**TEAM SPORTS FOR THE SEVERELY RETARDED: TRAINING A
SIDE-OF-THE-FOOT SOCCER PASS USING A MAXIMUM-TO-MINIMUM
PROMPT REDUCTION STRATEGY**

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A program to teach three severely retarded adults to use a side-of-the-foot soccer pass was evaluated. A 9-step stimulus-response chain was taught using forward chaining. In contrast to usual practice, intensive physical prompts were provided initially to teach each response component, then systematically faded. Approximately 20 lessons (trials) were presented in 20-min sessions. A multiple baseline across subjects design showed that the three trainees achieved the no-prompt criterion after 24, 29, and 22 sessions, respectively. Subanalyses indicated that successive response components were learned only after training was implemented. Follow-up data were obtained 57 and 276 days later in the training room and in a gymnasium; in both settings, criterion was achieved with fewer than three reinstructions.

DESCRIPTORS: severely retarded, leisure skills activities, sports skills, prompt

Teaching the severely handicapped to participate in sports has the potential to improve motor and social skills, to teach rule-governed behavior, to provide for peer-based competition, and to contribute to normalization (Cuvo et al., 1983). Recent research describes work to improve the individual sports behavior of severely handicapped people, including swimming (Best & Jones, 1974; Bundschuh, Williams, Hollingsworth, Gooch, & Shirer, 1972), sprinting, and the standing broad jump (Cuvo et al., 1983). Unfortunately, severely retarded people are almost entirely excluded from participation in team sports.

We developed and evaluated a procedure to teach severely retarded people to use a side-of-the-foot soccer pass as an initial component in a program to teach an adapted game of soccer. An im-

portant feature was the use of a maximum-to-minimum prompt reduction procedure in which physical prompts were given first and then systematically faded. Although most researchers have used the opposite approach, the minimum-to-maximum strategy (Snell, 1983), pilot work indicated that such procedures produced high error rates, slow acquisition rates, and various forms of negative emotional response.

Two other considerations supported the use of a maximum-to-minimum prompt reduction strategy. First, we wished to maximize successful performance; hence, we used physical prompts at the beginning of training. In addition, because most training programs in institutions are implemented by direct-care staff, many of whom have little or no training in behavior analysis, we wished to develop a fully articulated, prescriptive procedure that both provided and faded prompts systematically to assure successful progress through the program while avoiding prompt dependence (Bailey, 1985).

METHOD

Subjects and Setting

Three mentally retarded adult males were selected based on the criteria that they (a) be under good instructional control for basic commands, such

A complete description of the training procedures, floor set-up, equipment, observation system, and data analyses is available from Paul D. Luyben, Psychology Department, SUNY-Cortland, Cortland, New York 13045.

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as "Stop," "Look at me," etc.; (b) were both seeing and hearing; (c) could stand on one foot for 1 s when unsupported; (d) could swing one foot when supported; (e) were known to be responsive to particular reinforcers, such as social approval; and (f) would allow trainers to pick up and manipulate a foot while supported.

Their ages ranged from 24 to 52 years, with IQs of 23 and 22 on the Stanford-Binet (Dan and Dave) and 52 on the WAIS (Roger). Receptive and expressive language ranged from good (Roger could talk about the past, present, and future) to extremely poor (Dave used a limited telegraphic vocabulary). Gross motor skills ranged from fair (Roger could run and usually could catch a ball) to poor (Dan ran flat footed and awkwardly, and seldom could catch a ball).

The study was conducted in a room (2.7 m $\times$ 6.7 m) between 2:30 and 5:00 p.m. 3 days a week after work in a sheltered workshop.

Training Materials

Training materials included (a) two standard soccer balls (one for the trainee and another for the assistant trainer) mounted on tees (inverted tennis can lids taped to the floor); (b) "floor prompts"—pieces of tape placed on the floor to indicate correct foot placement; (c) "balance prompts"—a walker, quad cane, and standard cane, used to assist balance while the trainee's foot was manipulated; and (d) two targets—pieces of lightweight, impact resistant, closed-cell styrofoam (0.43 m $\times$ 0.43 m $\times$ 0.07 m).

Task Analysis

The pass was analyzed into nine response components, including:

1. *Get Set*—Place the toe of the kicking foot directly in front of the soccer ball.
2. *Look at the Ball*—Gaze at the soccer ball for at least one-half s.
3. *Grab the Walker or Cane*—Reach forward and grasp the balance prompt placed next to the ball on the nonkicking side of the ball. (This component was eliminated when the balance prompts were faded.)
4. *Step Forward*—With the nonkicking foot, step forward placing the foot adjacent to the ball.
5. *Turn Foot*—Turn kicking foot outward so that the instep of the foot faces the ball and the foot is turned more than 45 degrees from the direction of the kick.
6. *Pick Up the Foot*—Lift up the kicking foot so that both heel and toe are off the ground and the sole is roughly parallel to the ground.
7. *Look at the Ball*—Gaze at the soccer ball for at least one-half s.
8. *Push Foot*—With the ball removed, swing foot forward to simulate the action of kicking. (This step was faded once trainees had mastered the response.)
9. *Pass the Ball*—Swing foot forward, striking the ball with the instep of the foot so that the ball rolls forward and hits the target.

Training Sessions and Lessons

Each 20-min training session began with a demonstration by the assistant trainer of the entry-level response for that day. The remainder of the session consisted of approximately 20 lessons, each of which included an instruction, the prompts prescribed for that lesson, a "do-it signal," the task response, and consequences as appropriate (Becker, Engelmann, & Thomas, 1975). If the response was correct, descriptive praise and approval were given; if incorrect, a descriptive correction was given, followed by a reinstruction sequence in which the trainee was prompted through the response until he performed correctly.

In addition to providing imitative and physical prompts, the assistant trainer monitored each lesson and cued the trainer to ensure that the prescribed sequence was followed, using the following rules: (a) three consecutive correct responses resulted in a step up the training hierarchy; (b) two consecutive errors led to a drop of one level, after which three consecutive responses again were required to progress.

The training hierarchy consisted of a chain of nine response components with several prompt levels associated with each response component. To teach

each successive response component, the trainers first demonstrated the response and then provided *verbal instruction plus a strong physical prompt* in which the assistant trainer held the trainee's body and positioned it correctly. At the next level, the strong physical prompt was replaced with a *mild physical prompt* in which the participant's body was guided into position without enclosure by the assistant trainer's hand. In subsequent levels, physical prompts were succeeded by an *imitative prompt*, followed by *gestural* and *verbal* prompts. Ultimately, all prompts were faded. (Gestural and verbal prompts were provided throughout the program until they in turn were faded.)

Once the entire nine-component response chain had been performed three times at criterion, the balance prompts were faded. The walker was replaced by a quad cane, followed in turn by a standard cane which was eventually withdrawn. The floor prompts that cued foot position for the Get Set and Step Forward response were successively faded by repositioning and by reducing the amount of tape visible. Ultimately the tape was removed completely.

Observation System

All training sessions were videotaped. Event recording was used to score occurrence/nonoccurrence/nonresponse for 10 classes of trainee and 23 classes of trainer responses. The primary data were the percentages of the 92-step training hierarchy on which the trainees had achieved criterion each day. Trainer responses were also scored.

Reliability

A second observer independently rated all training sessions. Agreement percentages were computed on occurrences of trainer and trainee responses, and on nonoccurrences of trainer responses that were prescribed for that lesson but were not emitted (e.g., the trainer failed to provide a prompt that was prescribed for that lesson). An agreement was scored if both observers scored an occurrence or nonoccurrence in exactly the same way. The ratio of agreements divided by agreements plus disagreements multiplied by 100 was used.

Experimental Design

A multiple baseline design across subjects was used. During three lessons provided on each of three baseline days, trainees were instructed to "Pass the ball," after which training was initiated with Roger. Baseline data for the other two trainees were probed at weekly intervals until instruction was begun. Fifty-seven and 276 days after training was completed, maintenance and generalization data were obtained in the training room and in a gymnasium.

RESULTS

Reliability

Reliability data were obtained on all baseline and training sessions. Collapsed across the nine response components for the pass, agreement was obtained on 99% of comparisons. (Coefficients computed separately for the nine response components were 98% or better.) Collapsed across training response categories, agreement was obtained on 97% of comparisons (ranging from 75% to 100% for particular response categories).

Primary Data

During baseline, no instances of a complete side-of-the-foot pass were observed. After training was initiated, Roger, Dan and Dave achieved criterion on the pass after 24, 29, and 22 sessions, respectively. These data are presented in Figure 1.

Acquisition data for the nine response components of the pass are presented separately for each trainee in Figure 2. These data reflect performance during the last three lessons of each training session and show that performance did not improve on any response component until that component was specifically trained in the forward-chaining procedure.

During generalization and maintenance checks, all trainees reached criterion on the pass after only one or two reinstruction lessons.

Program Data

One goal of training was to maximize success. Analysis of overall performance on the pass showed

Figure 1. Percentages of the 92-step training hierarchy at the criterion of three consecutive correct responses across days.

Figure 2. Number of prompted and unprompted correct responses during the last three lessons for each response component across sessions. "F" refers to days when balance or floor prompts were faded.

that the trainees were correct on 94% of the lessons (ranging from 86%–99% for different response components). Further analysis by prompt level showed that lesson performance ranged from 91%–99% correct for the various categories of prompts.

The number of lessons required to attain criterion reflects the difficulty level of the task. Roger achieved criterion on the minimum number of lessons for two of the nine response components, whereas Dan and Dave each did so for one response component. The particular response components on which criterion was achieved with the minimum number of lessons, differed across trainees.

The correspondence between the planned vs. actual training program was assessed, and data showed that training responses (instructions, prompts, and consequences) were correctly implemented on 96.7% of the occasions.

DISCUSSION

Our primary objective was to evaluate a procedure to teach severely retarded people to use a side-of-the-foot soccer pass. The results provide clear evidence that this skill was acquired, and that acquisition was due to the training procedures used. Further, the maintenance and generalization data indicated that acquisition of the pass was not a transitory outcome but was well established.

An important feature of the training was the use of the maximum-to-minimum prompt reduction strategy. The advantages of this procedure were the high initial and sustained rates of successful responding and the simultaneous provision for systematic prompt reduction. One reservation about this procedure, however, was that its use might delay acquisition by requiring exposure to unnecessary prompt levels. Although direct evidence on this question is not available, one might expect that our trainees would have achieved criterion in the minimum number of lessons prescribed to teach response components if the pro-

gram was too easy. In fact, our data showed that this happened only four times, and for different response components across the three trainees. In contrast, we are inclined to believe that intensive practice and high success rates were important factors in producing the maintenance and generalization that were observed. Also, frequently changing the prompt level seemed to maintain motivation by challenging the trainees.

We report the initial step in a program to teach severely retarded people to play a team sport. An interesting problem for future study is whether or not to use the maximum-to-minimum prompt reduction strategy. It may be that this strategy is useful for teaching basic skill topographies (such as the pass and trap) but that other approaches are preferred for teaching offensive and defensive patterns. In the meantime, this project offers hope that severely handicapped people will learn the skills to participate in team as well as individual sports.

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