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Progressive Time Delay Procedure for Teaching Motor Skills to Adults With Severe Mental Retardation

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The purpose of this study was to investigate the effectiveness of the progressive time delay (PTD) procedure on teaching gross motor skills to adult males with severe mental retardation. A multiple probe design across three skills and replicated across 4 participants was utilized. Results indicated that a PTD procedure with a 0 to 5 s delay was effective in teaching 4 participants three gross motor skills (tee-ball batting, softball pitching, croquet striking) over a period of 13 weeks. Data on effectiveness were analyzed in terms of the number of instructional sessions ($M = 9.58$), the number of trials ($M = 105.41$), the number of min ($M = 84.66$), and the number of performing errors to criterion ($M = 4.08\%$). A maintenance level ($M = 96.87\%$) was also determined across 4 participants and three skills on the 1st, 4th, 14th, and 24th sessions after terminating the PTD instruction.

The time delay procedure is recognized in the field of adapted physical activity as an instructional intervention strategy for individuals with severe intellectual disabilities (Sherrill, 1998; Zhang, Horvat, & Gast, 1994). Sherrill (1998, p. 534) defines time delay interventions as “the term to describe attention to the amount of time an individual needs to initiate communication.” Two types of time delay procedure have been used: constant time delay (Zhang et al., 1994) and progressive time delay (our study).

The constant time delay (CTD) procedure is “a response-prompting strategy in which the teacher fades her assistance by systematically inserting a fixed amount

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of time between the presentation of the target stimulus and the delivery of the controlling prompt” (Zhang et al., 1994, p. 349). *Target stimulus*, in this definition, refers to instructional cue (i.e., verbal direction). *Controlling prompt* refers to teacher assistance that ensures correct response (i.e., physical assistance). Although much special education research has been conducted on CTD (e.g., Snell & Gast, 1981; Wolery, Ault, & Doyle, 1992), Zhang, Gast, Horvat, and Dattilo (1995) were the first to report research on the application of CTD to the teaching of task-analyzed lifetime sports to individuals with severe intellectual disabilities. These researchers indicated that CTD was effective in teaching gross motor skills to adolescents, that it increased the teacher’s positive interaction with students, and that it reduced errors during the acquisition of gross motor skills.

The progressive time delay (PTD) is similar to CTD except that a fixed amount of time is not used. Instead, the teacher inserts a progressively longer amount of time between the instructional cue and the controlling prompt (Wolery et al., 1992). The use of a progressively longer time between teacher cue and prompt has been shown to be effective in teaching fine motor skills to students with various disabilities (Smeets & Striefel, 1980; Striefel, Bryan, & Atkins, 1974; Touchette, 1971). However, the application of PTD to teaching task-analyzed gross motor skills to individuals with severe mental retardation (MR) has not yet been reported in the adapted physical activity literature. The purpose of our study, therefore, was to determine the effectiveness of a PTD procedure, which used verbal description plus physical assistance as the controlling prompt when teaching gross motor skills to adult males with moderate to severe MR.

Method

Participants

Participants were 4 male adults with moderate to severe MR; 1 of these participants had Down syndrome. The study was approved by the Human Subjects Research Committee, and informed consent to allow access to confidential files was obtained from both parents and participants. Participants had a mean age of 35.5 years and a mean IQ of 42. Files indicated that IQs had been measured by the Leiter International Performance Scale (Leiter, 1950) and the Wechsler Adult Intelligence Scale (Wechsler, 1981). Adaptive behavior rating scores ranged from 4.5–6.85 with a mean of 6.25 according to their confidential files. All 4 participants came from same group home located in the state of New Mexico. Table 1 summarizes participants’ demographic information.

The sampling design was purposive. Criteria that participants met were (a) ambulatory and able to perform basic motor skills, such as running on a treadmill, biking on a stationary bike; (b) able to understand directions and follow simple verbal commands, respond to social praise, and accept reinforcers; (c) able to remain on an instructional task for 15 to 20 min; and (d) free from significant auditory problems.

Settings and Materials

All preassessment, instruction, and maintenance sessions were conducted in a one-to-one teaching arrangement in the backyard of a group home setting. Stations

Table 1 Participants' Demographic Information

Participants	Age	IQ/Scale	Adaptive behavior (yr)
B.H.	33	25/LIPS	4.60
J.L.	31	40/LIPS	6.10
B.R.	31	48/WAIS	6.10
G.R.	47	55/WAIS	6.90
Mean	35.50	42	6.25
Range	31-47	25-55	4.60-6.90

Note. LIPS refers to Leiter International Performance Scale; WAIS refers to Wechsler Adult Intelligence Scale. B.R. was the participant with Down syndrome.

were set for three skills: tee-ball batting, softball pitching, and croquet striking skills. The equipment used to teach the skills were (a) a tee-ball set with plastic bat, (b) a softball (regular size but softer) with a 4' x 8' target board set, and (c) a croquet set including 6 balls and 6 mallets. Data recording sheets, a video camera, and a VCR were used for the data collection and analysis. Each teaching session was video taped.

Target Skills and Task Analysis

Three target skills were tee-ball batting, softball pitching, and croquet striking. These were selected based on the criteria that each skill would be (a) age-appropriate and (b) community-based. Tee-ball was used instead of softball batting because of vision and skill problems. The rationale behind selection of these three targeted skills was that they were frequently used by people in the community and that they were critical skills that contributed to independent functioning in activities today and in the future (Eichstaedt & Lavay, 1992).

Task analysis refers to the procedure of breaking down a skill or a task into smaller parts. The three task analyses were developed through reviewing textbooks (Block, 1994; Eichstaedt & Lavay, 1992; Sherrill, 1998; Wolery et al., 1992) and related research (Zhang et al., 1994). The primary researcher then gave these task analyses to special/regular physical education teachers (they were public school teachers hired as National Youth Sports Program staff) for review. Some task analyses were revised based on the feedback of the special/regular physical education teachers. The final task analysis for the tee-ball batting skill included eight steps; the softball pitching skill included seven steps; and the croquet striking skill included eight steps (Table 2).

Research Design

A single-subject multiple probe design (Snell & Gast, 1981; Tawney & Gast, 1984) across three gross motor skills and replicated across 4 participants was used to evaluate the effectiveness of the PTD procedure. Each participant was first probed

Table 2 Task Analyses for Three Gross Motor Skills

Skill	Step	Participant response definition
Batting tee-ball	1.	Get ball with hand
	2.	Place ball on tee
	3.	Get bat with hand
	4.	Stand around spot close to plate (the distance that feels comfortable to swing the bat and hit the ball).
	5.	Grip bat with two hands together (left hand on the bottom for right-handed hitter)
	6.	Place bat behind ball
	7.	Swing bat away from the ball
	8.	Swing bat to hit the ball
Softball pitch	1.	Get ball with hand
	2.	Stand around throwing line with face to target (closed the line but not step on the line, or not exact behind the line)
	3.	The ball held in front of the body with both hands
	4.	One step forward (opposed leg of throwing hand)
	5.	Swing throwing arm upward
	6.	Swing throwing arm with full circle motion and forward
	7.	Release the ball to target
Croquet strike	1.	Get ball with hand
	2.	Place ball at the spot
	3.	Get stick with hand
	4.	Stand behind shooting line with face to goal (right behind the line but not step on the line)
	5.	Grip stick with two hands (left hand on top for right-handed hitter)
	6.	Place stick just behind ball
	7.	Swing stick backward
	8.	Swing stick forward and hit the ball to goal

on each skill during the first three sessions for baseline. At the beginning of each probe trial, the teacher gave the participant a task direction (e.g., “It is time to pitch the ball”), and then waited 5 s for the participant to initiate the first step of the task analysis. The participant’s correct response on the previous step was the criterion for him to initiate the next step of the task analysis. A wrong response on a step resulted in the teacher stopping the participant’s response by removing the equipment from the participant’s hand, skipping the wrong step, and setting up the discriminative stimulus for the next step (Zhang et al., 1995). This procedure prevented teaching the participant the target skill during the baseline probe trials but allowed the participant to complete each step of the task analysis for the baseline (Snell, 1987). No error correction or reinforcement was provided on any step during the baseline.

After the baseline level was established, the PTD instruction was then introduced to the participant for the first skill (e.g., tee-ball). When the targeted criterion for the first skill was reached, the participant was probed on the second skill (e.g., softball pitch) for three baseline sessions. (The instructional criterion was defined as a participant achieving 100% unprompted correct responses on three consecutive daily probe trials.) When the baseline level for second skill was established, the PTD instruction was applied to the second skill and then the same procedure for third skill (e.g., croquet striking). Unlike the multiple baseline design, the multiple probe design does not collect baseline data on a continuous basis on behaviors that have not been introduced to the intervention. Rather, probe trials are conducted intermittently on behaviors “to be trained.” These probe trials provide the researcher with data that can be used to evaluate whether a student is improving prior to the introduction of the independent variable (Tawney & Gast, 1984). The multiple probe design avoids the problem of frustration that might cause aggressive behaviors from repeated exposure to unlearned skills without instruction and reinforcement (Collins, 1990; Zhang et al., 1994).

General Procedures

Probe trials were conducted in three types of experimental condition: baseline condition, PTD instructional condition, and maintenance condition. Baseline probe trials, which included six baseline probe trials on each of the untrained skills, were conducted prior to the PTD instruction to evaluate the participant’s performance of an untrained skill. After the PTD procedure was initiated with the first skill, an intermittent baseline trial was conducted once per week for the remaining two untrained skills. As soon as the first skill reached the targeted performance, a continuous baseline trial was conducted for a minimum of three consecutive trials for the second skill prior to initiating the PTD instruction. The same baseline procedure was repeated on the third skill.

A PTD instructional session was conducted each day for each participant, 5 school days per week over 5.75 weeks. A PTD session included 11 instructional trials on a skill, and the session time was approximately 15-20 min. In addition, one daily probe trial on the skill that was being trained was conducted immediately before a PTD session to evaluate the participant’s acquisition of a training skill. When the participant had reached the instructional criterion on a learned skill, the maintenance probe trials were conducted to evaluate the participant’s continued performance of a previously learned skill over time. A maintenance session included four maintenance probe trials.

Instructional Procedures

A progressive time delay procedure with 1 s increment interval (0 s to 5 s; Snell & Gast, 1981) was employed in this investigation. A progressive delay starting at 0 s was employed. The first instructional session involved the teacher presenting the task and immediately prompting the correct movement. After 100% correct response was achieved with verbal plus physical assistance for a 0 s delay session, the following sessions employed 1, 2, 3, and 4 s. After 100% correct response was achieved for a 4 s delay session, the rest of the sessions utilized 5 s delay trials. On a given seconds delay trial, the investigator waited the appropriate amount of time by counting silently “1001,” “1002,” “1003,” “1004,” and “1005” before providing

the controlling prompt (e.g., verbal plus physical assistance) for each step of the task analysis. If the participant responded correctly after the target direction was delivered and before a controlling prompt was delivered, or within 15 s after the teacher provided the controlling prompt, reinforcement was provided. If the participant responded incorrectly at any time, for instance after the target direction was delivered or before the controlling prompt was provided, the teacher physically interrupted the step, immediately saying, "Wait, let me help you if you don't know how to do it." The teacher then provided the participant with physical assistance in order to complete the task.

Maintenance Procedures

After each participant had reached the criterion on each skill, the maintenance sessions were conducted. The participant's performance on each of three trained skills was scheduled in four maintenance sessions, which were set on the 1st, 4th, 14th, and 24th sessions (Zhang et al., 1995) after terminating the PTD instruction. Each maintenance session consisted of four trials: one prompt trial and three review trials (Zhang et al., 1995).

Data Collection Procedure and Data Analysis

The response types used in this investigation were a modification of the ones used in Zhang et al. (1994). Two types of correct and three types of incorrect responses were recorded in the study: (a) an unprompted correct response was defined as a participant initiating a step response within the given delay interval after the verbal direction and correctly completing the response within 15 s; (b) a prompted correct response was defined as a participant not resisting physical assistance provided by the investigator and initiating the correct response within a given time delay interval after delivery of the verbal instruction and completing a step response within 15 s; (c) an unprompted wrong response was defined as a participant initiating a step response within the given time delay interval after the verbal instruction but completing it incorrectly or not completing it within 15 s or completing the step out of sequence of the task analysis; (d) a prompted wrong response was defined as resistance to physical assistance provided by the instructor within a given time delay interval to perform any response other than one that was the verbal instruction after the delivery of the verbal instruction or not completing the response with 15 s; and (e) a no response was defined as not initiating a response within the designated time (15 s) after the verbal instruction (Zhang et al., 1994).

Only unprompted correct steps were counted toward completion of the instructional criterion. The instructional criterion was defined as a participant achieving 100% unprompted correct responses on three daily probe trials. The number of sessions, trials, minutes, and errors to criterion were collected. All participants' responses were coded by reviewing video tapes of each instructional session.

The method of visual inspection of the graphed data was based on the guidelines provided by Tawney and Gast (1984). Unprompted correct steps for the daily probe trials were graphed daily for each participant. Analysis was made of (a) level (data) stability and change in level within conditions and (b) graph trend direction and trend stability and changes in trend within conditions. The data were computed as a mean and percentage and presented in figures and tables.

Reliability Analysis

Following the method of Zhang et al. (1994), reliability data were collected by the primary investigator and a doctoral student in southern region of the United States. The graduate student was trained by the primary investigator to observe the teaching procedure from video tapes for five sessions. He then practiced on a sample of video tapes using data sheets until 90% agreement with the primary investigator was obtained. Total reliability of participants' responses was computed according to the point by point method for calculating interobserver agreement (Tawney & Gast, 1984). The formula for this reliability measure was the number of agreements divided by the number of agreements plus the number of disagreements and multiplied by 100 (Billingsley, Write, & Munson, 1980).

Results

Reliability Data

Instructional reliability data on participant performance were collected with a 31.3% of the total 115 sessions (Schuster, Gast, Wolery, & Guiltinan, 1988; Zhang et al., 1994). One baseline session, one 2 s delay session, one 4 s delay, and one 5 s delay session were randomly collected from each skill for each participant and then across three skills and 4 participants. Reliability of agreement on student performance for all participants and all skills reported an overall average 95.5%, ranging from 85.7% to 100%. There was a mean of 96.7%, ranging from 85.7% to 100% for baseline sessions, and a mean of 96.3%, ranging from 91.3% to 100% for probe sessions. For instructional sessions, there was a mean of 93.1%, ranging from 91.2% to 98% for 2 s delay sessions; a mean of 93.9%, ranging from 88.7% to 98% for 4 s delay sessions; and a mean of 97.9%, ranging from 92.5% to 100% for 5 s delay sessions.

Data to calculate reliability of agreement on investigator behavior were collected at the same time as participant performance reliability data were recorded. Interobserver agreements averaged 97.7%, ranging from 92% to 100%. There was a mean of 98.8%, ranging from 93.3% to 100% for providing task directions; a mean of 95.6%, ranging from 92% to 98.7% for appropriate delay interval; a mean of 97.9%, ranging from 96.2% to 100% for delivering controlling prompts; a mean of 97.1%, ranging from 93.3% to 100% for ensuring appropriate consequence; and a mean of 99.4%, ranging from 97.5% to 100% for reinforcing at the end of each trial.

Experimental Results

Data from baseline, intervention, and maintenance sessions were collected and graphed. These graphs showed that participants' unprompted correct responses during baseline sessions remained consistently low. None of the participants were able to complete the skill during the baseline sessions even though some participants completed one to two steps on some task analyses. A visual inspection of Figures 1 through 4 for all participants indicates a gradually increasing trend in the direction of improvement after the PTD procedure was employed. This trend continued until the instructional criterion was reached. According to the guidelines of the multiple probe design, if a participant's responding remains at or near baseline level across intermittently conducted probe trials or sessions, and a targeted behavior

improves only after the intervention has been applied, a functional relationship between the independent variable and behavior change has been demonstrated (Tawney & Gast, 1984). Maintenance data were collected across 4 participants on the 1st, 4th, 14th, and 24th days after each skill reached the criterion. Results indicated that a mean maintenance level of 96.87% with a range of 87.5 to 100 remained across participants and skills on the 24th day of the maintenance probe session. Figures 1 through 4 show this trend.

Time Delay Instructional Effectiveness Data

The instructional effectiveness findings of teaching 4 participants tee-ball batting, softball pitching, and croquet striking skills are presented in Table 3, whereas the number of unprompted correct steps as a function of a daily probe trial for all three skills is shown in Figures 1, 2, 3, and 4. These data and figures show the results of each skill completed independently across participants before the prompt. Also, the graphs indicate a gradually increasing trend in the direction of improvement until the instructional criterion was reached.

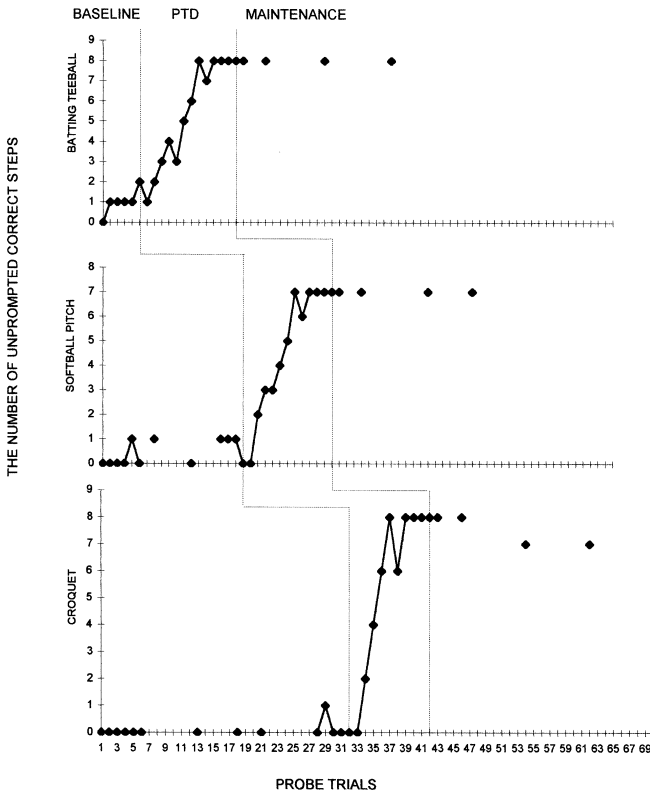


Figure 1 — Number of unprompted correct steps completed by B.H. on three gross motor activities during baseline, PTD, and maintenance sessions.

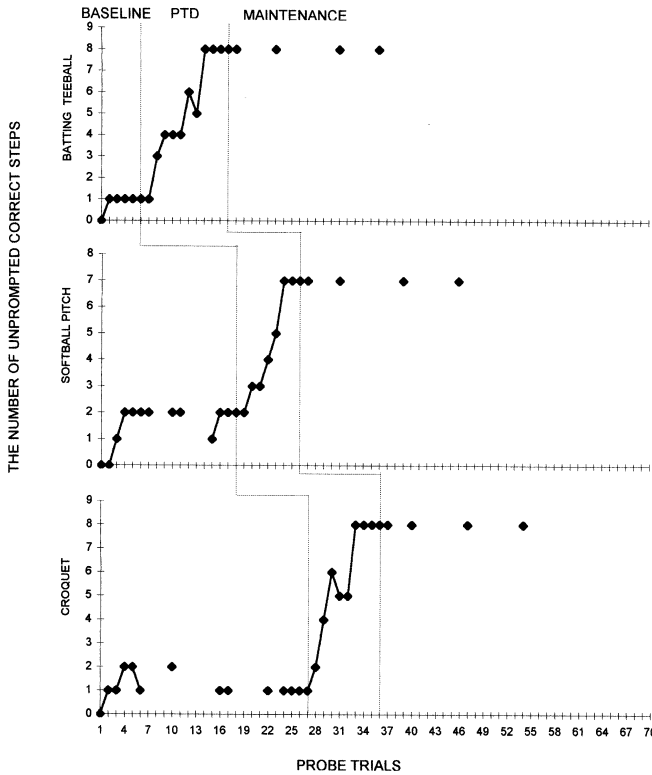


Figure 2 — Number of unprompted correct steps completed by B.R. on three gross motor activities during baseline, PTD, and maintenance sessions.

Number of Sessions to Criterion. The number of sessions for all participants across all training sessions to reach the criterion is presented in Table 3. A total of 115 sessions was used to teach 4 participants the three skills. The mean number of sessions for all three skills to reach the criterion was 9.58 (ranging from 8 to 12). When comparing across each skill, a mean of 10.5 sessions (ranging from 8 to 12) was required to reach the tee-ball batting criterion; a mean of 9.25 sessions (ranging from 8 to 11) was required to reach the softball pitching criterion; and a mean of 9 sessions (ranging from 8 to 10) was required to reach the croquet criterion. When individual means were examined, the participants needed 8.3, 9, 10.3, and 10.6 sessions, respectively, to meet the criterion performance level.

Number of Trials to Criterion. The number of trials required to reach the criterion for 4 participants across three skills is presented in Table 3. A total of 1,265 trials was required to teach 4 participants three skills to criterion. The mean number of trials for all three skills to reach the criterion was 105.41 trials (ranging from 88 to 132). When examined across skills, a mean of 115.5 trials (ranging from 88 to 132) was required to reach the tee-ball criterion; a mean of 101.75 trials (ranging from 88 to 121) was required to reach the softball pitching criterion; and a mean of 99 trials (ranging from 88 to 110) was required to reach the croquet criterion. When means were examined for each participant, G.R. needed a mean of

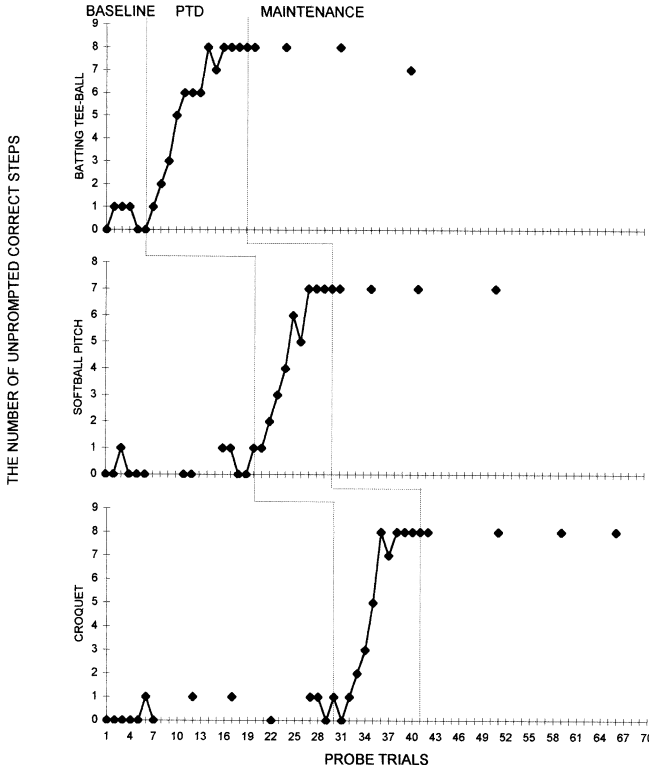


Figure 3 — Number of unprompted correct steps completed by J.L. on three gross motor activities during baseline, PTD, and maintenance sessions.

91.6 trials, B.R. needed a mean of 99 trials, J.L. needed a mean of 113.6, and B.H. needed a mean of 117.3 trials to reach the criterion of all three skills.

Instructional Time to Criterion. The actual instructional time required for 4 participants to reach the criterion is presented in Table 3. A total of 1,016 min was required to teach 4 participants three skills to criterion. The mean number of minutes for all three skills to reach the criterion was 84.66 min (ranging from 88 to 132). When counting for each skill, a mean of 105.5 min (ranging from 89 to 127) was required to reach the tee-ball batting criterion; 63 min (ranging from 58 to 74) were required to reach the softball pitch criterion; and 85.5 min (ranging from 64 to 113) were required to reach the croquet criterion. When comparing across each participant, G.R. needed a mean 71 min, B.R. needed a mean 74 min, J.L. needed a mean 95.6 min, and B.H. needed a mean 97.6 min to reach the criterion for all three skills.

Percentage of Errors to Criterion. The percentage of errors during the PTD instructional session is presented in Table 3. A total of 382 errors occurred out of 9,713 learning steps while teaching 4 participants three skills. The mean of errors for all three skills to the criterion was 4.08% (ranging from 1.23 to 8.95). Across skills, a mean of 3.02% errors (ranging from 1.23 to 5.34) occurred to reach the tee-ball criterion; 5.08% errors (ranging from 3.8 to 8.95) occurred while teaching

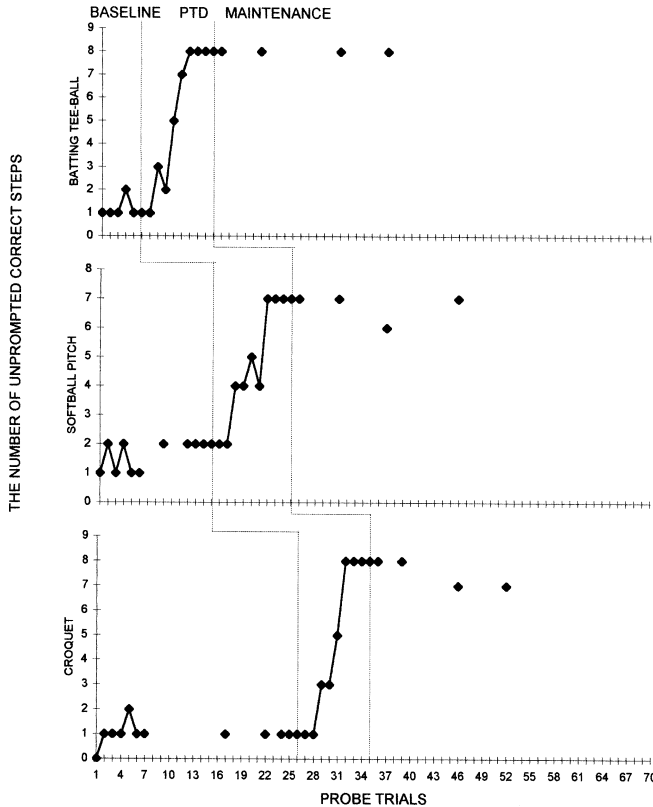


Figure 4 — Number of unprompted correct steps completed by G.R. on three gross motor activities during baseline, PTD, and maintenance sessions.

the softball pitch to criterion; and 4.15% errors (ranging from 3.52 to 5.26) occurred during teaching of the croquet skill to criterion. When counting for each participant, G.R. made a mean 5.82% errors, B.R. made a mean 4.19% errors, J.L. made a mean 2.93 errors, and B.H. made a mean 3.39% errors to reach the criterion of all three skills. Most research in special education reporting error rates during PTD instructional conditions has indicated a mean error rate of 10% or less to criterion (Snell, 1982; Touchette & Howard, 1984).

Maintenance Session Data

Maintenance session data for all participants are presented in Table 3. In this study, maintenance data were collected on the 1st, 4th, 14th, and 24th days after each skill reached the criterion. On the 1st day and the 4th day of the maintenance probe session, all participants independently completed all steps with 100% correctness on all three skills. On the 14th day of the maintenance probe session, all participants independently completed 100% correctly on the tee-ball skill, but only 2 participants completed 100% correctly on the softball pitch and croquet skills. The other 2 participants performed correctly at 85% or 87% (6, 7 steps). When the

number of correct steps was divided by the total number of steps, a mean maintenance level of 96.72% with a range of 85.7 to 100 remained across participants and skills on the 14th day maintenance probe session. On the 24th day maintenance probe session, all participants independently completed 100% correctly on the tee-ball skill and the softball pitch skill except J.L. who completed at 87.5% correct (7, 8 steps) on tee-ball. B.R. and J.L. performed 100% correctly on croquet, while B.H. and G.R. performed correctly at 87.5% (7, 8 steps). When the number of unprompted correct steps was divided by the total number of steps, a mean maintenance level of 96.87%, ranging from 87.5% to 100%, was attained across 4 participants and three skills on the 24th day maintenance probe session.

Table 3 Number of Sessions, Trials, Minutes, Errors, and Maintenance Required to Meet Criterion Performance

Category	Tee-ball	Softball	Croquet	Mean
Number of sessions to meet criterion				
B.H.	12	11	9	10.60
J.L.	12	9	10	10.30
B.R.	10	8	9	9
G.R.	8	9	8	8.30
Mean	10.50	9.25	9	9.58
Number of trials to meet criterion				
B.H.	132	121	99	117.30
J.L.	132	99	110	113.60
B.R.	110	88	99	99
G.R.	88	99	88	91.6
Mean	115.5	101.75	99	105.41
Number of minutes to meet criterion				
B.H.	127	74	92	97.60
J.L.	114	60	113	95.6
B.R.	92	58	73	74.30
G.R.	89	60	64	71
Mean	105.5	63	85.5	84.66
Percentage of error (%)				
B.H.	2.27	4.25	3.66	3.39
J.L.	1.23	4.04	3.52	2.93
B.R.	5.34	3.08	4.17	4.19
G.R.	3.27	8.95	5.26	5.82
Mean	3.02	5.08	4.15	4.08
Maintenance level/24th day (%)				
B.H.	100	100	87.5	95.9
J.L.	87.5	100	100	95.9
B.R.	100	100	100	100
G.R.	100	100	87.5	95.9
Mean	96.87	100	93.75	96.87

The result indicated that a high percentage of correct skills was demonstrated during the maintenance sessions.

Discussion

The purpose of our study was to investigate the effectiveness of the PTD procedure on teaching gross motor skills to adult males with moderate and severe MR. Results indicated that the PTD procedure using verbal description plus physical assistance as a controlling prompt appeared to be effective in teaching three task analyzed gross motor skills to adults males with moderate to severe MR. This research presents a new method of teaching gross motor skills to individuals with severe mental retardation in an adapted physical activity setting.

The results of our study are in agreement the results of previous research using the PTD procedure to teach fine motor skills in special education (Godby, Gast, & Wolery, 1987; Snell, 1982). Participants with MR are limited in their ability to think and synthesize; therefore, using the PTD procedure plus one controlling prompt (verbal plus physical assistance with a 1 s increment delay schedule) appears to promote effective learning.

In our study, the mean error rate was 4.08%, ranging from 1.23% to 8.95%. Participants made a total of 382 errors out of 9,713 steps in learning all three skills. PTD procedure impacts errors by allowing a more gradual fading of prompts. We used only a 1 s increment fading schedule during each instructional session, which reduced the chance of errors. According to Zhang et. al. (1994), the constant time delay procedure has a larger increment fading schedule between 0 and 4 s session (e.g., from 0 s jumping to 4 s), which might increase the chance of errors while waiting for the student's response. Although no research compares the PTD and the CTD procedures using participants with a variety of disabilities and ages, it would be logical to assume that participants with more severe disabilities would be more successful with progressive time delay because it allows for fewer errors related to a more gradual fading schedule.

Analyzing the results of the PTD procedure indicated that the high percentage of maintenance (96.87%) was related to a low rate of error during the instructional sessions and the review of the learned skills on 1st, 4th, 14th, 24th maintenance sessions. The PTD procedure resulting in a lower error rate acquisition, which helped participants to maintain a high level of correction during the maintenance sessions, is a strength of the PTD procedure.

Combining a PTD procedure with task analyzed skills facilitates effective teaching of gross motor skills to participants with moderate to severe MR. Specific task steps makes the PTD procedure easier to be replicated. We recommend that all teachers use the same analyzed task steps to teach batting tee-ball, softball pitch, and croquet strike. The behavioral effects of the PTD procedure used in this study should be replicated with similar participants across different skills. Replication of this study may further determine whether or not the PTD procedure is effective in teaching individuals with mental retardation. Future research is needed also to compare CTD and PTD procedures to determine which is more efficient in terms of low number of errors and short training time. Future research might also examine the effectiveness of the four-step strategy (ready, look, do, score) of Yang and Porretta (1999) in teaching gross motor skills in relation to the effectiveness of using CTD and PTD procedures.

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