people other than with the investigator.	5	5	3.67
6) Participating in this study was beneficial to the participant.	5	5	4.67

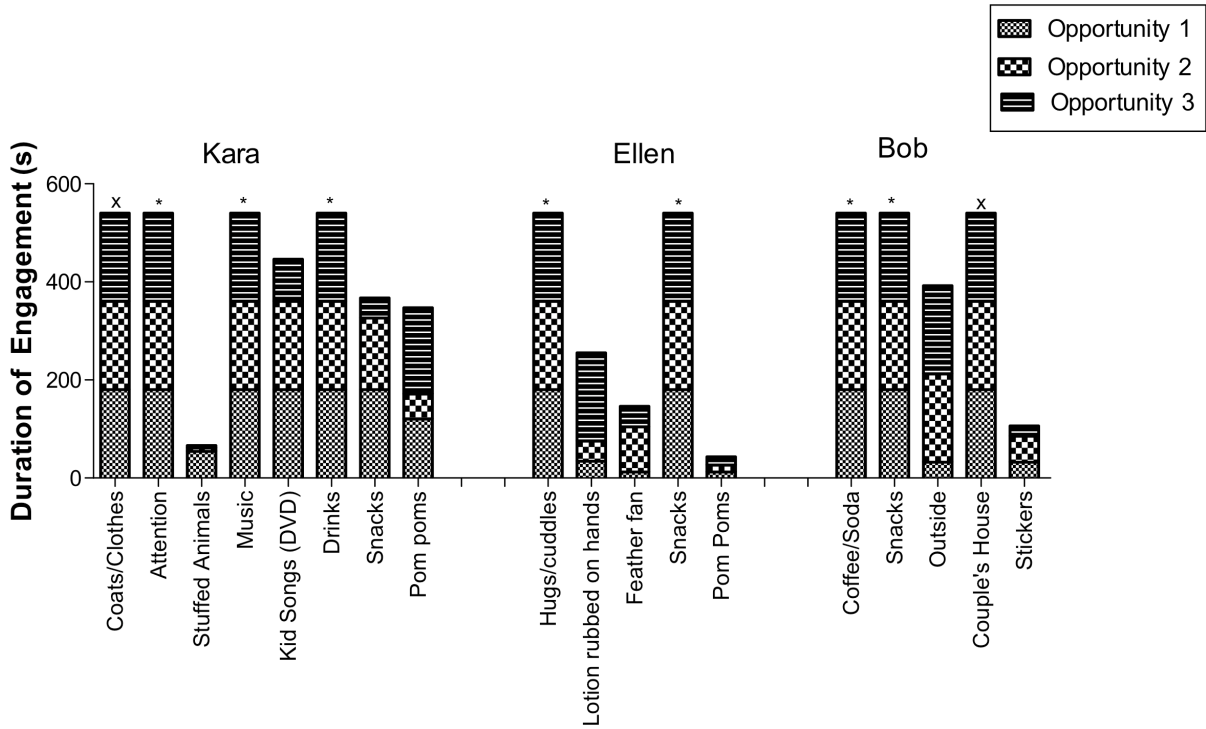


Figure 1. Results of preference assessment for each participant. Items with the longest duration of engagement were considered most preferred. "\*" indicates the preferred items chosen for each participant. "x" indicates those items that were highly preferred but not chosen because of requests by staff members.

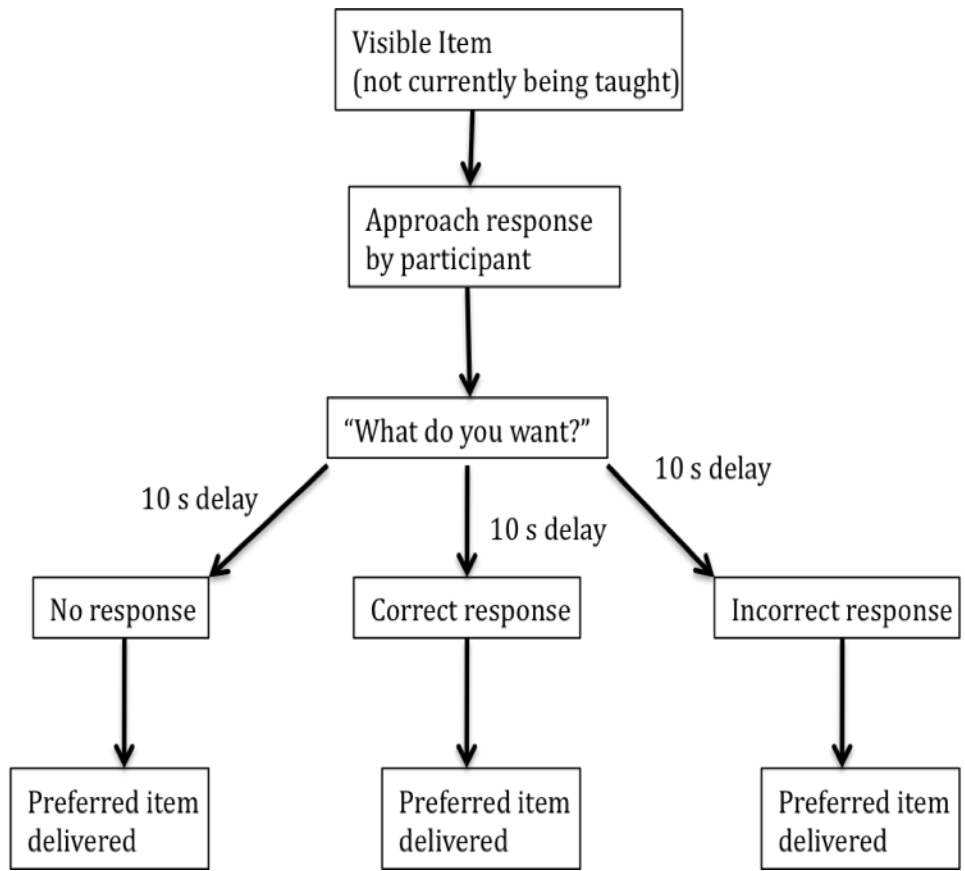
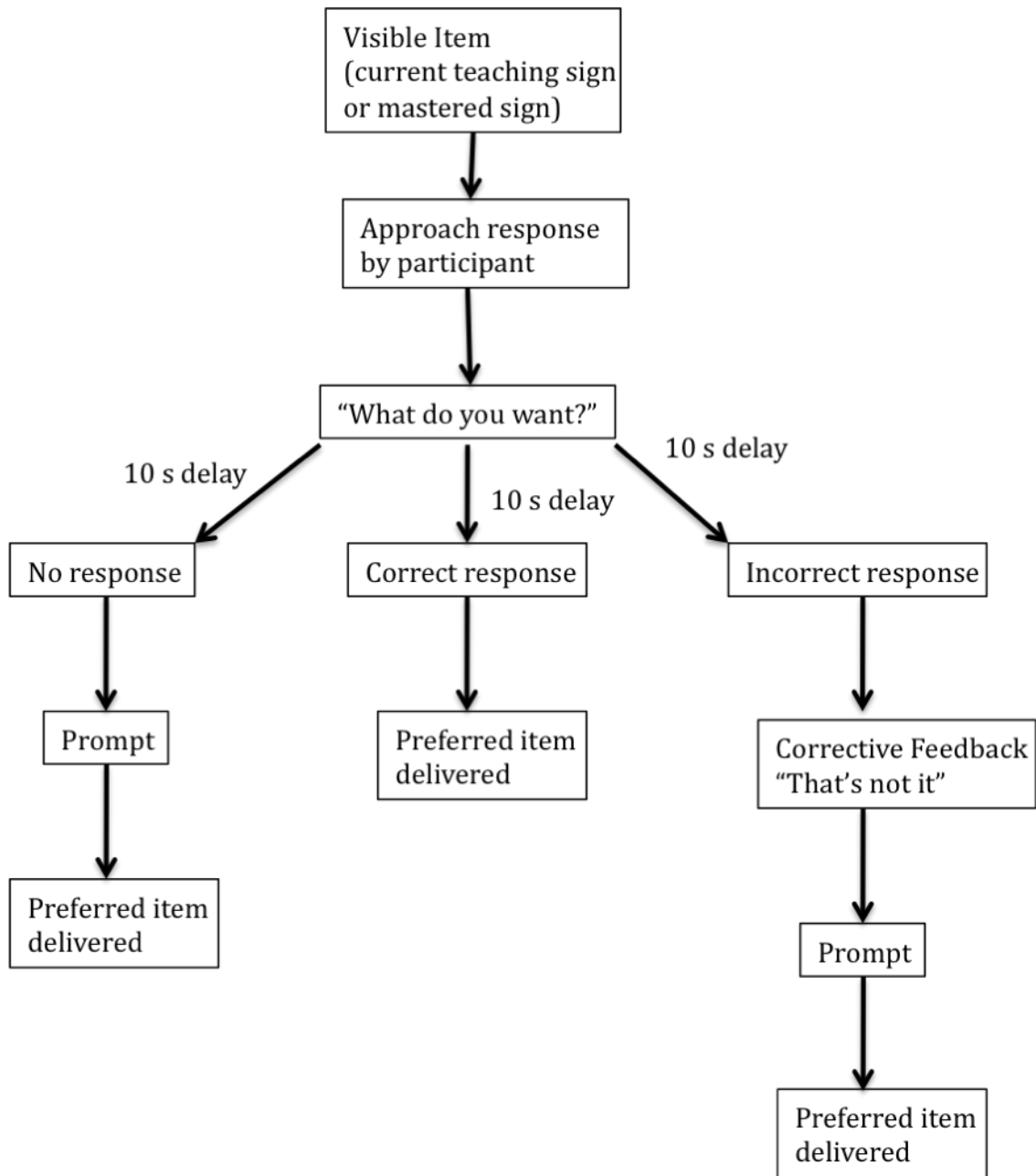


Figure 2. Procedures used during the Communication phase for untaught communicative signs.



*Figure 3.* Procedures used to teach and maintain communicative signs during the Communication phase.

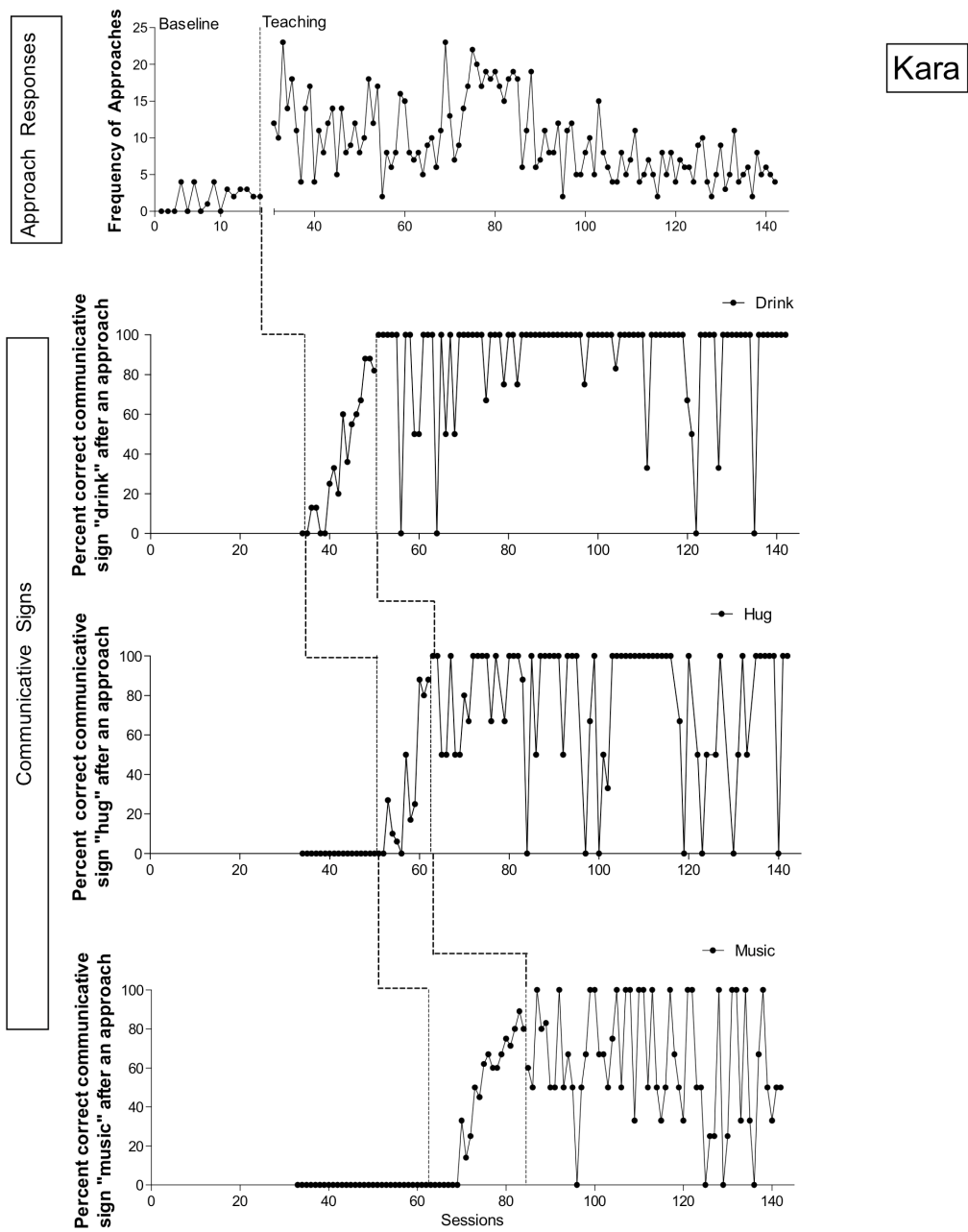


Figure 4. The top panel displays the frequency of approach responses made by Kara. Panels 2-4 display the percent correct communicative signs displayed by Kara after making an approach response.



Ellen

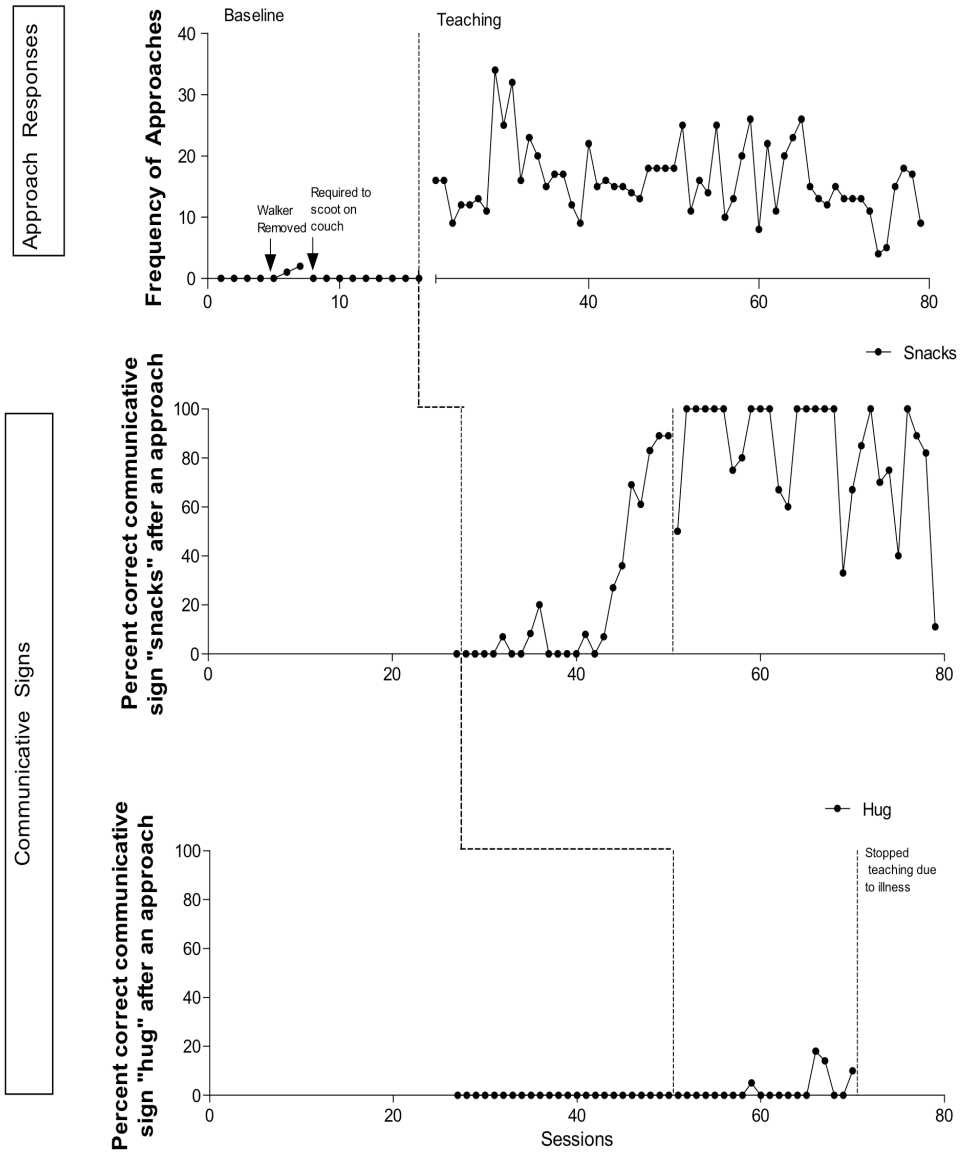


Figure 5. The top panel displays the frequency of approach responses made by Ellen. Panels 2-3 display the percent correct communicative signs displayed by Ellen after making an approach response.

Bob

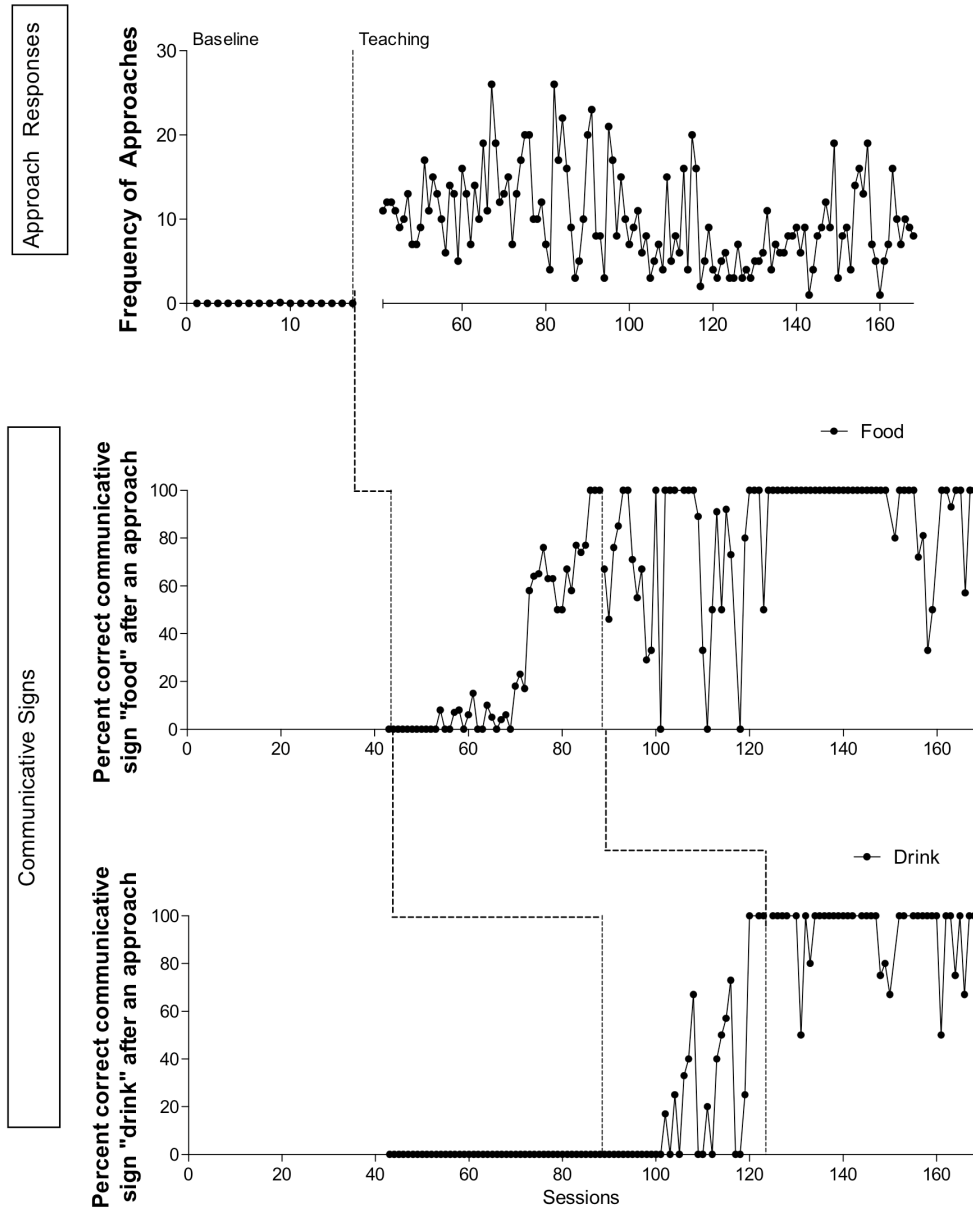
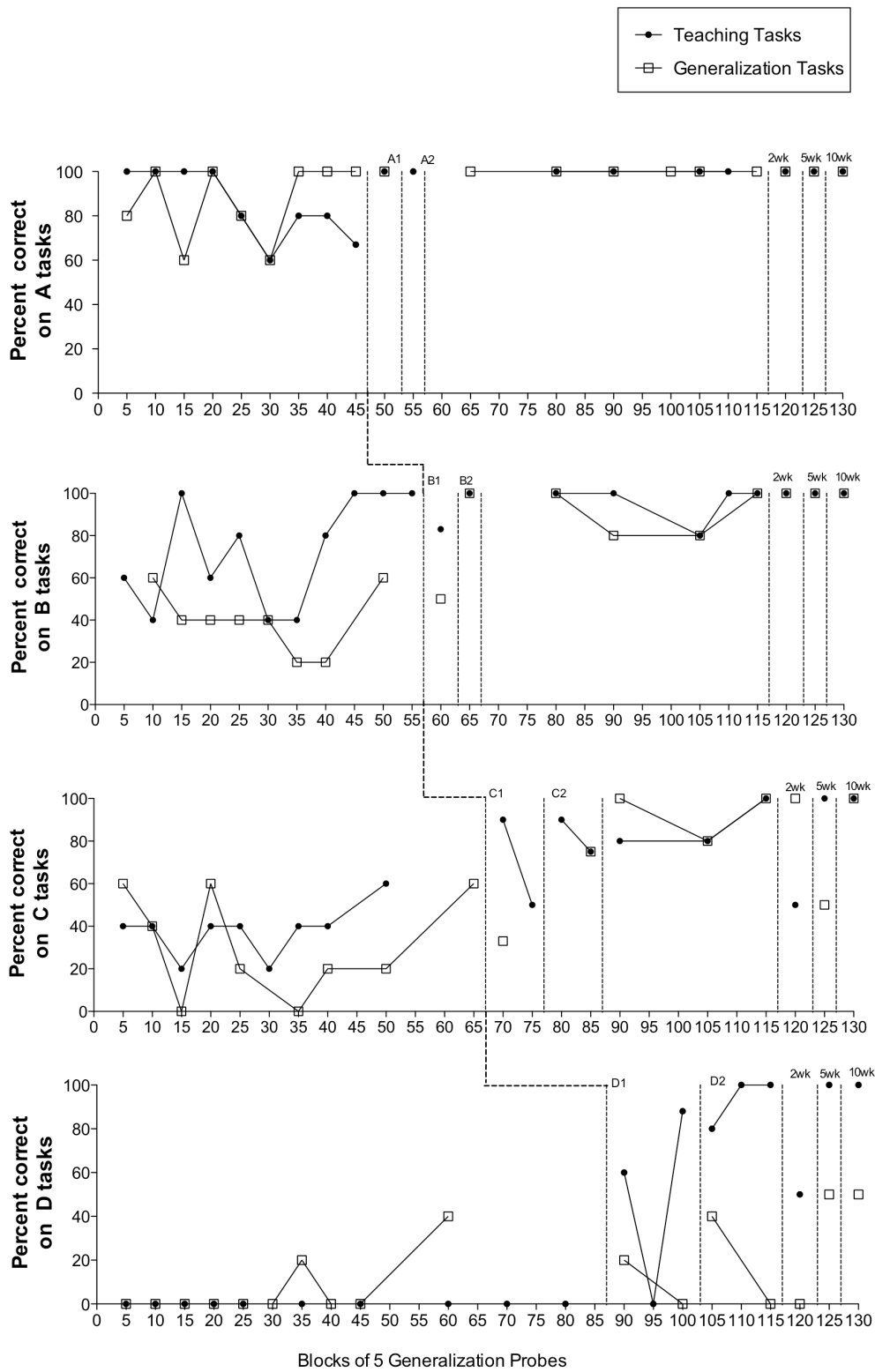


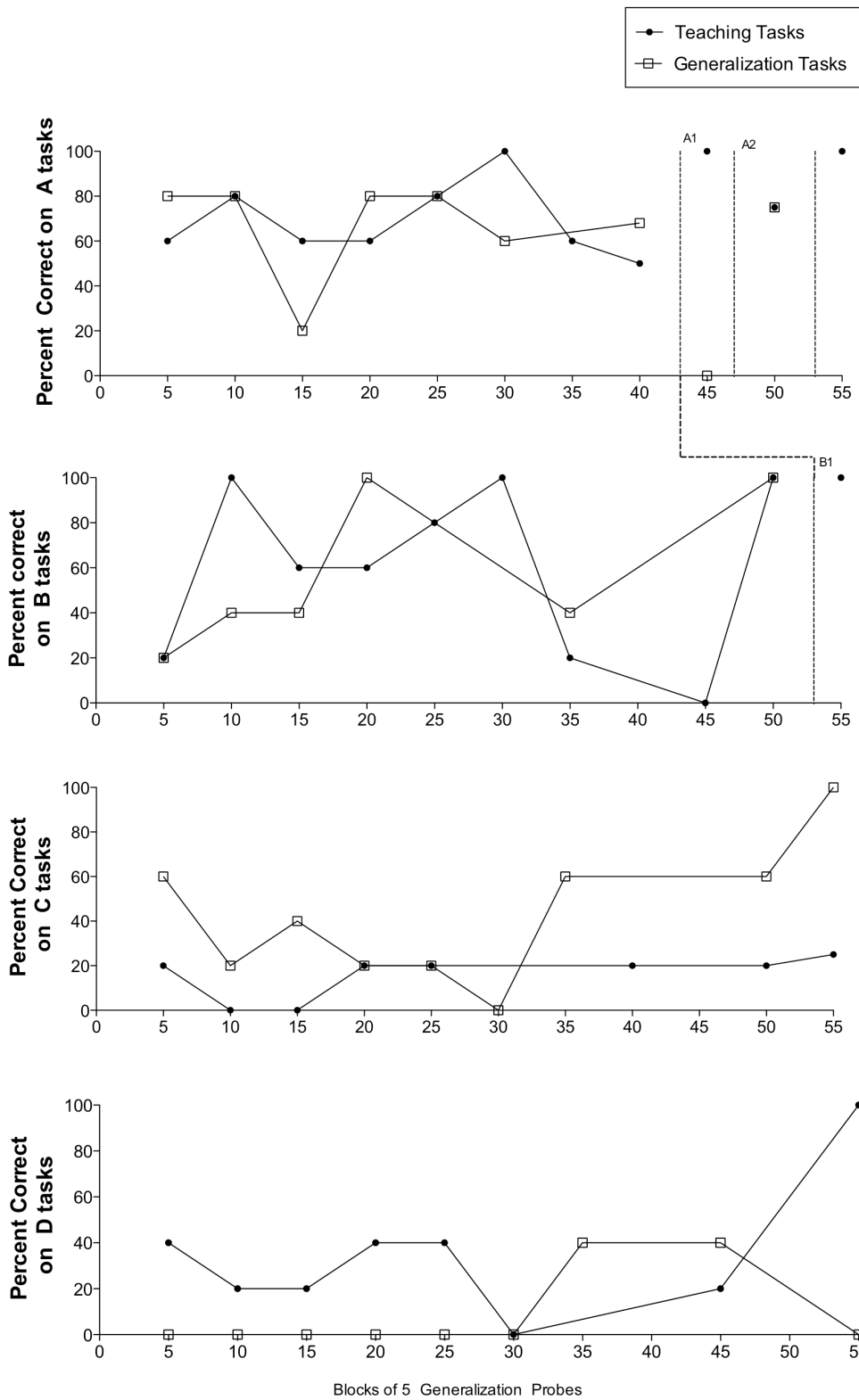
Figure 6. The top panel displays the frequency of approach responses made by Bob. Panels 2-3 display the percent correct communicative signs displayed by Bob after making an approach response.





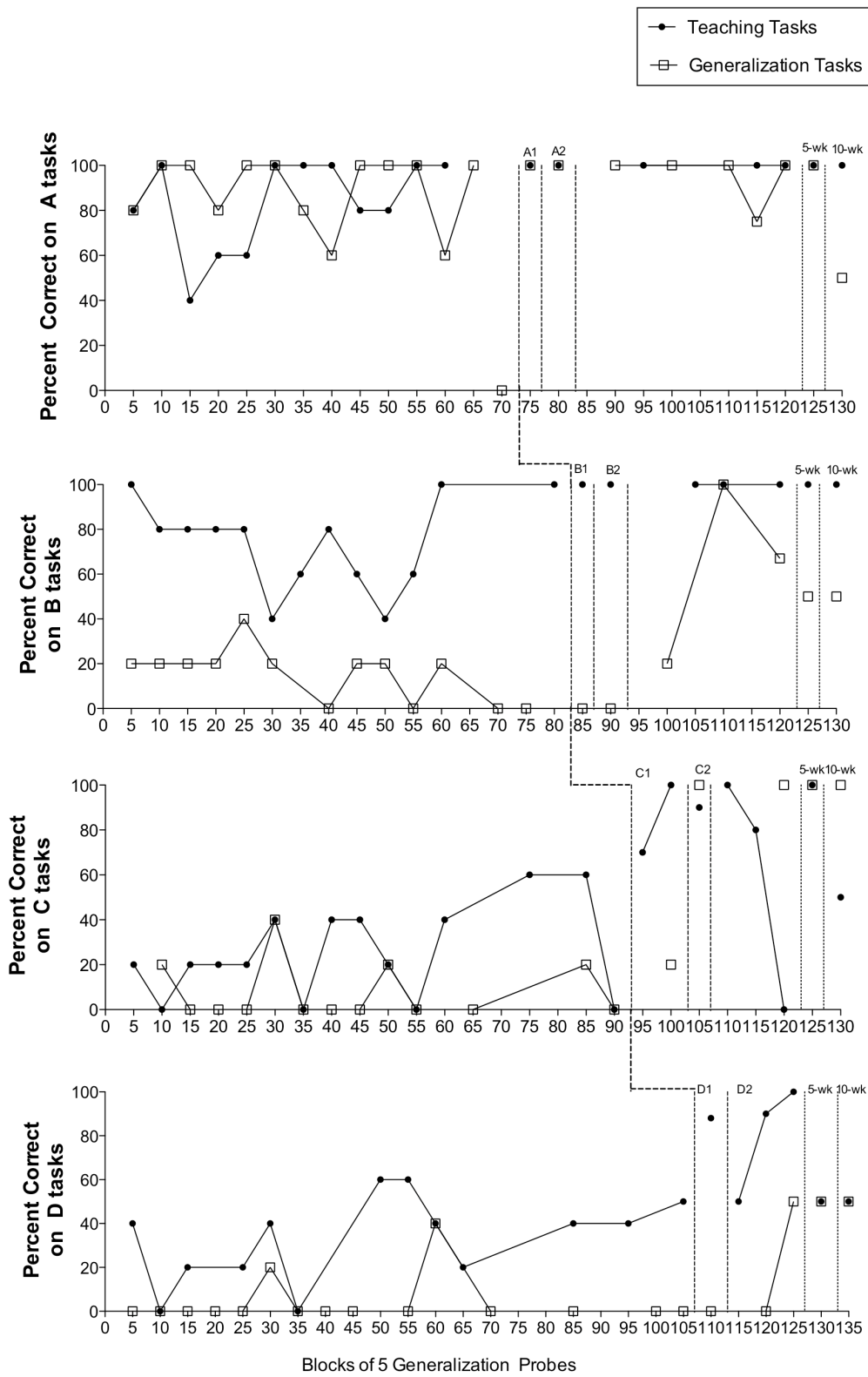
Kara

Figure 8. Performance on Teaching Tasks and Generalization Tasks without reinforcement.



Ellen

Figure 9. Performance on Teaching Tasks and Generalization Tasks without reinforcement.



Bob

Figure 10. Performance on Teaching Tasks and Generalization Tasks without reinforcement.



## **Appendix A**

### **Operational Definitions for Dependent Variables**

#### **Kara**

##### *Approach response*

Taking at least one step toward the investigator and using a flat handed touch/grab to the arm of the investigator, above the wrist and below the shoulder

Example: Kara approaches investigator and touches investigator/staff on the elbow.

Non-example: Kara approaches investigator and touches investigator/staff on the shoulder and pulls her hair.

##### *Communicative Response*

Approaches the investigator (see above) and uses any 3 of the following signs:

1. Drink (crystal light)-making a “c” shape/fist with hand and bring it to mouth
2. Hug- Crossing arms over chest
3. Music-using one arm reach out with the palm facing the ceiling while having the other arm make a back and forth motion over the other hand.

##### *Task Compliance*

Initiates the tasks within 10 seconds of instruction:

- 1) “High Fives” –Kara must reach out with a flat palm and touch the investigator’s outstretched flat palm.
- 2) Connect Four-Kara must independently place anywhere from 5-10 checkers into the Connect Four game board without throwing any of the pieces.
- 3) Stacking Cups-Kara must independently stack anywhere from 2-5 cups without throwing the materials.
- 4) Clothes in laundry basket-Kara must independently place anywhere from 5 pieces of clothing into a laundry basket.
- 5) Stacking bowls- Kara must independently stack anywhere from 6 bowls without throwing the materials.
- 6) Hand over preferred items-Kara must independently hand over a preferred item to the investigator when she is asked.
- 7) Carry laundry basket to a specific area-Kara must carry her laundry basket to an area (e.g., table, washing machine) designated by the investigator without removing the contents of the basket.
- 8) Arts and Crafts-Kara must engage in arts and crafts activities (coloring, cutting, using stickers) for at least one minute without throwing any of the materials.
- 9) Stacking blocks-Kara must independently stack anywhere from 5-10 blocks without throwing any of the materials.
- 10) Sit down-Kara must down at the table when instructed and stay seated for at least 30 seconds.
- 11) Transfer clothes out of laundry basket-Kara must remove the contents of the laundry basket and put the contents in an area (e.g., inside washing machine, on her bed) designated by the investigator.



- 12) Sort Plastic Utensils-Kara must sort anywhere from 5 plastic utensils into their designated areas within the utensil tray without throwing any of the materials.
- 13) -Dishes in drying rack/dishwasher-Kara must place 5 plates into the slots of the dishwasher/drying rack without removing them from the slots or throwing the plates.
- 14) Folding clothes-Kara must imitate folding 2 clothing items.
- 15) Puzzle-Kara must complete a puzzle with anywhere between 2-6 pieces.
- 16)“Follow the Leader”-Kara must follow the investigator after the instruction “come with me” for a minimum of 30 seconds

#### *Aberrant behavior*

Any instance of hair pulling, hitting, pinching, biting, pushing others, and throwing materials

### **Ellen**

#### *Approach Response*

Approaches the investigator/staff by scooting her body down the length of the couch (at least 2 feet) and use a flat-handed touch/grab to the investigator’s arm between the wrist and shoulder

Example: Ellen scoots on the couch and touches investigator/staff on the elbow.

Non-example: Ellen crawls on the floor toward the Investigator.

#### *Communicative Responses*

Approaches the investigator (see above) and uses any of the following signs/gestures:

1. Hugs/cuddles: both arms crossed across her chest
2. Eat (snacks): bringing closed fingers to mouth

#### *Task Compliance*

Initiates the task within 10 seconds of instruction

- 1) “Take this”-Ellen must remove an object from the investigator’s hand.
- 2) Open Jar-Ellen must twist a lid of a jar and remove the lid from the jar.
- 3) Set timer –Ellen must independently press the start/stop button on a timer when instructed.
- 4)“Look at me”-Ellen must make eye-contact with the instructor for at least 2-seconds after the instruction.
- 5) Pouring items from cup into a bowl-Ellen must pour objects (e.g., flour, liquid) from a measuring cup/cup into a bowl without throwing any of the materials.
- 6) Hand Shake-Ellen must reach out with one hand and make contact with the investigator's hand.
- 7) Tolerating items (5 seconds)-Ellen must tolerate having an item next to her (on the couch, at the table) for at least 5 seconds without throwing the materials or pushing the object on the floor.
- 8) Choosing between two preferred items-Ellen must point to make a choice between two preferred items.
- 9) Stacking/un-stacking bowls- Ellen must place a smaller bowl into or remove a smaller bowl out of a larger bowl.
- 10) Stirring a bowl-Ellen must grab the spoon and make a stirring motion inside a cup or bowl for at least 5 seconds.

- 11) Spoon out of cup- Ellen must grab the wooden spoon and fully remove the spoon out of the cup and hand it to the investigator.
- 12) "Hand me that"- Ellen must hand over an item she is holding to the investigator without throwing the item.
- 13) Holding items- Ellen must hold an item given to her by the investigator for at least ten seconds without throwing the item.
- 14) Wearing socks- Ellen must wear both socks without removing them for at least 5 minutes.
- 15) Wearing shoes - Ellen must wear both shoes without removing them for at least 5 minutes.
- 16) Tolerating objects (15secs)- Ellen must tolerate having an item next to her (on the couch, at the table) for at least 15 seconds without throwing the materials or pushing the object on the floor.

### *Aberrant Behavior*

Any instance of self-hitting, self-kicking, self-scratching, throwing items

## **Bob**

### *Approach response*

Must take at least one step forward and make a flat handed/grab touch to the arm of the investigator, above the wrist and below the shoulder

Example: Bob approaches the investigator and touches investigator/staff on the wrist.

Non-example: Bob approaches the investigator and pushes investigator out of the way to close a door.

### *Communicative Responses*

Approaches the investigator/staff (see above) and uses any of the following signs and gestures:

1. Eat (snacks): bringing closed fingers to mouth
2. Drink (coffee)-bringing two hands toward mouth

### *Task Compliance*

Initiates task within 10 seconds of instruction:

- 1) "Hand shake"- Bob must reach out with one hand and make contact with the investigator's hand.
- 2) Connect Four- Bob must independently place 5 checkers into the Connect Four game board without throwing any of the pieces
- 3) Clothes in basket- Bob must independently place 3 pieces of clothing into a laundry basket.
- 4) Bean game- Bob must place 5 beans into the game board without throwing any of the materials.
- 5) Pour a drink- Bob must independently pour a drink from a pitcher into cup (at least half full)
- 6) Carry Laundry basket to specific area- Bob must carry his laundry basket to an area (e.g., table, washing machine) designated by the investigator without removing the contents of the basket.
- 7) Chinese Checkers- Bob must place 5 marbles onto the game board without throwing any of the materials.
- 8) "Hand over items"- Bob must give the investigator an item in which he is holding without throwing the materials.

- 9) Transfer Clothes- Bob must remove the contents of the laundry basket and put the contents in an area (e.g., inside washing machine, on bed) designated by the investigator.
- 10) Close washer lid-Bob must close the washing machine lid when instructed.
- 11) Sort Coins-Bob must place 3 coins into a piggy bank when instructed without throwing the materials.
- 12) Open washer lid-Bob must open the washing machine lid when instructed.
- 13) "Sit at the table"- Bob must down at the table when instructed and stay seated for at least 30 seconds.
- 14) "Place unwanted items into a bin"-Bob must place unwanted items into a designated area (e.g., laundry basket, bin) and not into the kitchen drawers.
- 15) String beads-Bob must independently place 3 beads onto a string without throwing the materials.
- 16) Puzzle-Bob must complete a puzzle with anywhere between 2-6 pieces without throwing the materials.

*Aberrant Behavior*

Pushing staff/investigator and while grunting, throwing materials

**Appendix B**  
**Example Datasheet for Dependent Measures**

<b>Interval</b>	<b>Approach Responses</b>	<b>Communication</b>	<b>Reinforcer</b>
20:00-19:00		I P No	
19:00-18:00		I P No	
18:00-17:00		I P No	
17:00-16:00		I P No	
16:00-15:00		I P No	
15:00-14:00		I P No	
14:00-13:00		I P No	
13:00-12:00		I P No	
12:00-11:00		I P No	
11:00-10:00		I P No	
10:00-9:00		I P No	
9:00-8:00		I P No	
8:00-7:00		I P No	
7:00-6:00		I P No	
6:00-5:00		I P No	
5:00-4:00		I P No	
4:00-3:00		I P No	
3:00-2:00		I P No	
2:00-1:00		I P No	
1:00-0:00		I P No	
		I P No	
<b>Tasks</b>		I P No	
<i>Beginning</i>		I P No	
<i>Middle</i>		I P No	
<i>Last</i>		I P No	
	I P No	I P No	
	I P No	I P No	
	I P No	I P No	
	I P No	I P No	
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No		
	I P No	<b>Problem Behavior</b>	<b>Frequency</b>
	I P No	Pushing Others	
	I P No	Throwing Materials	
	I P No	Hitting	
	I P No	Pinching	
	I P No	Biting	

**Appendix C**  
**Treatment Fidelity Datasheet**

**Investigator's Behavior**

<b>Approach 1</b>					
<b>Approach 2</b>					
<b>Approach 3</b>					
<b>Approach 4</b>					
<b>Approach 5</b>					
<b>Approach 6</b>					
<b>Approach 7</b>					
<b>Approach 8</b>					
<b>Approach 9</b>					
<b>Approach 10</b>					
<b>Approach 11</b>					
<b>Approach 12</b>					
<b>Approach 13</b>					
<b>Approach 14</b>					
<b>Approach 15</b>					
<b>Approach 16</b>					
<b>Approach 17</b>					
<b>Approach 18</b>					
<b>Approach 19</b>					
<b>Approach 20</b>					

R-delivers preferred item  
Q-asks "What do you want?"  
P-prompts correct response  
EC-error correction for incorrect response  
T-presents a task demand

## Appendix D Social Validity Survey

1) The investigator and the participant developed a positive relationship throughout the course of the study.

1	2	3	4	5	Did not observe their interactions
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	

2) The participant enjoyed spending time with the investigator.

1	2	3	4	5	Did not observe their interactions
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	

3) The teaching procedures used in the study were appropriate for the participant.

1	2	3	4	5	Did not observe their interactions
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	

4) The skills taught to the participant were important for him/her to know.

1	2	3	4	5	Did not observe their interactions
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	

5) The participants used his/her new skills with people other than with the investigator.

1	2	3	4	5	Did not observe their interactions
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	

6) Participating in this study was beneficial to the participant.

1	2	3	4	5
Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree