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A RAPID ASSESSMENT OF SKILLS IN YOUNG CHILDREN WITH AUTISM

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Educational interventions based on the principles of behavior analysis are highly effective for establishing skills in young children with autism. As a first step in program development, the child's current skill level is determined by evaluating performance on tasks drawn from a preestablished curriculum. However, few specific guidelines have been delineated for conducting these skills assessments or interpreting the results. In this study, we evaluated an efficient methodology for conducting skills assessments. Six children who had been diagnosed with autism participated. The relative efficacy of two assessment packages—one containing several reinforcement procedures and one containing several potentially effective prompts—was evaluated across two to three skills for each child using multiple baseline and reversal designs. Results suggested that the methodology was useful for matching targeted skills to appropriate interventions.

DESCRIPTORS: autism, differential reinforcement, instructional strategies, noncompliance, skills assessment

Research conducted over the past 40 years has identified a number of effective instructional and motivational strategies for children with autism and other developmental disabilities. For example, prompts that involve alterations to task material (e.g., exaggerating certain features of the task), insertion of additional material (e.g., pictorial cues), or other forms of assistance provided by the teacher (e.g., modeling the correct response) have been found to increase the likelihood that a child will perform correctly when learning new skills (see MacDuff, Krantz, & McClannahan, 2001, for a review). Various motivational strategies have been shown to increase compliance to task demands and to decrease escape-motivated behavior (e.g., DeLeon, Neidert, Anders, & Rodriguez-Catter, 2001; Roane, Fisher, & Sgro, 2001). These strategies include delivering potent reinforcers for compliance, providing opportunities to choose reinforcers or tasks, and interspersing known tasks with unknown tasks (see R. L. Koegel, Koegel, & McNerney, 2001, for a review).

One important step in program development is to assess the child's current skills in the targeted curriculum areas. Although a number of efficient standardized skill assessments are available for children with autism, these assessments typically do not generate information that is precise enough to identify specific behaviors to teach (Notari & Bricker, 1990; Romanczyk, Lockshin, & Matey, 2001). More important, standardized assessments are not useful for identifying the most effective instructional strategies for individual children. Educational research with typically developing children has increasingly focused on the value of matching instructional strategies to the student's current skill level (e.g., Daly & Martens, 1994; Daly, Martens, Kilmer, & Massie, 1996; Eckert,

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Ardoin, Daly, & Martens, 2002). For example, drill and reinforcement are appropriate when a student has acquired a skill but is not yet fluent, whereas prompting should be used with skills that have not yet been acquired.

In lieu of standardized assessments, many authors recommend that parents and teachers of children with autism conduct informal assessments by evaluating the child's performance on tasks drawn from a preestablished curriculum (e.g., Romanczyk et al., 2001; Taylor & McDonough, 1996). However, few specific guidelines have been delineated for conducting skills assessments or interpreting the results.

A child is often said to have a skill deficit if the task materials and relevant instructions do not occasion a predetermined level of performance in the absence of prompts. Results of studies with typically developing children have shown the importance of understanding how certain features of directives (e.g., complexity of instructions; types of prompts used) affect performance on tasks (McComas et al., 1996; Richman et al., 2001). Richman et al. systematically increased the complexity of the task instruction for 22 children while the target behavior and consequences for correct responding remained unchanged. For all participants, response accuracy was directly related to the complexity of the directives. Results of a second experiment revealed an interaction between the effectiveness of certain prompts and the type of task used (i.e., academic vs. play activities) for some children. In a third experiment, a child's response to effective versus ineffective directives was influenced by the consequences for responding (i.e., differential reinforcement for attempts vs. differential reinforcement for accurate responses only).

Together, the findings of Richman et al. (2001) indicate that the effects of antecedent and consequent events on task responding should be evaluated across multiple skills when assessments for children with autism and developmental disabilities are conducted. Appropriate interventions for specific tasks may be readily identified by separately evaluating the effects of motivational procedures and instructional prompts on task responding. For example, reinforcing correct responses may lead to near-perfect performance without the need for prompts. Strategies designed to promote maintenance and generalization (e.g., schedule thinning, incidental teaching) would be suitable for these skills. On the other hand, a skill should be targeted for further instruction with prompts and prompt-fading procedures if reinforcement procedures alone have minimal effect on performance.

However, research findings suggest that various motivational and instructional interventions may produce idiosyncratic effects across children and skills or lead to relatively gradual changes in performance. For example, a child may respond to certain types of prompts (e.g., alterations to the task materials) but not to other types (e.g., model prompts). In a similar manner, choice or task-interspersal procedures may be needed to enhance the effects of reinforcement procedures for some children (e.g., L. K. Koegel & Koegel, 1986). A fairly lengthy assessment may ensue if various interventions have to be evaluated before clear improvements in performance are obtained.

This problem may be circumvented by combining several potentially effective motivational strategies (reinforcement, choice, and task interspersal) into one assessment condition and several potentially effective prompts (task alteration, demonstration) into a second assessment condition. In this manner, similar assessment conditions could be applied across children and tasks. The viability of this approach was evaluated with children who had been diagnosed with autism.

METHOD

Participants and Settings

Participants were 6 children who had been diagnosed with autism, including the first 5 children to enroll in an early-intervention summer program (Robert, Mary, Harvey, Wendy, and Lester). The 6th participant (Peter) was a child who had been referred for the assessment and treatment of problem behavior after the inception of this study but prior to the summer program. Peter, an 8-year-old boy, was enrolled in a self-contained classroom for children with developmental disabilities at a private school. He could say a few words but rarely engaged in spontaneous speech. He imitated the verbal and motor actions of others and followed instructions requiring an action and an object. Peter engaged in aggression and disruption in the classroom. Results of a functional analysis conducted prior to the study (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) indicated that his problem behavior was maintained by escape from demands (data are available upon request). He was not receiving any medication at the time of the study. Robert, a 5-year-old boy, was homeschooled at the time of this study. Robert's mother reported that he could label at least 20 common objects but rarely used speech spontaneously. She also reported that he imitated the verbal and motor actions of others and followed instructions requiring an action and an object. Robert exhibited tantrums at home and was taking citalopram for "emotional outbursts" (crying spells).

Mary was a 4-year-old girl who attended a self-contained preschool classroom for children with autism. Her teacher reported that Mary emitted a few words and sounds but rarely engaged in spontaneous speech. She imitated certain sounds and motor actions of others and followed some instructions requiring an action and an object. Her teacher also reported that Mary frequently eloped and occasionally threw materials in the classroom. She was receiving fluoxetine and risperidone (for aggression and elopement) and Clonidine (for sleep problems) at the time of this study. Harvey was a 4-year-old boy who attended a self-contained preschool classroom for children with autism. He had no expressive language skills. Harvey's teacher reported that he did not imitate sounds or motor actions of others and never followed instructions requiring an action and an object. He engaged in aggression, screaming, and self-injury. Results of a functional analysis conducted prior to the study (Iwata et al., 1982/1994) indicated that these behaviors were maintained primarily by escape from demands (data are available upon request). Harvey was not receiving medication at the time of the study.

Wendy, a 5-year-old girl, attended a self-contained preschool classroom for children with autism. She had no expressive language skills. Wendy's teacher reported that she did not imitate sounds but sometimes imitated the motor actions of others. Her teacher also reported that Wendy followed some directions requiring an action and an object. Wendy was taking carbamazepine for seizures at the time of the study. Lester was a 6-year-old boy who attended a self-contained preschool classroom for children with autism. He had no expressive language skills. Lester's teacher reported that he did not imitate sounds or motor actions of others and never followed instructions requiring an action and an object. Lester was receiving chelation to remove mercury from his body at the time of the study.

Peter's sessions were conducted in a small area of the school library. The area contained a table, chairs, shelves of books, and materials needed to conduct the sessions. For the other participants, sessions were conducted in two small therapy rooms in a building that housed a university-based early-intervention summer program. The rooms con-

tained a table, chairs, and materials needed to conduct the sessions.

Response Measurement and Reliability

For all participants except Harvey and Lester, correct responding on tasks was defined as initiating the requested action (i.e., touching the task materials) within 5 s of the therapist's instruction and completing the response within 10 s of the instruction. For Harvey and Lester, correct responding on tasks was defined as completing the requested action within 10 s of the therapist's instruction. The 5-s task-initiation requirement was excluded from the definition for Harvey and Lester because it was anticipated that they would require different types of instructional prompts than the other participants (see further explanation below). The form of the correct response was determined individually for each task (see further discussion below).

Observers used laptop computers to collect frequency data on correct responses. A second observer independently collected data during at least 50% of the sessions for each participant. Mean occurrence agreement for correct responses was 93.3% (range, 83% to 100%) for Peter, 97.7% (range, 50% to 100%) for Robert, 99.8% (range, 67% to 100%) for Mary, 98.5% (range, 71% to 100%) for Harvey, 96% (range, 50% to 100%) for Wendy, and 97.8% (range, 75% to 100%) for Lester.

Procedure

Prior to the study, paired-choice preference assessments were conducted using procedures similar to those described by Fisher et al. (1992) to identify highly preferred stimuli (toys, food, attention) for each child. Food and leisure items were evaluated in separate preference assessments (DeLeon, Iwata, & Roscoe, 1997). The highest ranked items were used in the study (see details below). Tasks were selected from popular curriculum guides for children with autism (Leaf & McEachin, 1999; Maurice, Green, & Luce, 1996). Preacademic skills (identifying shapes, numbers, letters, colors; matching objects) and receptive language skills (following one-step instructions, such as "roll the ball," "put the ring on the stack," "hand me —.") were selected for each child. These skill areas were identified by the child's teacher (or, for Robert, by his mother) as those that the child had been working on during the current school year or those that would be targeted in the upcoming school year. The materials and instructions were similar to those used in the child's classroom or home. However, specific tasks within each skill area (e.g., the colors used to assess color identification skills, the objects used to evaluate receptive language skills) were selected somewhat arbitrarily for each child. In addition, all tasks required the child to complete an action with an object.

In all conditions, the child was seated at a table with the experimenter. Prior to each session, the experimenter demonstrated the correct response to the child and then physically guided the child to complete the response. Each session consisted of 10 instructional trials. The instructional trials consisted of (a) an initial verbal instruction with or without prompts, (b) the child's response to the instruction, and (c) the therapist's response (or lack thereof) to the child's behavior. All disruptive behavior was ignored. Three to six sessions were conducted per day for each child, usually 5 days per week.

Baseline. Instructional trials were presented approximately on a fixed-time 10-s schedule. At the beginning of each trial, the experimenter placed the necessary materials on the table in front of the child and delivered the relevant instruction (e.g., "hand me green"). If the child exhibited the correct response within 5 s of the initial instruction, the materials were removed, and the trial was terminated. If the child began to respond

within 5 s (touched the materials) and either did or did not complete the correct response within 10 s, the materials were removed and the trial was terminated. If the child did not touch the materials within 5 s, the materials were removed and the trial was terminated for all participants except Harvey and Lester. For Harvey and Lester, each trial lasted 10 s even if the child did not touch the materials within 5 s. Unlike the other participants, Harvey and Lester reportedly did not imitate, so more intrusive prompts (e.g., placing the task materials in the child's hand) were planned for some phases of the assessment. Eliminating the 5-s task-initiation requirement ensured that the type of prompt provided by the therapist would not influence the amount of time available to respond correctly. No programmed consequences were provided for correct or incorrect responses. Three to six sessions were conducted with each task.

The purpose of this condition was to identify two or three target tasks and at least one maintenance task for each child. Target tasks were defined as those associated with 30% or fewer correct responses. This criterion was selected because a child could respond correctly on 30% of trials due to chance alone on many of the tasks (i.e., those involving three-choice discriminations). When tasks involved multiple discriminations (e.g., identifying three colors in a set), the data were analyzed further to determine if the child was consistently responding correctly to one stimulus in the set (e.g., correctly identifying green but never yellow or red). If so, the task was modified to eliminate the known discrimination, and baseline sessions were repeated with the modified target task. Maintenance tasks, defined as those associated with 80% or greater correct responses, were used during the reinforcement condition (see description below). Skills that were likely to meet the criterion for maintenance tasks (as reported by caregivers or teachers) were evaluated first during baseline. No target tasks were exposed to the reinforcement condition until at least one maintenance task was identified. Tasks identified for each child and definitions of correct responses are shown in Table 1.

Reinforcement. Procedures were identical to those described above except that (a) target tasks were interspersed with maintenance tasks, (b) reinforcement was delivered for correct responses, and (c) opportunities to choose were incorporated into the sessions. Initially, maintenance and target tasks were interspersed on a one-to-one basis (i.e., 10 maintenance task trials were interspersed with 10 target task trials). One maintenance task trial was interspersed with every two or three target task trials if correct responses began to increase under this condition. Correct responses on either the target or maintenance task produced access to reinforcement (praise plus a small piece of food or 20-s access to a toy) during the first few instructional trials of each session; thereafter, correct responses on the target task produced praise plus the tangible reinforcer and correct responses on the maintenance task produced praise only (Charlop, Kurtz, & Milstein, 1992). Reinforcing stimuli used for each child were based on the results of preference assessments conducted prior to baseline (see description above). Procedures for Peter differed slightly because attention was identified as his most preferred reinforcer. Enthusiastic praise was delivered when Peter responded correctly on the target task, and brief, less enthusiastic praise was delivered when he responded correctly on the maintenance task. Whenever possible, opportunities to choose were incorporated into the sessions. For example, at the start of each session, some participants were given opportunities to select the reinforcers or maintenance tasks that would be used during the session. (Initial sessions with Lester indicated

Table 1
Tasks and Definitions of Correct Responses for Each Child

Child	Target tasks: Correct responses	Maintenance tasks: Correct responses
Peter	Matching colors (two-choice discrimination): Placement of blue or yellow bear in the corresponding color square. Pegboard: Placement of a peg fully in a hole. Matching numerals (1, 2, 3, etc.) to words (one, two, three, etc.) (three-choice discrimination using flashcards): Placement of number on the corresponding word.	Alphabet puzzle: Correct placement of letter in puzzle.
Robert	Matching numerals (4, 5, 6) to numerals (4, 5, 6) (three-choice discrimination using flashcards): Placement of number on the corresponding number. Alphabet puzzle (letters H, M, U, Y): Correct placement of letter in puzzle. Receptive numbers (5, 6, 7, 8) (four-choice discrimination using flashcards): Placement of the correct flashcard in therapist's open hand.	Shapes puzzle (circle, triangle, oval, rectangle, and diamond): Correct placement of shape in puzzle.
Mary	Receptive shapes (single discrimination using a 3-D object): Placement of the triangle in therapist's open hand. Receptive colors (red, yellow, blue, green) (four-choice discrimination using flashcards): Placement of correct flashcard in therapist's open hand. Matching words to pictures (flower, pretzels, car, fork) (four-choice discrimination using flashcards): Placement of word on the corresponding picture.	Alphabet puzzle: Correct placement of letter in puzzle. Shape sorter: Correct placement of shape in sorter.
Harvey	Receptive object labels (shoe, sock, cup, spoon, block) (three-choice discrimination using 3-D objects): Placement of correct item in therapist's open hand. Receptive shapes (square, circle, rectangle, triangle) (three-choice discrimination using flashcards): Touching correct flashcard. Receptive colors (red, yellow, green, blue) (three-choice discrimination using flashcards): Placement of correct flashcard in therapist's open hand.	Animal puzzle: Correct placement of piece in puzzle. Shape sorter: Correct placement of shape in sorter.
Wendy	Receptive object labels (block) (single discrimination using 3-D object): Placement of block in therapist's open hand. Receptive shapes (square, circle, triangle)(three-choice discrimination using flashcards): Placement of correct flashcard in therapist's open hand.	Ring stack: Placing a ring on a stack and releasing it.
Lester	Shape puzzle (square): Correct placement of square piece in puzzle. Receptive object labels (doll) (single discrimination using a 3-D object): Placement of the doll in therapist's open hand.	Shape puzzle (circle): Correct placement of circle piece in puzzle. Roll ball: Pushing ball toward therapist.

Table 2
Reinforcers, Choices, and Prompts Used for Each Task in the Assessment

Child	Target tasks	Reinforcers and choices	Prompts
Peter	Matching colors	Praise; chose color of bear to match on each trial.	
	Pegboard	Praise; chose color of peg to insert on each trial.	
	Matching numerals to words	Praise; chose number to match on each trial.	Correct word moved closer to child; therapist modeled correct response.
Robert	Matching numerals to numerals	Praise plus food items (goldfish crackers, potato chips, Reese's Pieces®, cookies); chose food item prior to each session.	
	Alphabet puzzle	Same as above.	All but the four targeted letters placed in puzzle; therapist pointed to correct space in puzzle.
	Receptive numbers	Same as above.	Correct number moved closer to child; therapist modeled correct response.
Mary	Receptive shapes	Praise plus food item (potato chip, goldfish cracker); chose food item and maintenance task prior to each session.	
	Receptive colors	Same as above.	Correct color moved closer to child; therapist modeled correct response.
	Matching words to pictures	Same as above.	Same as above.
Harvey	Receptive object labels	Praise plus food item (potato chip, Starburst®, gummi bear) plus Barney doll; chose food item and chair prior to each session.	Therapist modeled correct response, then placed item in child's hand.
	Receptive shapes	Same as above.	Correct shape moved closer to child; therapist modeled correct response.
	Receptive colors	Same as above.	Therapist modeled correct response, then placed card in child's hand.
Wendy	Receptive object labels	Praise plus food item (potato chip) plus toys (scrubby, clacker); chose color of ring to stack.	
	Receptive shapes	Same as above.	Correct shape moved closer to child; therapist modeled correct response.
Lester	Shape puzzle	Praise plus toys (bubbles, See n Say®).	
	Receptive object labels	Same as above.	Therapist physically guided response, then placed doll in child's hands.

that he had difficulty making choices, i.e., he grabbed items randomly, so the choice component was discontinued.) A more complete description of the specific reinforcers and choices for each child and task is given in Table 2. The purpose of this condition was to determine if the antecedents inherent in the task (materials and relevant verbal instruction) would improve performance when combined with reinforcement procedures.

Prompts. Procedures were identical to baseline except that the initial instruction

was paired with one or more prompts. Specific prompts for each task and child are described in Table 2. In most cases, some type of response prompt (e.g., modeling the correct response) was combined with a stimulus prompt (e.g., altering the task material). For children who reliably imitated the actions of others, a model prompt was delivered simultaneously with the initial instruction. Some type of physical prompt (placing the material in the child's hand or physically guiding the response) was combined with the initial instruction for children who did not have a history of responding to model prompts (Harvey and Lester). To evaluate the effects of the prompts per se, no consequences were provided for correct or incorrect responses. This condition was implemented only when a child failed to meet the performance criterion with a certain task under the reinforcement condition (see further description of experimental design below).

Combined intervention. Procedures were identical to those described under the reinforcement and prompts conditions. The purpose was to determine if performance would improve when the two interventions were combined. This condition was conducted only if the performance criterion was not met for a certain task under either assessment condition. Results would rule out the possibility that the strategies evaluated in the assessment were ineffective for improving performance on a given skill.

Experimental Design

A combined reversal and multiple baseline design across tasks was used. Following the baseline condition, the reinforcement condition was always implemented first. A reversal to baseline and replication of the reinforcement condition were conducted if correct responses met or exceeded 70% of trials within the first two or three sessions under reinforcement. The prompts condition was implemented if correct responses did not increase under the reinforcement condition. If correct responses met or exceeded 70% of trials within the first two or three sessions under the prompts condition, a reversal to the reinforcement condition and replication of the prompts condition followed. If responding did not reach at least 70% under either condition, the two procedures were combined.

RESULTS

Results across target tasks for each participant are shown in Figures 1 through 3; results for the maintenance tasks are not shown. Peter's performance exceeded the acquisition criterion under baseline for one of four skills evaluated (correct placement of letters in an alphabet puzzle; $M = 90\%$ correct). This task was designated the maintenance task. As shown in the left panel of Figure 1, correct responses on two of the remaining three skills (matching colors and placing pegs in a board) increased to at least 80% within the first three sessions under the reinforcement package, an outcome that was replicated following a reversal to baseline. However, performance on the final skill (matching numbers to words) did not improve unless the intervention packages were combined. Robert exceeded the acquisition criterion under baseline for one of four skills evaluated (correct placement of shapes in a shape puzzle; $M = 100\%$). This task was designated the maintenance task. Under the reinforcement package, performance on just one of the three remaining skills (matching numbers) met the criterion (see right panel of Figure 1). Correct responding on the final two skills (correct placement of letters in a puzzle and receptive numbers) did not exceed chance levels under reinforcement but met the criterion when prompts were used.

During baseline, Mary's performance exceeded the acquisition criterion on two of five tasks (correct placement of letters in a

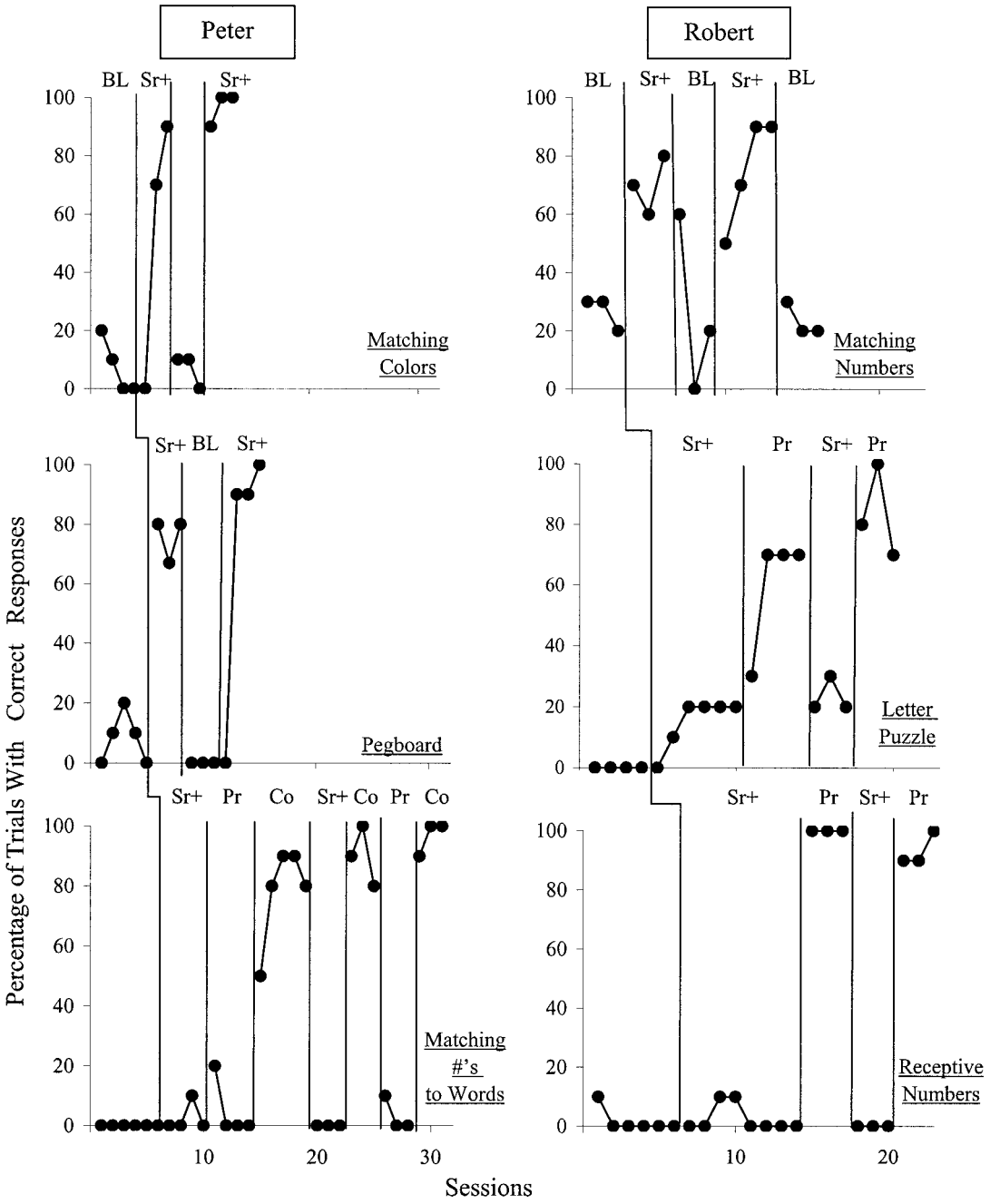

Figure 1. Percentage of trials with correct responses on the target tasks for Peter and Robert. BL = baseline; Sr+ = reinforcement condition; Pr = prompts condition; Co = combined condition.

puzzle, $M = 80\%$, and correct placement of shapes in a shape sorter, $M = 96\%$), which were designated maintenance tasks. As shown in the left panel of Figure 2, three different outcomes were obtained for the remaining skills: Performance improved under the reinforcement condition for receptive shapes, the prompts condition for matching words to pictures, and the combined intervention for receptive colors. For Harvey, re-

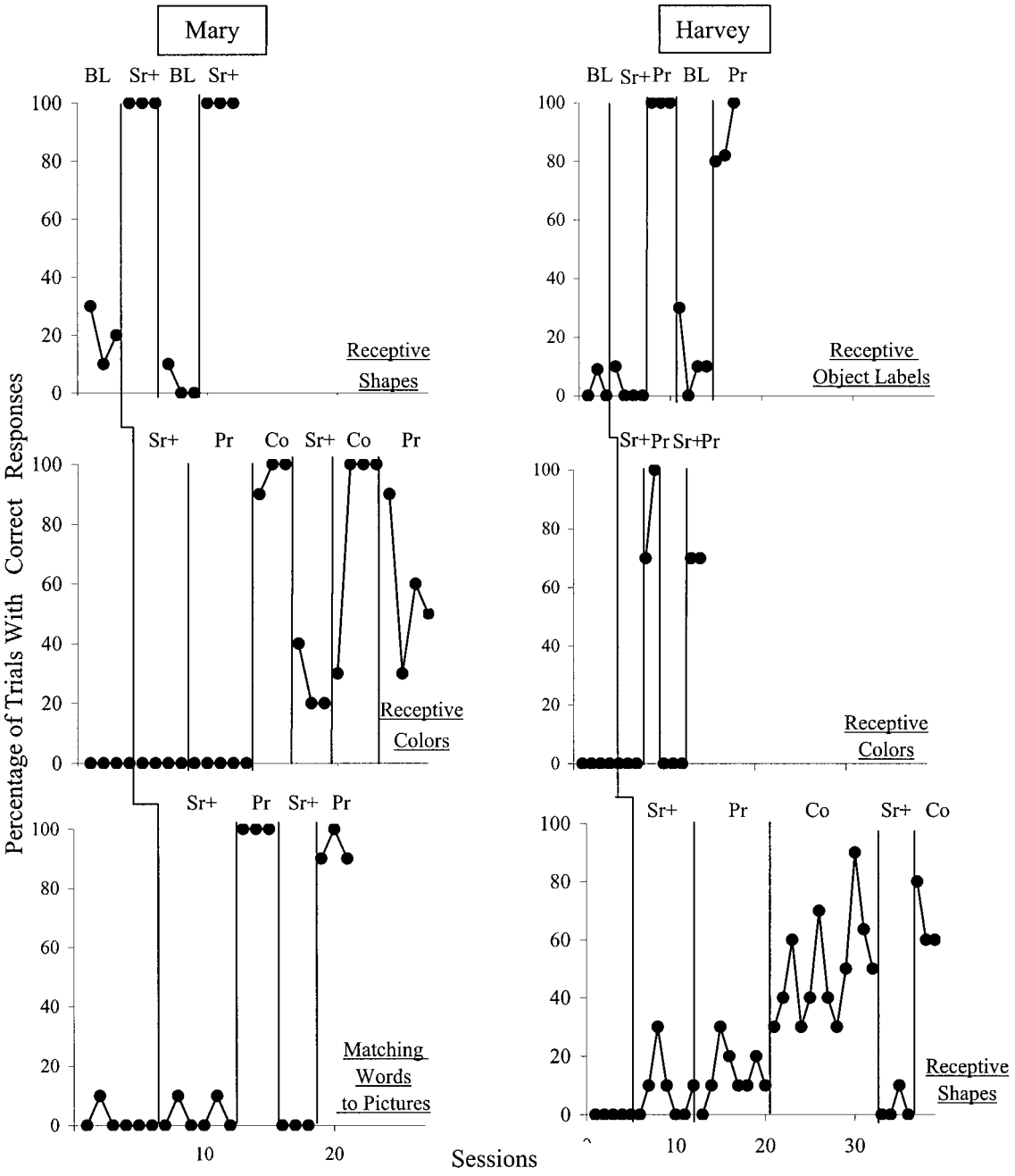

Figure 2. Percentage of trials with correct responses on the target tasks for Mary and Harvey. BL = baseline; Sr+ = reinforcement condition; Pr = prompts condition; Co = combined condition.

sponding on two of five tasks exceeded the acquisition criterion in baseline (correct placement of objects in a puzzle, M = 100%, and correct placement of shapes in a shape sorter, M = 100%). Performance on two of the three remaining skills (receptive object labels and receptive colors) met the criterion only when prompts were used (see Figure 2, right). For the remaining skill (receptive shapes), correct responding rarely ex-

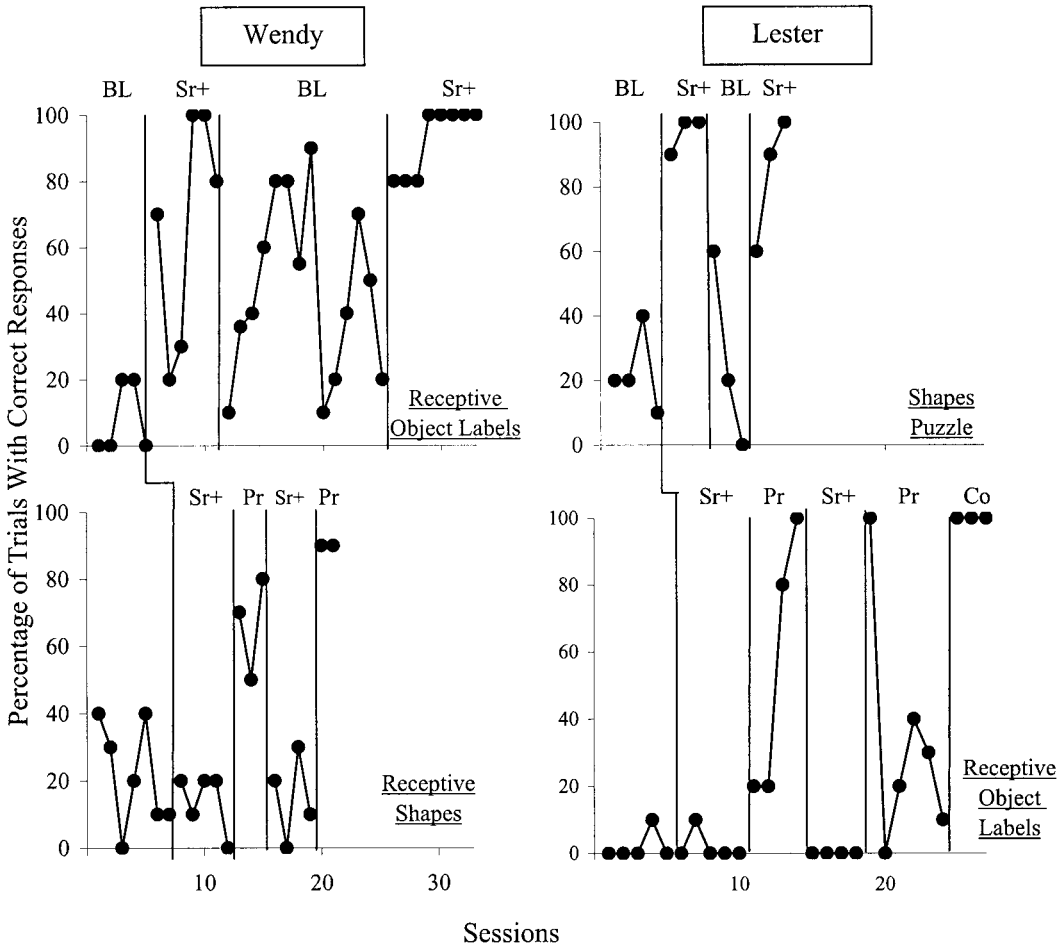

Figure 3. Percentage of trials with correct responses on the target tasks for Wendy and Lester. BL = baseline; Sr+ = reinforcement condition; Pr = prompts condition; Co = combined condition.

ceeded chance levels under either the reinforcement or prompts condition. Responding was variable but eventually met the criterion when the interventions were combined. A reversal to the reinforcement condition indicated that prompts were still needed for this remaining skill following lengthy exposure to the combined intervention.

Only two target skills and one or two maintenance tasks were identified for the remaining 2 participants due to time constraints. For Wendy, performance on one skill exceeded the acquisition criterion under baseline (stacking rings; M = 100%). Responding on one of the two target skills (receptive object labels) met the criterion under the reinforcement condition (Figure 3, left). Wendy received extended exposure to the second reinforcement phase due to variable responding when reinforcement was withdrawn. Performance on the other skill (receptive shapes) met the criterion when prompts were delivered. After identifying two maintenance tasks (rolling ball, M = 100%, and placing circle piece in puzzle, M = 100%), similar results were obtained for Lester (Figure 3, right). However, for one skill (receptive object labels), reinforcement had to be combined with prompts after re-

sponding decreased to baseline levels during his second exposure to the prompts condition.

DISCUSSION

Results suggested that this assessment methodology was useful for evaluating performance on educational tasks in a clear and efficient manner. Skills that did and did not exceed an acquisition criterion were identified during baseline. For 5 of 6 children, correct responding on one or more of the designated target tasks immediately increased to high levels under the reinforcement condition. This finding indicated that the antecedents inherent in the task (i.e., materials, relevant verbal instructions) combined with the reinforcement procedures were adequate to produce mastery on these skills. Performance on at least one task for each child did not improve to a meaningful degree under the reinforcement condition, yet did so when prompts were introduced alone or combined with the reinforcement package. These results suggested that the children were unable to complete these tasks independently (i.e., respond correctly in the presence of the task materials and relevant verbal instructions) and that additional training with prompts and prompt-fading procedures would be appropriate for these skills.

The idiosyncratic outcomes across children and skills highlight the importance of including each target in a systematic assessment prior to program development. The assessment methodology also generated some important information about performance that would not be obtained from other types of assessment, such as verbal reports from caregivers, direct observation of the child in the natural environment, and standardized skill assessments. In addition to providing baseline data on tasks drawn from a prespecified curriculum, results of the assessment differentiated among skills that (a) persisted for at least brief periods in the absence of programmed reinforcement, (b) were exhibited with high levels of accuracy with reinforcement procedures alone, and (c) were responsive to commonly used instructional prompts in the absence of other educational interventions (e.g., error correction).

Parents and teachers could use this information to match targeted skills to appropriate interventions. For example, further instruction with prompts, prompt fading, and reinforcement would be recommended for tasks that fail to meet an acquisition criterion with reinforcement procedures but that do so with prompts. Strategies to promote maintenance and generalization (e.g., schedule thinning, incidental teaching) would be indicated for skills that meet the criterion with reinforcement alone. Finally, tasks that meet the acquisition criterion in the absence of reinforcement or prompts could be incorporated into task-interspersal procedures when teaching new skills.

This approach has several additional advantages over other methods of assessment. First, direct measurement of task performance probably generates more reliable, valid information about current skills than does caregiver report or naturalistic observation. A parent, teacher, or other observer may rarely see a child engage in a skill if correct responses produce reinforcement infrequently in the natural environment or if few opportunities arise for the child to engage in the behavior. Second, this rapid skills assessment likely will be more efficient than naturalistic observations, which must be conducted in all relevant contexts in which a specific behavior might occur. Sessions in the current assessment lasted between 3 min (baseline and prompts conditions) and 10 min (reinforcement condition), and most skills were assessed in less than 30 sessions.

This skills assessment also may be useful for differentiating between skill deficits and

noncompliance in an objective manner. When a skill is assumed to be part of a child's repertoire, the failure to follow task instructions is typically termed noncompliance or a performance deficit. However, skill deficits and noncompliance may not be readily distinguishable during an initial skills assessment. In fact, treatments for noncompliance often combine both instructional and motivational components, including prompts; reinforcement for compliance; and physical guidance, error correction, or remedial trials for noncompliance (e.g., Horner & Keilitz, 1975; Neef, Shafer, Egel, Cataldo, & Parrish, 1983; Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Russo, Cataldo, & Cushing, 1981). If a child has already acquired a skill but is noncompliant to the instruction, the reinforcement package alone should lead to improved performance. On the other hand, the failure to follow an instruction may indicate that the skill has not yet been acquired if reinforcement procedures alone have minimal effect on performance but prompts are associated with increases in correct responses (Noell, Freeland, Witt, & Gansle, 2001).

Nevertheless, the extent to which this assessment can correctly differentiate noncompliance from skill deficits is unclear for several reasons. First, reinforcing correct responses may produce rapid learning. Second, prompts may decrease the likelihood of noncompliance by making the task less effortful. Both possibilities could be evaluated in future studies by exposing some or all of the target responses to prompts prior to reinforcement or by exposing all target responses to both assessment conditions regardless of the outcomes. Finally, correct responding may be low during the reinforcement condition if prompts have discriminative control over compliance. To minimize this possibility, the reinforcement condition should contain a number of salient stimuli that are discriminative for reinforcer delivery (e.g., reinforcers should be visible; reinforcement should be delivered for compliance to interspersed maintenance tasks), and the therapist should prompt the child to engage in the correct response at least once prior to each session.

The procedures used in this study contained some features that warrant further discussion. First, several potentially effective strategies were combined into each assessment condition to increase the likelihood of obtaining rapid improvements in performance. Thus, it is unclear which components were functionally related to the changes in performance and if similar outcomes would have been obtained with a single intervention (e.g., reinforcement only; one type of instructional prompt). Second, some educational strategies that are routinely included in skill-acquisition programs were excluded. In the prompts condition, for example, no consequences were delivered for correct or incorrect responses so that any improvements in performance could be attributed to the prompts. As part of clinical practice, however, prompts should be combined with consequences if performance does not improve under the reinforcement condition.

Third, the effectiveness of prompts was not evaluated for skills that improved under the reinforcement condition. It seemed most practical to first determine whether the antecedents inherent in the task (i.e., materials, relevant verbal instructions) combined with the reinforcement procedures would be adequate to produce mastery on these skills. If so, the prompts condition was omitted because the use of prompts with these skills seemed superfluous. However, a more complete assessment would have provided additional information about the separate effects of prompts and reinforcement on task responding and, as noted above, may have shed further light on the viability of distin-

guishing between skills deficits and noncompliance.

Despite these limitations, results suggest that this assessment approach may be an important tool for both research and clinical purposes. The reliability and validity of this assessment and the generality of this methodology should be evaluated further across other types of skills and responses. The relation between assessment outcomes and the efficacy of certain educational strategies also could be evaluated in future studies. For example, numerous studies have evaluated strategies to promote skill acquisition and performance in individuals with developmental disabilities, yet skills typically have been selected for inclusion on the basis of verbal report or brief, informal naturalistic observations. Initial skills assessments may help to clarify the operative mechanism of educational interventions (i.e., differentiate between those that promote maintenance vs. those that promote acquisition) and increase the generality of research findings. For example, some authors have suggested that guided compliance procedures may be more effective for teaching new skills than for treating noncompliance (e.g., Handen, Parrish, McClung, Kerwin, & Evans, 1992). Finally, further research is needed on efficient methodologies for assessing the relative effects of interventions that are typically combined to teach new skills to individuals with developmental disabilities (e.g., prompting and error-correction procedures; reinforcement and task interspersal).

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STUDY QUESTIONS

1. Aside from providing a measure of performance prior to intervention, what purpose did the baseline condition serve?

2. What criteria were used to select target and maintenance tasks?

3. What three variables were manipulated in the reinforcement condition? What determined the type of prompting strategy that was used for each participant in the prompts condition?

4. Why did the authors present the reinforcement condition prior to the prompts condition?

5. Briefly summarize the results for Mary.

6. How did the overall results of this study support the use of separate assessments to identify the influences of reinforcement and prompting strategies?

7. As suggested by the authors, what are some advantages of the rapid skills assessment over other assessment methodologies?

8. Why was the analysis of prompting less complete than the analysis of reinforcement?

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