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In Search of Solutions to Prompt Dependence: Teaching Children with Autism to Use Photographic Activity Schedules

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The progress of children with autism is often impeded by overdependence on prompts delivered by other people. Children who have learned to dress, play with toys, complete household chores, or greet other people often fail to display these responses unless teachers or parents prompt them to do so. Although verbal prompts may be carefully faded from instructions to single words, to initial sounds, and finally, to expectant looks, and although these cues may be progressively delayed, transfer of stimulus control from prompts to task-related stimuli frequently fails to occur.

It is possible that discrete-trial training and other forms of teacher-directed instruction foster prompt dependence. For example, in a discrete-trial paradigm, the teacher gives an instruction or asks a question, and the learner attempts (or does not attempt) to follow the instruction, receives (or does not receive) a reward, and waits for the teacher to initiate the next trial. Typically, intertrial latencies are determined at least in part by child performance: Behavior other than quiet waiting delays the next trial and the next reinforcement opportunity. Therefore, both passive waiting and adult instructions may become discriminative for reinforcement. Early in intervention, however, discrete-trial training is often necessary to diminish incompatible responses and shape critical skills such as sitting quietly, looking at relevant materials, and pointing when requested to do so (Etzel & LeBlanc, 1979), as well as to establish vocal and motor imitation.

Children's dependence on adults' prompts may promote an undesirable set of contingencies; children may be rewarded for prompted performances, and adults may be rewarded by children's compliance. Under these circumstances, prompts are likely to accelerate, and there are fewer opportunities for transitions from prompted to unprompted responding. Some years ago, we attempted to address this problem by establishing gradually decreasing criteria for the number of verbal prompts that intervention agents might deliver in specified time periods. This

strategy did not achieve the desired outcome, because prompt fading was associated with increases in children's stereotypic and disruptive responses.

If children with autism could respond to stimuli in the physical environment without prompts from other people, their daily activities would more closely approximate those of their nondisabled peers. In addition, parents would be spared the virtually continuous supervision that is often perceived as highly stressful and isolating.

Research on Pictorial Stimuli

Between 1979 and 1985, a number of investigators (e.g., Connis, 1979; Frank, Wacker, Berg, & McMahon, 1985; Martin, Rusch, James, Decker, & Trtol, 1982; Sowers, Rusch, Connis, & Cummings, 1980; Thinesen & Bryan, 1981; Wacker & Berg, 1983, 1984; Wacker, Berg, Berrie, & Swatta, 1985) reported using pictorial cues (line drawings, pictures, or photographs) to help children, adolescents, and adults with mild-to-severe retardation engage in self-care, home-living activities, and vocational tasks. These studies used packages of prompting procedures. Typically, some combination of instruction, modeling, verbal and physical correction, behavioral rehearsal, and contingent praise and snacks was used to teach participants to engage in a depicted task, turn to the next picture, complete that pictured activity, and so on.

A first investigation of the use of pictorial stimuli with children with autism (Knapp, McClannahan, & Krantz, 1986) used a multiple-baseline design across three children, ages 6, 10, and 14, who were taught to follow a five-component photographic activity schedule that included jigsaw puzzles, parquetry design blocks and boards, an audiotape player and exercise tape, dot-to-dot worksheets, and handwriting worksheets. Photographs of these materials were mounted on cardboard and prominently displayed in consecutive order. Preinvestigation assessment documented that, when instructed to do so, the children could complete all target activities without further assistance and could correctly label each activity represented in the photographs.

Teaching procedures initially included verbal prompts, modeling, behavioral rehearsal, behavior-specific praise, and contingent delivery of tangible rewards, but as children learned to follow their pictorial schedules, verbal prompts were replaced by gestural prompts, and the teacher's presence was gradually faded, so that by the end of the training condition, she was no longer present. The youngsters met criterion in the training setting (a school dining room) in 5–15 sessions, but probes conducted in a different setting (a classroom) at a different time of day showed that schedule-following skills did not transfer until the trainer provided verbal prompts in that setting. Although two of the participants responded to a single instruction to generalize and subsequently displayed high levels of engagement while completing depicted tasks without prompts, the third remained dependent on the trainer's directions throughout the study.

This unwanted but familiar outcome led to a reassessment of teaching procedures. Because the goal was enabling children to remain engaged in appropriate activities in the absence of adult instruction, verbal prompts were limited to single, beginning instructions, such as "go and play" or "find something to do," and teachers subsequently used only manual guidance to teach children to point to a picture, obtain necessary materials, complete a depicted activity, put materials away, return to the photographic schedule, turn a page, and repeat this series.

In addition, a sequence of most-to-least prompts was selected because it was comparatively errorless. Teachers were trained to guide children manually through activities and to prevent errors, long interresponse times, and stereotypies. Gestural prompts were prohibited, and manual prompts were delivered from behind the children, so that stimuli associated with adult supervision would not intervene and interrupt response chains. As children developed proficiency in following picture schedules, prompts shifted from graduated guidance, to spatial fading, to shadowing, and ultimately the teacher's presence was faded from the room or activity area.

Consequent events were also scrutinized, and rewards for following pictorial activity schedules were embedded in schedules; preferred stimuli (e.g., snacks, TV, play activities) became depicted activities. In addition, for very young children and children with severe disabilities who were learning to follow their first pictorial schedules, edibles were contingently delivered from behind; teachers continued to "stay out of the way" (i.e., not intervene between children and their pictures and activities).

The efficacy of these procedures was documented in a multiple-baseline design across four boys with autism who resided in a community-based group home (MacDuff, Krantz, & McClannahan, 1993). Photographic activity schedules that depicted six after-school activities were taught with graduated guidance. The pictorial stimuli generated sustained engagement in an hour-long sequence of home-living activities in the absence of adults' instructions; in addition, engagement and schedule-following skills were maintained over a significant period of time and generalized to a different sequence of photographs and to different photographs of new activities.

Subsequent to this investigation, the boys' photographic schedules were gradually extended, eventually encompassing all of their waking hours from their arrival home from school until bedtime. Although they appropriately engaged in and completed depicted activities, independently changed tasks, and moved across different group-home settings, they were, for the most part, silent participants in family living, in spite of the fact that all had acquired some expressive language skills. Interaction tasks—greeting others, requesting assistance with homework assignments, asking for adult attention (e.g., tickling, wrestling), and requesting preferred snacks—were added to their picture schedules and gradually acquired stimulus control.

Concomitantly, data from the clinic suggested the usefulness of including photographic activity schedules in home programs. Photographs are readily

transported to a variety of settings, and they can easily be programmed for use in training settings and children's own homes (Stokes & Baer, 1977). Therefore, an investigation was designed to assess the effects of intensive, short-term, in-home assistance to teach the parents of three boys with autism to use graduated guidance to help their children follow photographic schedules that began after school and concluded after dinner. In addition to leisure, self-care, homework, and housekeeping tasks, the schedules depicted social interactions (Krantz, MacDuff, & McClannahan, 1993). A multiple-baseline design across participants showed that when parents taught their children to follow picture schedules, there were marked increases in engagement and social initiations and decreases in disruptive behavior; these behavior changes were maintained for as long as 10 months.

Photographs as "Natural" Stimuli

Two of the four group-home youths who learned to follow pictorial schedules (MacDuff et al., 1993) later followed written activity schedules (Krantz & McClannahan, 1993). When sight-word reading skills were first acquired, however, words such as *bike* did not evoke bike riding, although a photograph of a bike typically resulted in a correct response. Therefore, superimposition and stimulus fading (Etzel, LeBlanc, Schilmoeller, & Stella, 1981) were used to shift stimulus control from pictures to words; specifically, sight words were superimposed on familiar photographs and were faded in as photographs were faded out. As youngsters' reading skills continued to develop, written schedules were lengthened and elaborated, so that they increasingly resembled "to do" lists or appointment books: stimuli that many would acknowledge as naturalistic.

Other "picture readers" have not yet learned to respond to textual stimuli, and they continue to use photographic schedules that enable them to complete socially relevant tasks, change activities, and engage in social interaction—all in the absence of prompts from other people. Their pictorial stimuli seem to be as naturalistic as glasses for people with visual impairment or wheelchairs for people with paraplegia.

Fading Pictorial Stimuli

When photographs are used to evoke complex response chains, it is often necessary to begin with a series of pictures that cue successive, discrete responses. For example, the task of feeding the dog might be sequenced into pictures of the dog's food bowl, a can of dog food, a utensil, a can opener and a partially opened can, the bowl filled with food, the bowl placed in a location where the dog is typically fed, and the dog eating. After children master the responses cued by these photographs, however, it is often possible to fade picture sequences from beginning to end so that feeding the dog is eventually evoked by the last photograph: the dog eating. Similarly, response chains such as table setting or making a school

lunch may initially be represented by many separate photographs but ultimately come under the control of single pictures (e.g., a table that is set or a prepared lunch).

Photographic Stimuli and Choice-Making Skills

The procedures that are effective in teaching youngsters with severe developmental disabilities to respond to pictorial stimuli are also useful in teaching them to make choices. Initially, a child is taught that, on encountering a blank page in the schedule book, she or he should select one of two pictures, mount the chosen photo in the book (Velcro is helpful here), and then engage in the depicted activity. As these skills are acquired, the field of photographs is gradually expanded. Many young people have learned to respond to blank pages in their schedules by making selections from a file box that contains many photographs (e.g., having a snack, taking a rest, looking at magazines, going outdoors, playing the piano).

When the aforementioned skills are mastered, a next programming step involves displaying a variety of photographs on a tabletop or bulletin board and teaching the children, youths, or adults to select and sequence several pictures (i.e., to create a part of their own schedule). Subsequently, the number of photographs is gradually increased so that eventually the clients are specifying the order and content of their own daily schedule and making choices from a large pool of pictures. Many youths with autism have learned to structure their own daily schedules from after school until bedtime. They frequently vary their routines, sometimes completing all work assignments before engaging in leisure activities, sometimes playing first and working later, and sometimes intermixing home-living responsibilities and recreational pursuits.

Pictorial Cues and Time Management

When a child or youth is first taught to follow a photographic activity schedule, activities are selected not only with regard to age appropriateness and current skill levels, but also with attention to the ease of determining when a target activity is completed. For example, a puzzle is finished when the last piece is in place; play with beads concludes when all the beads are strung; and snack is over when the food has been consumed. But many activities do not have clear endings; looking at books, playing with wheeled toys, and listening to music are examples of activities of indeterminate duration. Many people who have acquired the skills prerequisite to schedule following have not yet learned to tell time.

Sowers et al. (1980) addressed this problem by teaching three adults with mental retardation to match pictures of clock faces to real clocks, enabling the trainees to go to and from lunch and coffee breaks at relevant times; however, the sustained vigilance required by this matching task is difficult for some young children with autism, as well as for older persons with severe developmental disabilities.

Alternatively, it is possible to use photographic cues to enable people to set digital timers for designated periods and to put materials away and move to their next activities when timers signal. Initially, several photographs depict the series of (usually color-coded) buttons that must be pressed; later, the relevant responses may be evoked by a single picture. (This strategy has also been useful in teaching people with autism to use microwave ovens and oven timers). It is worthy of note that some children and adults who master the use of digital or kitchen timers later begin to adjust the durations of their own activities; such responses might be taken as indicators of preference.

Photographic activity schedules are also useful vehicles for helping people to schedule temporally remote events and to engage in activities that do not occur on daily bases. For example, a picture of a calendar may evoke checking the calendar for activities, responding to photographs on the calendar (e.g., responding to a picture of a trash can by taking containers to the curb or to a picture of a telephone by calling a friend or relative), and "crossing off" that day so that the next day's date will be readily identifiable.

Clients Prompting Intervention Agents

For many years, there has been broad agreement on the importance of activity schedules as a key feature of human service programs (Favell, Favell, Riddle, & Risley, 1984). Activity schedules identify planned activities, specify when and where they will occur, and note which clients and staff members will participate. Typically, however, activity schedules are managed by intervention agents who prompt clients to go to designated areas at specific times and to engage in previously selected activities with previously identified others. In the interest of efficient intervention, "many service providers exercise a great deal of control over the lives of clients with developmental disabilities" (Bannerman, Sheldon, Sherman, & Harchik, 1990, p. 79); typically, much of this control is exerted through instructions that promote or exacerbate dependence on verbal prompts.

Teaching people with autism to use photographic activity schedules creates another alternative, one in which clients prompt their helpers. A child who has learned to select and use pictorial cues may choose a photograph of the staff member whose help will be enlisted as well as a photograph of a target activity (e.g., a piggyback ride, a walk, a hug). Youngsters may also use photographic cues to initiate instruction: Pictures of relevant materials may evoke requests such as the following:

"Will you teach me *same* and *different?*"
"It's time for reading."
"Could you check my work?"

Those who have not yet acquired expressive language may achieve similar outcomes by presenting photographs or materials to caregivers.

Conclusion

Children, youths, and adults with autism who are nonreaders and who have very small expressive-language repertoires have learned to use photographic cues that enable them to remain engaged in appropriate and relevant activities, to change tasks without prompts from others, and to enter and leave a variety of home, school, and group-home settings independently. Learning to follow photographic activity schedules is associated with decreases in the disruptive behavior of people with lengthy histories of stereotypies, tantrums, aggression, and self-injury. Furthermore, pictorial stimuli can evoke social interactions with staff members, peers, siblings, and parents, and brief, home-based assistance has enabled parents to teach their own children to follow picture schedules at home.

It has been suggested that intervention programs should be responsible for helping individuals perform daily routines that are enjoyable and functional and that these routines should be similar to the usual activities of nondisabled persons (Saunders & Spradlin, 1991). Picture schedules are instrumental in achieving these goals: They facilitate engagement in social-interaction, self-care, academic, home-living, and leisure activities with minimal prompts from others, and they present opportunities to teach choice making and time-management skills that ultimately enable people to construct their own daily routines.

When pictures acquire stimulus control and people with autism are no longer dependent on verbal prompts from staff members, the role of the intervention agent changes. Staff members can circulate among clients, respond to their requests, prompt briefly when necessary, praise good performance, take advantage of opportunities for incidental teaching, make observations that are useful in determining when to add new photographs or fade existing pictorial cues, and interact with clients in ways that more closely approximate typical social exchanges.

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