1992

The Effects of Prompting on Catching Proficiency of Young Mildly Retarded Children.

Joseph G. Schmalfeldt
Louisiana State University and Agricultural & Mechanical College

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The effects of prompting on catching proficiency of young mildly retarded children

Schmalfeldt, Joseph G., Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1992
THE EFFECTS OF PROMPTING ON CATCHING PROFICIENCY
OF YOUNG MILDLY RETARDED CHILDREN

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Kinesiology

by

Joseph G. Schmalfeldt
B.S., University of Wisconsin-Milwaukee, 1980
M.S., University of Wisconsin-LaCrosse, 1982
August, 1992
ACKNOWLEDGEMENTS

I would like to thank: Dr. Geoffrey Broadhead for starting me on road to "Ph.D Land"; Dr. Don Franks for taking over as major professor and by providing guidance and technical assistance over this long tedious journey; my wife and children (Deb, Sara, and Jeff) for putting up "Leave dad alone, he's working on his Ph.D.!"; all my friends and colleagues for giving me encouragement to "keep on going"; and finally, my mom and dad, Marilyn M. and John M., for bringing me into this world, and giving me the "never give up" attitude. " Deb, you now can tell your friends and coworkers I finally finished my Ph.D." Finally to my kids, "Yes, now we can go to DisneyWorld!"
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ABSTRACT

This study sought to determine the effects of prompting on the catching proficiency of young mildly mentally retarded boys. The study randomly assigned seventy-two 7 year old boys, thirty-six nondisabled and thirty-six mildly mentally retarded, to 3 treatment groups. The treatments were No, 1 or 3 prompts. The subjects were initially given an catching proficiency pretest. Next, they were given 6 practice sessions over a 2 week period. Finally, they were given a catching proficiency posttest. Both the mentally retarded and nondisabled groups in this study improved with practice. In terms of prompting, 1 prompt was as effective as 3 prompts.
INTRODUCTION

Catching is a fundamental motor skill that requires the use of the hand(s) and other body parts to stop and control a tossed ball or object. Catching is a difficult motor skill to study because of seven factors that influence the measurement of catching performance. These seven factors are: ball size, distance ball travels before being caught, method of ball projection, ball direction in relation to the catcher, ball speed, precatch change of position that is required, and arm/hand position of the catcher (Wickstrom, 1983). Two hand catching is a developmental skill that is generally mastered by children 5 years of age (Williams, 1983). Fischman & Schneider (1985) stated that for successful one-handed catching performance to occur the catcher must be provided three informational items. First, "exteroceptive" (Gibson, 1966; Lee, 1978) which concerns itself with the ball's flight characteristics and its location in space. Second, "proprioceptive" which involves the limb position that is used to accomplish the catch. Finally, the catcher must coordinate these two sources of information "exproprioceptively" (Lee, 1978) so the limb is moved to the correct point of interception at precisely the right moment. This information is utilized by older
individuals possessing mature catching ability. However, children, especially disabled children, may lack the necessary perceptual motor and timing skills to use this important information (Dobbins & Rarick, 1977; Ross & Ross, 1981; Byde & McClenagah, 1984). Wade (1980) reported that mentally retarded subjects have a tendency to be impulsive when performing motor tasks due to a lack of experience and exposure to those motor tasks.

REVIEW OF LITERATURE

A review of research on the comparison of motoric abilities between nondisabled and mildly mentally retarded students has found that the mildly mentally retarded are generally 2 to 4 years behind developmentally compared with their nondisabled peers during childhood (Ulrich, 1983). These skills consist of a wide range of gross and fine motor abilities such as running, jumping, throwing, balance, and activities that require manual dexterity. Research findings also indicate that this gap increases with age and severity of impairment to intellectual functioning (Bruininks, 1974; Ulrich, 1983). Furthermore, there is evidence suggesting that mentally retarded individuals experience difficulty responding to the experimental task presented to them because their perceptual/motor (P/M) skills are
inferior to their nondisabled peers (Dobbins & Rarick, 1977; Ross & Ross, 1981).

Incorporating appropriate learning strategies early in the development of motor skills helps MR children learn to compensate for their decreased cognitive abilities. Wade, Hoover, and Newell (1983) proposed a method to instruct MR individuals based on analysis of the individual's capabilities in relation to requirements of the task(s) to be learned. Vernon (1986) stated that differences in performance between mentally retarded (MR) and nondisabled (ND) individuals on a variety of cognitive tasks may be attributed to differences in the speed of execution of basic information processes and problem-solving skills and strategies rather than to knowledge differences. He stated that MR individuals generally fail to use learning strategies before training; however, they can implement a strategy and improve their performance with minimal instruction or coaching. The review of literature dealing with memory processes and prompting has been limited to studies dealing with young children and studies dealing with the mentally retarded. These studies have shown the use of prompting can assist young ND children to increase their performance levels comparable to children several years
older (Flavell, 1970; Winther & Thomas, 1981). Promoting is defined as an instruction to attend to a particular aspect of a multi-dimensional stimulus or to carry out a particular operation on it (Hartley, Kieley & Slabach, 1990). Prompts reduce the learner's uncertainty about the upcoming stimulus. Studies dealing with memory processes and prompting have shown that prompting can help MR children increase their performance levels comparable to children several years older (Ellis, 1970; Brown, 1974; Kelso, Goodman, Stamm, Hayes, 1979; Reid, 1980; Horgan, 1983). Sugden (1978) found that mildly MR children were less likely to use prompting than their nondisabled peers. Kelso et al. (1979) conducted 3 linear positioning experiments with 35 mild MR students. They reported that the MR children could maintain kinesthetic information up to 7 seconds. These researchers also stated that while no rehearsal strategies were provided to the subjects, it might be beneficial to examine whether the use of rehearsal strategies would enhance the memory and motor performance of MR individuals.

Attentional focusing (AF) is a cognitive strategy designed to encourage the performer to: focus their attention toward, identify, interpret, and respond to
critical task related information (Kahneman, 1973; Whiting, 1975 and Singer, Cauraugh, Tennent, Murphey, Chen, and Lidor 1991). These studies generally have used nondisabled college-aged subjects. Singer et al (1991) stated that the use of AF strategies are suggested as desirable by scholars, but very little research has been completed in this area. Ziegler (1987) reported that beginning tennis players could improve their acquisition of groundstrokes by using AF. She had her subjects focus on 3 observational keys and 1 interim key: 1) to develop early tracking skills, as soon they saw the ball leaving the tennis ball projection, they were to quietly vocalize the word "ball"; 2) to focus on the pathway of the ball, when the ball bounced they were to quietly vocalize the word "bounce"; 3) to focus on contacting the ball with the racquet, when they observed the ball contacting the racquet they were to quietly vocalize the word "hit"; and 4) to get physically ready for the next return they were to quietly vocalize the word "ready".

A search for literature on catching and the development of catching skill for young MR children found few studies (Johnson, 1973; Ryan, 1977; Ulrich; 1983). Johnson (1973) studied the effect of using a specially designed mechanical apparatus to project the
ball with 50 moderately MR students 8 to 10 years of age. He reported nonsignificant differences between a mechanical throwing apparatus treatment group and the hand tossed control group. Ryan (1977) reported that nondisabled 6 and 8 year-old subjects demonstrated more mature catching patterns than their MR peers. Ulrich (1983) found that 50% of the nondisabled subjects demonstrated criterion level catching performance by age 7; however, 50% of the mildly MR subjects did not reach the criterion level of catching performance until age 10.

Most research on catching and the development of catching skill for nondisabled young children concerns itself with the following factors: ball size, ball color, distance and trajectory/interception of the object rather than the qualitative aspects of the skill itself (McClenaghan & Gallahue, 1978; Herkowitz, 1978; Wickstrom, 1983; Williams, 1983). Ridenour (1974) found that horizontal distance and speed of the ball were more important than ball size in helping young children become successful in catching. Payne (1982) reported that first grade children were more successful at catching when using 10 inch playground balls compared to either a 6 or an 8 and 1/2 inch playground ball. Belka (1985) conducted 3 experiments and found: Experiment 1- no
significant differences on the effects of 3 ball sizes (5, 7, and 8-1/2 inches) on catching scores; Experiment 2- that chest height catching was superior to either waist or knee height catching scores; and, Experiment 3- catching scores from 8 feet was superior to either 13 or 18 feet for children 6 and 8 years old.

By introducing prompting techniques during instruction in motor skill development classes, young mildly MR children could develop skills on how to use a prompt in preparation for performing motor skills. This may increase their motor skills to levels that more closely approximate those of their nondisabled peers. Prompting might enable more mildly MR students to participate and interact with nondisabled students in regular physical education classes instead of being placed in a segregated adapted physical education class.

PURPOSE

The purpose of this study was to determine the effects of different amounts of prompting on the catching ability of mildly MR children.

Hypothesis

The use of prompting will improve the catching proficiency of mildly mentally retarded children to levels that closely approximate their nonhandicapped peers.
METHOD

Subjects

This study included 72 male subjects who had a chronological age of 7.0 years to 7 years 11 months: 36 nondisabled and 36 mildly MR students who had IQ scores ranging from 55 - 70 on a standardized intelligence scale (state of Louisiana criteria for students classified as mildly MR, Bulletin 1508, Louisiana Dept. of Education, 1983), and who qualified for adapted physical education services in the mildly motor deficit range (based on state of Louisiana criteria for students eligibility for adapted physical education, Bulletin 1641, Louisiana Dept. of Education, 1989) (see Appendix A). These students demonstrated from 45% to 69% competency on the required state motor proficiency test. An equal number of subjects from each group were randomly assigned to either the control group or one of the two experimental treatment groups. All students participating in the experiment submitted parental/custodial permission forms (see Appendix B).

Procedure

A catching pre-test was given individually to each subject using Cashin’s (1974) scoring scale (see Appendix C) of catching ability. Each subject was given 1 practice
and 12 test trials. Each subject was alternately given two ramp trials then two underhand tossed trials (with a total of twelve trials) trying to catch a 7 inch playground ball that had been rolled off a ramp or tossed to chest height. Balls were bounced or tossed between waist and chest height and within the subject's shoulder width to be counted as a trial, if not the trial was disallowed and another trial was given. The ramp/underhand toss delivery method was used for the practice sessions and post-test.

The ramp/underhand toss method of ball delivery was chosen to standardize the speed, flight, and bounce characteristics for all subjects (see Appendix D) based on the results of the pilot study (Appendix E). The 7 inch playground ball was chosen based on the review of the literature. This size ball is large enough to be caught and controlled with 2 hands yet still allow the subjects the opportunity to use a mature catching pattern (Morris, 1980; Herkowitz, 1978). Hand position was standardized with each subject using a "thumbs up" hand position with each subject informed to "catch with hands only" which promotes a more mature catching pattern.

The pre-test, practice and post-test sessions were videotaped and scored by the experimenter as well as 2
independent scorers (certified adapted physical education teachers). The scorers were trained and had obtained an inter-rater reliability rating of $r=.90$ on scoring the practice sessions (see appendix F).

Two practice strategies (treatments) differentiated by the number of prompts were included in this study. The use of prompts is recommended for MR children (e.g. Belmont and Butterfield, 1978). Sherrill (1986) indicated that short, explicit commands are beneficial when instructing MR children. Three major aspects of catching (Wickstrom, 1983) were emphasized by the prompts, namely, the ready position, hand position, and attention to the ball. The treatments used: (1) one term, "get ready" for the one prompt group, and, (2) three terms, "get ready", "hands", and "ball" for the three prompts group. The subjects in the first treatment group were instructed to "get ready" in the proper preparatory body position to catch the ball. The subjects in the second treatment group were instructed to get in the proper preparatory position to catch the ball when they hear "get ready". Then the experimenter said "hands" so the subject would bring his hands up to the proper position. Finally, the experimenter presented the ball and said "ball" prior to rolling the ball down the ramp or tossing
the ball underhand to the subject. The subjects in the control group received no prompting or catching instruction during the practice or testing sessions. The subjects in each group received individual practice sessions. Each subject had 24 catching trials per practice session (12 ramp and 12 underhand toss, in blocks of 2 ramp, then 2 tossed) three times a week for two weeks (total of 120 catches over two weeks) using the appropriate prompting strategy. A pre-test/post-test format using Cashin's (1974) scoring scale of catching ability was used in this study. Each subject was given 1 practice trial per delivery system then 12 test trials (in blocks of 2 ramp, then 2 tossed) without any prompting for both the pre and post-test. Differences among groups (mildly MR, and nondisabled); treatments (0, 1, and 3 prompts), repeated measures; and device (ramp or hand-tossed), repeated measures were determined by a 2x3x2 ANOVA (p<.05) (see Appendix G). Post hoc ANOVAs, Student Neuman-Keuls multiple comparison, and paired t-tests follow-ups were used for significant main effects of group and interaction.

RESULTS AND DISCUSSION

The findings are presented and discussed in two sections. The first section deals with differences between
groups & prompts in catching proficiency including time (pre-test, post-test), the second section deals with differences between groups and prompts in catching proficiency including device (ramp, tossed). Mean scores and standard deviations tables are included in Appendix H.

**Time**

Table 1 summarizes the results of the prompt/group/time ANOVA. It revealed the main effects of Group, $E(1,66)=11.0$, was statistically significant ($p < .05$) as well as the interaction effect of Prompt with Time (Pre-test,Post-test) $E(2,66)=5.5$. The ND group had higher scores than the MR group. An ANOVA, with Student Neuman Keuls (SNK) follow-up for treatment at the pre- and post-test revealed that 1 Prompt and 3 Prompts were both superior to No Prompts, but not different from each other on both the pre- and post-test (Table 2). Paired t-test revealed (Table 3) revealed that scores for each group increased and were significantly different from pre- to post-test.

**Device**

Table 4 summarizes the results of the Prompt/Group/Device ANOVA. This ANOVA revealed the main effects of Group $E(1,66)=11.0$, Prompt $E(2,66)=4.4$ and Device $E(1,66)=54.2$ were statistically significant ($p < .05$). The
### Table 1

**Group by Prompt Pre/Post ANOVA Summary Table**

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<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
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<td>222.507</td>
<td>11.003</td>
<td>0.0015*</td>
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<tr>
<td>Prompt</td>
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<td>89.715</td>
<td>4.436</td>
<td>0.0156*</td>
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<td>G x P</td>
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<td>20.181</td>
<td>10.090</td>
<td>0.499</td>
<td>0.6094</td>
</tr>
<tr>
<td>Error</td>
<td>66</td>
<td>1334.708</td>
<td>20.223</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Time (T)</td>
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<td>134.174</td>
<td>54.593</td>
<td>0.0000*</td>
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<td>G x T</td>
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<td>4.340</td>
<td>1.766</td>
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<td>P x T</td>
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<td>13.590</td>
<td>5.530</td>
<td>0.0060*</td>
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<td>G x P x T</td>
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<td>5.597</td>
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* Significant p < .05
Table 2
Prompt by Pre/Post ANOVA & SNK Summary Table

Prompt (Pretest) ANOVA Summary Table

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<td>0.022*</td>
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<td>883.750</td>
<td>12.808</td>
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* Significant p < .05

Prompt Pretest SNK Summary Table

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<th>3 Prompts</th>
</tr>
</thead>
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<tr>
<td>No Prompts</td>
<td>XX</td>
<td>S*</td>
</tr>
<tr>
<td>1 Prompt</td>
<td>NS</td>
<td>XX</td>
</tr>
<tr>
<td>3 Prompts</td>
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<td>NS</td>
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* Significant p < .05
### Prompt (Posttest) ANOVA Summary Table

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</thead>
<tbody>
<tr>
<td>Prompt</td>
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<td>103.083</td>
<td>51.542</td>
<td>4.108</td>
<td>0.021*</td>
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<td>865.792</td>
<td>12.546</td>
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* Significant p < .05

### Prompt Posttest SNK Summary Table

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<th>3 Prompts</th>
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<td>XX</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>1 Prompt</td>
<td>NS</td>
<td>XX</td>
<td>NS</td>
</tr>
<tr>
<td>3 Prompts</td>
<td>NS</td>
<td>NS</td>
<td>XX</td>
</tr>
</tbody>
</table>

* Significant p < .05
Table 3

Prompt Group Means & Paired T-Tests

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<th>Post $\bar{x}$</th>
<th>$t$</th>
<th>$p&lt;$</th>
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</thead>
<tbody>
<tr>
<td>No Prompts</td>
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<td>45.08</td>
<td>3.92</td>
<td>0.0007*</td>
</tr>
<tr>
<td>1 Prompt</td>
<td>45.04</td>
<td>48.00</td>
<td>6.03</td>
<td>0.0001*</td>
</tr>
<tr>
<td>3 Prompts</td>
<td>45.96</td>
<td>46.79</td>
<td>2.35</td>
<td>0.0278*</td>
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* Significant $p < .05$
Table 4

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<td>222.507</td>
<td>11.0030</td>
<td>0.002*</td>
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<td>Prompt</td>
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<td>89.715</td>
<td>4.436</td>
<td>0.016*</td>
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<td>G x P</td>
<td>2</td>
<td>20.181</td>
<td>10.090</td>
<td>0.499</td>
<td>0.609</td>
</tr>
<tr>
<td>Error</td>
<td>66</td>
<td>1334.708</td>
<td>20.223</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Device (D)</td>
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<td>232.562</td>
<td>54.165</td>
<td>0.000*</td>
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<td>P x D</td>
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<td>1.693</td>
<td>0.192</td>
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<td>G x P x D</td>
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<td>12.181</td>
<td>6.090</td>
<td>1.418</td>
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</tr>
<tr>
<td>Error</td>
<td>66</td>
<td>283.375</td>
<td>4.294</td>
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</table>

* Significant p < .05
Table 5

SNK Prompt Group for Main Effect - Device

<table>
<thead>
<tr>
<th>Prompt Group</th>
<th>No</th>
<th>1</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Prompts</td>
<td>XX</td>
<td>S*</td>
<td>S*</td>
</tr>
<tr>
<td>1 Prompt</td>
<td>NS</td>
<td>XX</td>
<td>NS</td>
</tr>
<tr>
<td>3 Prompts</td>
<td>NS</td>
<td>NS</td>
<td>XX</td>
</tr>
</tbody>
</table>

* Significant p < .05
nondisabled (ND) group was superior to the MR (MR) group. The SNK follow-up of the main effect (Table 5) revealed 3 Prompts were significantly superior to No Prompts, and 1 Prompt was significantly superior to No Prompts, with no significant difference between 1 Prompt and 3 Prompts groups. The Ramp scores were superior to Toss scores.

Discussion

The analysis of catching proficiency shows that prompting is important to children. It helps them attend to the task at hand, by focusing their attention on what is required to accomplish that motor task. Both the MR and nondisabled groups in this study improved with practice (Figure 1). The mentally retarded group's post-treatment mean was similar to the nondisabled group's pre-treatment mean which suggests that differences in pre-test scores between groups may be experiential in nature. In terms of prompting, 1 prompt was as effective as 3 prompts. In this study, there was a trend for 1 prompt scores to increase more than 3 prompts scores, although it was not significantly different in the follow-up analysis of the Prompt x Time interaction. (figure 2). It is possible that 1 prompt provided just the right amount of attentional stimuli for catching preparation while 3 prompts
Mean Scores

48
47
46
45
44
43
42
41
40

Pretest Total	Posttest Total

N

M

Nondisabled
Mentally Retarded

Figure 1
ND and MR Mean Scores Across Time
Figure 2
Prompt Group Mean Scores Pretest to Posttest
provided over-stimulation which decreased catching preparation; or that 3 prompts are not necessary for this age group and motor task. It is also possible that prompting as related to attentional focus for the 3 prompts group, "get ready, hands, ball" didn't get the subjects to focus on the ball, or that the timing of the 3 prompts were too close together to help improve catching scores.

The use of the ramp projection device in this study was superior to the hand toss compared to Johnson (1973) study who reported nonsignificant findings with the use of a mechanical throwing apparatus. The ramp device used in this study did not appear threatening to the subjects which may be the reason for differences between the two studies. Based on a variety of ball projection devices tested in the pilot study for this study, the ramp delivery method was chosen. The reason that ND had higher scores than their MR subjects in this study may be due to ND children being exposed to more opportunities to practice their catching skills, e.g., participation in organized little league sports programs, than their MR peers.

Recommendations for further study include: studying the effects of prompting younger children; ND
and MR children matched by mental age; follow-up on
the effect of practice, massed versus distributed on
catching proficiency, or other motor tasks on MR children;
the inclusion of a variety of disabling conditions such as
the learning disabled and autistic to determine the effect
of prompting on those specific disabling conditions.
REFERENCES


APPENDIX A

Bulletin 1641: CTAPE

Motor Deficit Criteria

<table>
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<tr>
<th>CTAPE Score</th>
<th>Class Setting</th>
<th>Motor Deficit</th>
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<tr>
<td>100% - 70%</td>
<td>Regular PE</td>
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<td>45% - 69%</td>
<td>Adapted PE</td>
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<td>44% - 20%</td>
<td>Adapted PE</td>
<td>Moderate</td>
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<tr>
<td>19% and</td>
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Note: MR Students included in Study
Scored at this Level on CTAPE
APPENDIX B

PARENTAL PERMISSION SLIP

Dear Parent/Guardian:

My name is Joseph G. Schmalfeldt, and I am a doctoral student at Louisiana State University in Baton Rouge. I am coordinating a motor proficiency study at LSU and need male children 7 years old for subjects. Little research has been completed on catching ability and young children, so your child's participation is greatly appreciated.

All children will be provided individual practice in the development of catching skills, and will be individually tested and videotaped at their school at the most convenient time for your child and his/her teacher. Approval of the specific arrangements will be sought from the building principal. All motor proficiency data and test results are confidential, and your child will NOT be identified in any report. Parent/guardian will be provided test results upon request.

No school placement decisions will be determined by your permission to allow your child to be tested. If you will allow your child to be in this research study, please complete the permission form on the next page and return the form to your child's classroom teacher. If you have any questions about the research study, please call me at home 652-4949 M-F 8:00PM to 10:00PM.

Sincerely,

Joseph G. Schmalfeldt
1421 Meeker Loop
LaPlace, LA 70068
TESTING PERMISSION SLIP

I, ________________________ give my consent to allow ______________________
(Print Name) (Print Child's Name)
to be videotaped while catching a seven inch playground ball
bounced softly to chest height. I understand that my child's catching
ability data/test results are confidential, and that my child will
NOT be identified in any report. No school placement decisions
will be determined by your permission to allow your child
to be tested.

_________________________________ _________________________
(Signature of Parent/Guardian) (Date)

_________________________________ _________________________
(Child's Age) (School Child attends)

_________________________________ _________________________
(Date of Birth) (Child's classroom teacher)

Please return this form to your child's classroom teacher by:
## APPENDIX C

### CATCHING SCALE

**Cashin's Catching Processing Scale**

<table>
<thead>
<tr>
<th>Points</th>
<th>Catch</th>
<th>Descriptive Criteria</th>
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<tbody>
<tr>
<td>5</td>
<td>Clean Catch</td>
<td>Simultaneous two-hand grasp and immediate control (without slapping or squeezing the ball).</td>
</tr>
<tr>
<td>4</td>
<td>Juggle Catch</td>
<td>Initial hand contact not simultaneous and without immediate control, followed by a two-hand catch with control.</td>
</tr>
<tr>
<td>3</td>
<td>Basket Catch</td>
<td>Use of other body parts than the hands and fingers to enable a successful catch. Hands and fingers may also be used.</td>
</tr>
<tr>
<td>2</td>
<td>Hand Contact</td>
<td>Hands touch ball but attempt to catch failed and ball dropped to floor.</td>
</tr>
<tr>
<td>1</td>
<td>Attempt</td>
<td>An attempt to catch the ball was made but there was no hand contact and the ball dropped to the floor.</td>
</tr>
<tr>
<td>0</td>
<td>No Attempt</td>
<td>No visible attempt was made to catch or stop the ball.</td>
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APPENDIX D

RAMP DIAGRAM

Ramp Diagram and Catch Procedure
APPENDIX E
PILOT STUDY DATA

Pilot Study G x P X T ANOVA Summary Table

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<thead>
<tr>
<th>Source</th>
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### Pilot Study Data Scores Means Table

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### Interobserver Agreement (IOA) By Scorers After Training

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* IOA = agreements / (agreements + disagreements)
## Research Design

### 2 X 3 X 2 ANOVA

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APPENDIX H
MEANS AND STANDARD DEVIATION TABLES

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APPENDIX H Continued

Prompt Group Mean Scores and Standard Deviation Totals Table

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APPENDIX H Continued

ND and MR Group Mean Scores and Standard Deviation Totals Table

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<th>Toss</th>
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PLEASE NOTE:

Page(s) missing in number only; text follows.
Filmed as received.
APPENDIX I
EXTENDED REVIEW OF LITERATURE

[A] Brief Review

Research has shown that mentally retarded (MR) children develop and acquire motor skills at a slower rate and to a lesser degree of competence than their nondisabled (ND) peers (Francis & Rarick, 1959; Malpass, 1963; Rarick, 1973; Bruininks, 1974; Mann, Burger & Proger, 1974; Ulrich, 1983). ND children generally walk by age 12 months compared to mentally retarded children's 3.2 years (Frankenburg & Dodds, 1967; Sherrill, 1986). Bruininks (1974), in his review of literature on physical and motor performance of retarded persons, stated that MR children and adults are consistently inferior to ND persons on measures of physical development, and gross & fine motor abilities. He also stated that motor performance of mentally handicapped persons is most impaired on measures that require:

- High incentive motivation for optimum performance
- Conceptual understanding of movement patterns demanding a series of responses
Movement patterns requiring simultaneous or sequential integration of various senses and parts of the body.

Rarick (1980) reported that mildly MR children were .96 standard deviations below the mean motor performance compared to their ND peers. Ulrich (1983) found that ND children were approximately 3.5 years ahead of their mildly MR peers on qualitative performance of twelve fundamental motor skills.

{B} Motor Learning

Little is known about the motor learning capacity and potential of the MR child. Motor Learning is defined as changes in the information processing component of motor skill performance (Marteniuk, 1976). Research suggests that these children do not learn motor tasks easily, nor do they readily transfer skills from familiar motor tasks to unfamiliar ones (Brown, 1974; Belmont & Butterfield, 1977; Rarick & McQuillan, 1977; Borkowski & Cavanaugh, 1979; Brown & Campione, 1986; Drummer, 1988; and Bouffard, 1990). As a group, MR individuals have an extremely difficult time identifying and using salient stimuli during discriminant learning tasks (Zeaman & House, 1963).

{B} Information Processing
While several factors contribute to MR children's problem in motor skill acquisition, information processing deficiencies seem to be the largest single factor interfering with their development and acquisition of motor skills (Brown, 1974, 1975; Mercer & Snell, 1977; Belmont, 1978; Belmont & Butterfield, 1977; Bouffard, 1990).

Information processing refers to the mental or cognitive components involved in the input, decision-making, and feedback phases of performance, (Drummer, 1988). Vernon (1986) stated that differences in performance between MR and ND individuals on a variety of cognitive tasks may be attributed to differences in the speed of execution of basic information processes and problem-solving skills and strategies rather than to knowledge differences. He stated that MR individuals generally fail to use learning strategies before training; however, they can implement a strategy and improve their performance with minimal instruction or coaching.

To perform motor skills successfully a learner must be able to attend to:

1. The correct aspects of the environment; select, organize and interpret the input
2. Select or plan a motor response that is compatible with the environment
3. Organize the selected response
4 Execute the appropriate movement as planned
5 Analyze the movement and outcome information to evaluate that response, in case he or she must modify the next response.

Bouffard (1990) stated that the lag in movement skill development between MR and ND children relates to several factors:

- Knowledge base or ability to access it
- Spontaneous use of practice strategies
- Metacognitive knowledge and understanding
- Practice and motivation

Several studies have reported that if MR children are taught appropriate strategies, their performance does improve. However, if the same children are asked to perform the same tasks later, they don’t use the appropriate strategies unless requested to use them. Metacognitive knowledge refers to what learners know about their own information processing systems. Metacognitive understanding refers to the learner’s ability to consider requirements of the task, the environmental conditions, and the resources available to manage the situation (Keogh & Sugden, 1985). Borkowski, Reid & Kurtz (1984) reported that mentally retarded individuals difficulties with problem solving were due to deficient metacognitive knowledge and understanding abilities. MR children normally
have less experience with motor tasks than ND children. In addition, MR children often experience learning failures which decrease their expectancy for being successful. This decreased expectancy may lead to a lack of motivation to succeed (Balla & Zeigler, 1979; Borkowski, Weyhing, & Turner, 1986).

(B) Learning Strategies

Incorporating appropriate learning strategies early in the development of motor skills helps MR children learn to compensate for their decreased cognitive abilities. Wade, Hoover, and Newell (1983) proposed a method to instruct MR individuals based on analysis of the individual's capabilities in relation to requirements of the task(s) to be learned. They stated that instructors should incorporate task analysis (see Sherrill, 1986 pp. 136-138), knowledge of results, and variation of both the stimulus and the response complexity that mediates motor activity (practice) in training MR individuals. This training would provide MR individuals the ability to adapt their newly learned skills when the situation requires it. An excellent reference to grasp the basic concepts of the topics discussed in this article is Basic Stuff Series 1; Volume 3- Motor Learning (Rothstein and Wughalter, 1987).

This section of the paper will define various learning strategies, as well as describe studies that used those strategies. A variety of learning strategies have been reported
with varying degrees of success. Various researchers use different terminology to define their learning strategy (e.g., cue versus prompt); however, for this paper the various learning strategies are defined as follows.

[C] Cueing

A cue is defined as a stimulus providing information that an explicit stimulus or a stimulus with certain characteristics will subsequently appear as the target (Hartley, Kieley & Slabach, 1990). An example of a cueing strategy is using an arrow pointing to where a target will soon appear. Sugden (1978) found that mildly mentally retarded children were less likely to use cueing than their ND peers.

[C] Prompting

Prompting is defined as an instruction to attend to a particular aspect of a multi-dimensional stimulus or to carry out a particular operation on it (Hartley, Kieley & Slabach, 1990). Prompts reduce the learner's uncertainty about the upcoming stimulus. They inform the learner about the basis for the correct response. An example of a prompt is a starting signal in a track meet.

[C] Rehearsal

Rehearsal refers to simple labeling and repetition of typical verbal or picture stimuli (Baumeister, 1984). Kelso et al. (1979) conducted 3 linear positioning experiments with 35
mildly mentally retarded students. They reported that the mentally retarded children could maintain kinesthetic information up to 7 seconds. Reid (1980) reported that MR children do not engage in spontaneous rehearsal of motor information while ND children do use rehearsal strategies.

(C) Attentional Focusing

Attentional Focusing refers to concentrating on a certain aspect of a motor task. An example of this is preparing for a groundstroke in tennis by focusing your concentration on the tennis ball as it comes off your opponent's racket. Attentional focus training techniques are used frequently used by elite performers in weight lifting (Shelton and Mohoney, 1978). Ziegler (1987) reported that beginning tennis players could improve their acquisition of groundstrokes by using attentional focusing. Concentrating is a learned skill and can be improved through practice (Loehr, 1982). Building practice patterns that incorporate attentional focusing will lead to improved motor skill performance. Attentional focusing strategies could easily be implemented in motor skill training programs for young ND and mildly mentally retarded children.

(A) Enhancing Acquisition of Motor Skills

This review of literature has shown that mentally retarded individuals lag behind their ND peers on performance of motor skills. Yet, they can enhance their learning
capabilities by receiving instruction in developing learning strategies. Cueing, prompting, rehearsal, and attentional focusing can be easily implemented into programs in which MR children are taught. These learning strategies will help MR children increase and improve their motor skills and attain performance levels closer to their ND peers.

Teachers can enhance the acquisition of motor skills of MR students by paying attention to their environment, practice, learning strategies, and motivation.

(B) Environment

The learning environment should be organized to provide favorable conditions for the MR student to learn and practice newly acquired strategies and skills. Cruickshanks (1967); Masters, Mori and Lange (1983); and Sherrill (1988) have suggested several things that will improve the learning environment:

- Include highly structured teaching environment
- Eliminate irrelevant auditory and visual stimuli
- Increase the stimulus value of the equipment
- Break down complex skills into smaller teachable components
- Reduce the size of the learning environment
- Provide activities that motivate and interest children, and lead to increased achievement
• Vary the complexity of activities to be learned

An example of a highly structured teaching environment would be a 30 minute adapted PE class in which the students "know the routine" (i.e., they know at the start of class there will be 5 minutes of warmup activities; 4 five minute learning stations where students rotate after they hear a whistle; and finally, a 5 minute review of what was learned today and cooldown period at the end of class). Irrelevant stimuli could be eliminated by putting away or hiding unused equipment; shutting doors, and windows in the teaching area . Increasing the stimulus value can be as simple as using bright colored balls and implements. Applying task analysis to skills that you teach allows you to break down each skill into smaller components that may be easier for the MR student to comprehend and perform.

Reducing the size of the learning environment to a minimum (in a large room or gymnasium traffic cones can be set up as boundary markers to reduce space) but still insuring safe, successful participation, allows you as teacher maximize instruction and keep your students from wandering off task. Providing instructional activities that motivate, challenge and interest your students lead to increased participation and success; and less boredom and frustration of your students. Changing activity intensity allows your students a chance to recover from strenuous activities by providing them a
"breather" when they perform slower paced activities. Also, by alternating complex with simple motor activities, the students are able to succeed in performing some tasks and yet be challenged and motivated to perform the more difficult tasks.

(B) Practice

The teacher needs to be aware of the need for conceptual understanding of movement patterns that demand a series of responses or require simultaneous or sequential integration of various senses and parts of the body. The individual parts of these tasks need to be practiced then integrated in a logical sequence. Using task analysis and/or teaching the motor skills using the "Whole-Part-Whole" method will allow the learner ample time and opportunity to develop and use these newly acquired skills.

A variety of learning stations and practice schedules allow the disabled learner to explore different methods of using newly acquired motor skills. Learning stations allow the learner to concentrate and practice on a variety of motor skills that are incorporated into a game or activity. Learning stations to work on softball skills could include stations on batting, fielding, throwing, pitching, as well as a game type setting to bring all the skills that are used together. New tasks should be presented in simple terms with adequate time to learn that task before another one is introduced. Learned skills and
activities should be included in future instruction to check for retention of those skills by your MR students.

(B) Teaching and Learning Strategies

MR children need assistance in making the connection between different tasks, so they can learn to transfer skills from familiar tasks to unfamiliar ones. Brown & Campione (1986) list eight guidelines that will help train MR individuals to utilize transfer of skills from one task to another. Those eight guidelines are:

1. Know your domain
2. Know your learner
3. Train multiple contexts to finesse welding problem
4. Self management
5. Direct instruction in generalization
6. Direct feedback
7. Expert scaffolding
8. Training in situ

Knowledge of the physical activity will allow the teacher to do a task analysis of skills to be learned. Knowing the developmental status, e.g. evaluating motor skills with Peabody Developmental Motor Scales (Folio and Fewell, 1983), of the learner will provide insight into appropriate task presentation and sequence of components of the task. The welding problem can be minimized by having the learner train and use the skills
in a variety of appropriate settings such as welding the skill of catching by participation in flag football, softball, and basketball. The aim of self management is to keep the learner informed and an active participant in the learning process. This involvement encourages the student to take more responsibility for learning. Direct feedback should include explicit feedback concerning the effectiveness of the skills they are learning. The teacher needs to remember that MR children can retain information for a short time. Generalization of the use of skills can be enhanced by helping the student understand how learned skills can be used in a variety of situations, e.g., overhand throw skill can be used in softball, throwing at targets, or playing catch with a friend. Expert scaffolding refers to situations in which the expert (teacher) guides the novice (learner) to increased participation levels, for example, when learning a new skill the learner plays a game for five minutes and the participation time is increased as the student masters that skill. Training in situ provides practice in tasks as close as possible to the target task(s). Practicing motor skills in game-like situations such as practice kicking by having students kick soccerballs into a soccer goal.

The teacher can assist the MR child by working on information processing for the tasks. Often, practice is needed on the speed of response and on use of problem-solving and
learning strategies. To perform motor skills, a learner must be able to select, organize and interpret the input. Incorporating appropriate learning strategies early in development of motor skills helps MR children learn to compensate for their decreased cognitive abilities. Variability of practice, providing verbal prompts, and feedback after performance, will help the MR child learn to identify and use salient stimuli during learning tasks.

Wade, Newell, and Hoover (1983) propose a method to instruct and train MR individuals based on analysis of the individual's capabilities in relation to requirements of the task(s) to be learned. They stated that instructors should incorporate task analysis, knowledge of results, and variation of both the stimulus and the response complexity that mediates motor activity in training MR individuals. This would provide MR individuals the ability and opportunity to modify and/or adapt their newly learned skills when the situation required it.

Since MR children often fail to use learning strategies spontaneously, the teacher can improve their performance by using teaching methods that remind them of what they are trying to accomplish in the activities, e.g., telling the student to remember to "throw the ball hard, and follow through" so that student can put forth their best effort at an upcoming school field day. To perform motor skills, a MR child must be able to
deal with movement and outcome information to evaluate that response, in case modifications are needed for next response. Cueing and prompting help MR children increase their performance levels comparable to children several years older. A study by Schmalfeldt (1992) showed that one prompt was as effective as 3 prompts in improving catching skills in both MR children and ND boys.

Finally, the teacher's expectation that these children can learn and perform, combined with adequate practice time on the tasks are important ingredients for enhancing MR children's acquisition of motor skill.

(B) Motivation

MR children often experience learning failures which decrease their expectancy for being successful which leads to a lack of motivation to succeed. A good teacher is one who uses positive reinforcement to guide the students in building their confidence and self-esteem. "High fives", hugs, verbal praise, and token economy systems, in which good work is rewarded by receiving tokens that can be cashed in for prizes at the end of the week, are motivational techniques that help the MR student strive to go forward and try to perform new and more complex motor skills.
(A) Summary

Learning strategies can be easily implemented into programs in which MR children are taught. This article has shown that mentally retarded children can benefit and enhance their learning capabilities and motor skills by:

- Incorporating instruction developing learning strategies
- Structural changes in the learning environment
- Varying the practice conditions and complexity of skills to be learned.
- Implementing motivational techniques

These learning strategies assist MR children improve their motor skills and attain performance levels comparable to their ND peers.
(A) References


VITA

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April 3, 1992