A Quantitative and Qualitative Assessment of Autistic Individuals on Selected Motor Tasks

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Previous descriptions of the motor performance of autistic persons have often con
founded autism and mental retardation. Therefore, this study compared high function
ing autistic individuals to functionally retarded subjects matched closely on chronological
age and measured intelligence. Quantitative and qualitative scores for balance, throw
ing, catching, jumping, and running test items were obtained in a formal testing situa
tion. Also, for autistic subjects, the relationship between qualitative performance on
the formal test items and the quality of motor patterns elicited during guided play was
determined. It was concluded that the selected test items generally represented reliable
indices of the motor performance of autistic persons and that performance during formal
testing essentially mirrored that of guided play. While there was some trend toward
inferior qualitative scores by autistic individuals compared to their matched counter
parts, there were no meaningful quantitative differences between the groups. It is possible
that the poor motor performance associated with autism is largely a factor of mental
retardation.

Recent suggestions of physical activity programming for autistic persons (Crowe,
Auxter, & Pyfer, 1981; Kraft, 1983; Miller & Sullivan, 1982; Mosher, 1981; Reid &
Morin, 1981; Seaman & DePauw, 1982) reflect a growing concern of physical educators
to provide meaningful experiences for these individuals. Yet, the suggestions are seldom
based on data since there is a lack of information about the motor domain of autistic per
sons, particularly from the perspective of the physical educator. Some early clinicians
argued that the motor development of autistic children was within the normal range (Alder
ton, 1966; Kanner, 1943; Rimland, 1964; Wing, 1966) while more current descriptions
point to inadequate motor control and delayed acquisition of motor skills (Ornitz, Guthrie,
& Farley, 1977; Singleton, 1974; Wing, 1976). It appears that additional research is needed
to accurately describe the motor characteristics of autistic persons in order to guide pro
gram and curriculum development.

Reid, Collier, and Morin (1983) attempted to resolve some of the controversy by
describing the motor performance of autistic individuals. Six autistic children and six autistic
adolescents were tested on a wide range of anthropometric and motor performance items

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gleaned from batteries commonly used with individuals who are mentally retarded (Bruininks, 1978; Rarick, Dobbins, & Broadhead, 1976). Results indicated that both autistic groups tended to score below comparable samples of nonhandicapped and retarded persons on most motor performance items. In addition, the obtained scores did not appear to differentiate between the two autistic groups, suggesting a lack of substantial development in motor skills. However, the sample was extremely heterogeneous, and Reid et al. (1983) questioned the validity of their findings since it was not clear whether the lower functioning autistic individuals really understood the task requirements. Furthermore, they reported only four reliability estimates for 12 tasks. In addition, their subjects were mentally retarded as well as autistic, thus confounding the extent to which autistic characteristics and mental retardation contribute to motor performance (Prior, 1979; Wale, 1978; Yule, 1978).

The purpose of this study was threefold: to assess the reliability of formal motor performance testing of high functioning autistic adolescents, to determine the relationship between performance scores elicited through formal testing and guided play with autistic subjects, and to compare their performance to matched mentally retarded individuals in order to avoid the potential confounding of autism and mental retardation.

**Method**

**Subjects**

The subjects were eight autistic and eight functionally retarded adolescent males. The autistic group ranged in age from 15 to 21 years, with a mean age of 17.9 years, while the retarded group ranged from 15 to 20 years, with a mean age of 17 years. The autistic subjects were clinically diagnosed by consulting psychiatrists as suffering from a primary diagnosis of autism. The functionally retarded subjects were performing at a retarded level (although one subject had an IQ score within the nonmentally retarded range) and were free of any associated autistic features. The autistic and mentally retarded males were matched for age and IQ scores (Table 1). While two of the autistic subjects were living in child care institutions on a 5-day basis at the time of the study, all of the subjects had grown up in a noninstitutional environment and were presently in school settings in the Montreal area. The tester was well known to all subjects as their physical education teacher or camp director. All subjects were involved in regular recreation and physical education experiences in school and community.

Ideally, nonmentally retarded autistic subjects should be studied in order to avoid the confounding of autism and mental retardation. However, only 20% of autistic persons have measured IQs above 70 (Bartak, 1978), and only one child in every 2,500 births will be labeled autistic (Koegel, Egel, & Dunlap, 1980). Finding sufficient numbers of such high functioning autistic persons is difficult. Indeed, only 40% of autistic persons score above 50 on IQ scales. Therefore the autistic subjects in the present study (mean IQ 66) do represent a relatively high functioning group, and none had any problems with receptive language. Thus, understanding of the task requirements should not have been a problem. Also, matching them with educable mentally retarded adolescents should clarify the role of autism and mental retardation in motor performance.
Table 1
Summary Profile of Autistic and Functionally Retarded Subjects

<table>
<thead>
<tr>
<th>Matched pair</th>
<th>Subject</th>
<th>Intelligence test</th>
<th>IQ</th>
<th>Age (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AU*</td>
<td>WISC-R</td>
<td>73</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>FR**</td>
<td>WISC-R</td>
<td>73</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>AU</td>
<td>Stanford-Binet</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>WISC-R</td>
<td>69</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>AU</td>
<td>Leiter</td>
<td>47</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>WISC-R</td>
<td>50</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>AU</td>
<td>WISC-R</td>
<td>60</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>WISC-R</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>AU</td>
<td>WISC-R</td>
<td>97</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>WISC-R</td>
<td>91</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>AU</td>
<td>Leiter</td>
<td>54</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>WISC-R</td>
<td>54</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>AU</td>
<td>Estimated range</td>
<td>55</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>IQ 50-60, WISC-R</td>
<td>53</td>
<td>18</td>
</tr>
<tr>
<td>8</td>
<td>AU</td>
<td>Leiter</td>
<td>58</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>Stanford-Binet</td>
<td>64</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>AU</td>
<td>Stanford-Binet</td>
<td>66</td>
<td>17.9</td>
</tr>
</tbody>
</table>

| M            | FR      |                 | 63  | 17.0      |

AU* - Autistic
FR** - Functionally retarded

Tests and Apparatus

*Formal Test Items.* Five formal test items were administered to all subjects: dynamic balance, catching, standing long jump (modified from the Bruininks-Oseretsky Test of Motor Proficiency, 1978), throwing and running (adapted from Rarick et al., 1976).

*Dynamic Balance.* The subject was required to walk in alternate steps along a plastic beam, 7.5 cm wide, 2 meters long, raised 7.5 cm from the floor. The starting end of the beam was indicated by a line of tape on the floor. The score (5 maximum per trail) was the average number of steps taken over the 5 trials.

*Catching.* This item was divided into two parts: (a) the subject bounced a tennis ball onto a 1-foot square rubber mat on the floor with one hand, catching it with both hands; (b) the subject caught a tennis ball with both hands thrown to chest height from a distance of 4 meters. The score was the total number of balls caught in 5 trials in each part.
Target Throw. A tennis ball was thrown at a target on a wall from 5 meters away. The center of the target was 1.5 meters from the floor. The target was a series of concentric circles, each with a radius of 15 cm larger than the previous circle, set on a background of a white 1.5 meter square. A red center circle had a diameter of 30 cm. The circles were painted in a red, yellow, blue, white, and green pattern, and each was numbered (from 5 to 1) with the appropriate points awarded for hitting that part of the target. Ten trials were administered and the results were averaged to yield a score for each individual.

Standing Long Jump. Five trials performed on a hardwood gym floor were recorded, using a measuring tape extended from the starting line to the most posterior point of touch. The score was the average of the 5 trials.

15-Meter Run. The actual course was 25 meters, but in order to minimize the effect of starting and stopping, the first and last 5 meters were not timed. The start and finish line on this task were indicated by tape and two red pylons placed two meters apart. The running lane was also indicated by tape and pylons. Due to limited space, the running lane was constructed in a crescent shape. A chronus stopwatch was used to calculate the time to the nearest 10th of a second. The score was the average of 3 trials.

Guided Play Apparatus. Reid et al. (1983) questioned the validity of their formal testing of autistic children. Therefore in the present study it was decided to assess the autistic subjects during guided play and to investigate the relationship of performance during play and formal testing. Such play avoids the artificiality of where to stand and exactly how and when to execute a movement—traits of the formal testing that might have jeopardized a score being typical of performance. It was imperative that during this play each autistic person demonstrate at least five examples of each motor pattern assessed during formal testing, that is, catching, throwing, jumping, dynamic balance, and running.

Autistic children do not characteristically engage in self-initiated or imaginative play (Strain & Cooke, 1976; Wing, 1976) except in a self-stimulatory, repetitive manner (Black, Freeman, & Montgomery, 1975; Koegel, Firestone, Kramme, & Dunlap, 1974). Consequently, the gym was structured identically for each subject after the theraplay unit concept (Black et al., 1975) in order to maximize spontaneous motor activity for the autistic individuals. A variety of materials were used to promote and ensure the occurrence of the five motor patterns. For example, the throwing action was elicited with the use of tetherballs, tennis balls thrown through hanging hoops and tires as well as rubber balls thrown at a variety of targets and across the gym. The complete list of equipment and its placement in the gym can be found elsewhere (Morin, 1982).

Qualitative Assessment

Each of the five motor patterns was evaluated for qualitative performance by a rating scale developed after a review of the literature (Espenschade & Eckert, 1980; McClenaghan & Gallahue, 1978; Wickstrom, 1977) and tested for feasibility in a pilot study. The Qualitative Rating Scale for throwing, similar in structure to the other four patterns, is found in Table 2. Most components of the patterns could receive a score of 0, 1, 2, or 3, depending upon the maturity of the component. A zero indicated that the particular component was not evident or of no use within the movement, while a fully mature pattern scored 3 points. Although qualitative scales yielding numerical scores are now being developed (e.g., Mosher & Schutz, 1983), to our knowledge none existed at the time of this study.

A Hitachi 6500 VHS tape recorder and Sony color camera were also utilized—to provide a permanent record of performance and to facilitate the qualitative analysis.
Table 2
Qualitative Rating Scale For Throwing

<table>
<thead>
<tr>
<th>Component</th>
<th>Scale</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arms, hands</td>
<td>0</td>
<td>The arms are held stiffly, the ball is shoved forward or thrown underhand.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>The elbow is held forward, the ball is pushed (palmed) away.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>The arm is swung stiffly, with limited flexion. Follow-through is made on same side as throwing arm.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The arm is swung back with full elbow flexion; the follow-through continues across the body.</td>
</tr>
<tr>
<td>Trunk &amp; shoulder</td>
<td>0</td>
<td>The trunk remains perpendicular, with no shoulder rotation.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>A slight shoulder rotation is evident.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>The shoulders and trunk rotate.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>A full trunk rotation in prerelease is evident. The upper body rotates throughout the action.</td>
</tr>
<tr>
<td>Legs, feet</td>
<td>0</td>
<td>The feet are stationary. No shift of weight during action is evident.</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Movement of feet or shifting of weight is minimal.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>The weight shift increases. The foot on the same side as the throwing arm may move forward.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The weight shifts fully from the back to the front foot on the opposite side.</td>
</tr>
</tbody>
</table>

For the formal test items, the camera was positioned approximately 15 meters from, and perpendicular to, the direction of movement. For the 15-meter run, filmed from within the arc of the running track, the camera panned the subject for the entire timed section of each trial. Activity during guided play was also recorded by placing the camera at one side of the gymnasium.

Three observers were chosen to judge the qualitative aspects of the motor patterns using the rating scale; they were not aware of the nature of the study. Two sessions were spent explaining the various components of each pattern and demonstrating the different levels of performance via a training videotape. Agreement among observers was based on all three observers marking the identical score for each component on each trial.

Assessing Performance

**Formal Testing.** All subjects were tested individually in their school gymnasium. The five motor tasks were administered in random order with a 2-minute rest between each skill.
The administration of each test item followed a well defined continuum of prompting as determined by the response of each subject (these procedures are found in Morin, 1982). The physical prompting was contingent upon a nonresponse or inappropriate response subsequent to two successive verbal cues and demonstrations. The nature of each prompt and/or manipulation was carefully controlled since the exact manner of assistance could significantly affect performance (Hung, Cosentino, & Henderson, 1979; Watkinson & Wall, 1979). Any trial during which physical prompting and/or assistance was employed was considered a practice trial only.

A common characteristic of retarded and autistic individuals is an attentional deficit (Frith & Hermelin, 1969; Fulkerson, & Freeman, 1980; Varni, Loovas, Koege!, & Everett, 1979; Wing, 1976). This is especially true of autistic individuals who frequently fail to develop eye contact, which is so essential to learning through observation. Although this deficit is most severe in the lower functioning individuals (Wing, 1976), higher functioning autistics may also be deficient (Howlin, 1978). Demonstrations of the required motor tasks therefore began only after the tester had successfully employed an attentional cue. These cues were precise and clear, since verbal direction or cueing that is too lengthy could hinder subsequent performance (Browning, 1974).

Guided Play. Only the autistic individuals were assessed in this phase of the experiment. Although the functionally retarded subjects participated in this type of physical activity, during recess for example, our assessment of guided play was restricted to the autistic sample because the efficacy of the formal testing was a question primarily germane to the autistic and not the retarded group. Each subject was familiar with all of the equipment which was set up according to the theraplay concept. Each subject was told to make full use of all this equipment and to choose any activity available. Inappropriate or potentially dangerous activity was halted immediately, but perseveration on a particular activity was allowed to continue for 2 to 3 minutes. Self-stimulatory behavior was permitted as long as it was not harmful.

Since a wide variety of motor skills were to be examined, the active involvement of the tester was an integral part of each session. The primary function of the tester was to aid in the transition from one activity to another, and to act as a partner in many of the activities.

Each autistic participant was given sufficient freedom to demonstrate a preference for particular activities. One outcome of this flexibility was a possible difference in the number of trials elicited by each subject on the various motor tasks.

Trials were chosen for analysis following an examination of them by the tester. The purpose of this examination was to eliminate those trials which could not be validly compared to the trials in formal testing since the motor patterns were not similar. For example, all tetherball or two-handed throws were eliminated because the qualitative motor patterns were not expected to be similar to an overarm single arm throw.

Following this initial process of deletion, all trials with physical prompting were eliminated. This followed the same guidelines as in formal testing qualitative analysis. The remaining trials were considered for analysis. In order to minimize possible fatigue and/or learning effects, the first five of the remaining trials were used for analysis for balance, catching, and jumping. For running, the first three illustrations were used; for throwing, the first 10. Because of the nature of guided play, only qualitative scores were derived.

Qualitative measures were determined by the rating scale used by the three observers. A mean score of trials for each component of the movement pattern was determined for
each observer. Subsequently the scores for each component were averaged across observers. The score used in analyzing each of the five patterns was the sum of the components.

Analysis of Data

The administration of the formal testing and guided play phases were counterbalanced such that four autistic subjects performed the formal items before the guided play, and vice versa for the remaining four subjects.

In order to determine the three observers' degree of objectivity, a percent agreement score was calculated (Birkimer & Brown, 1979). The reliabilities of the formal tests were assessed by intra-class correlations derived from a two-way analysis of variance with repeated measures across trials (Safrit, 1976; p. 29). The relationship between the qualitative measures of the formal testing and guided play for the autistic subjects was determined by the Pearson Product Moment Correlation. The difference on formal test items between the autistic subjects and functionally retarded subjects were determined via independent t-tests.

Results

Interrater Agreement

Observers were considered in agreement when all three gave an identical score on the qualitative rating scale for a particular component (e.g., 2 on legs, feet action of throwing, see Table 2) of each of the five motor skills on a single trial. Scores ranged from 75% for the trunk and shoulders component of the throwing item to 95% for the head and eyes component of catching. The mean interrater agreement was an acceptable 82%.

Reliability of the Formal Test Items

Reliability coefficients were determined for quantitative and qualitative scores for both the autistic and functionally retarded groups; thus four separate coefficients were computed for each item. The results of these analyses are shown in Table 3.

The reliability coefficients for the functionally retarded group were generally high and ranged from .80 to .89 for quantitative measures, and from .94 to .98 for qualitative scores, with mean coefficients of .85 and .96 respectively. The reliability estimates for the autistic subjects were also consistently high for qualitative measures. The coefficients ranged from .76 to .98 with a mean coefficient of .84. Of the four quantitative coefficients, scores ranged from .46 to .94, with a mean coefficient of .71.

Relationship Between Formal Testing and Guided Play

The correlations between qualitative scores obtained with the rating scale during guided play and those obtained during formal testing are listed in Table 4. With the exception of the throwing item, there was a significant relationship between the qualitative performance of the autistic students in guided play and their qualitative performance during execution of the formal test items.
Table 3
Reliability Estimates Using Intra-Class Coefficients for the 5 Motor Test Items for Autistic and Functionally Retarded Groups

<table>
<thead>
<tr>
<th>Test item</th>
<th>Group</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autistic</td>
<td>Functionally retarded</td>
<td></td>
</tr>
<tr>
<td>Dynamic balance</td>
<td>0.68</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Catching</td>
<td>*</td>
<td>*</td>
<td>0.94</td>
</tr>
<tr>
<td>Target throw</td>
<td>0.77</td>
<td>0.90</td>
<td>0.94</td>
</tr>
<tr>
<td>Standing long-jump</td>
<td>0.46</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>Running</td>
<td>0.94</td>
<td>0.87</td>
<td>0.94</td>
</tr>
<tr>
<td>Average</td>
<td>0.71</td>
<td>0.84</td>
<td>0.96</td>
</tr>
</tbody>
</table>

*Not computed since only two scores, 0 or 1, were possible, thus eliminating meaningful variance.

Table 4
Pearson Product Moment Correlations Between Qualitative Data in the Guided Play and Formal Test Settings for the Autistic Group

<table>
<thead>
<tr>
<th>Motor pattern</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic balance</td>
<td>0.90*</td>
</tr>
<tr>
<td>Catching</td>
<td>0.76*</td>
</tr>
<tr>
<td>Throwing</td>
<td>0.47</td>
</tr>
<tr>
<td>Jumping</td>
<td>0.90*</td>
</tr>
<tr>
<td>Running</td>
<td>0.63*</td>
</tr>
</tbody>
</table>

*p < .05

Comparison Between Autistic and Functionally Retarded Subjects

The descriptive statistics for the five formal test items are listed in Table 5. In order to assess differences in the level of performance between the two groups, t-tests were conducted for both quantitative and qualitative data on all five formal test items. Since multiple t-tests were conducted, the experiment error rate was controlled at .05 via the Bonferroni statistic (Myers, 1972). Only two of the 10 analyses were significant (Table 5). In dynamic balance the autistic subjects demonstrated superiority over the functionally retarded males qualitatively, $t(14) = 4.19, p < .05$. The functionally retarded subjects performed significantly better on the qualitative measures of the target throw, $t(14) = 3.63, p < .05$. 
Table 5
Descriptive Statistics for Each Formal Test Item

<table>
<thead>
<tr>
<th>Test item</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Functionally retarded</td>
<td>Functionally retarded</td>
</tr>
<tr>
<td></td>
<td>Autistic</td>
<td>retarded</td>
</tr>
<tr>
<td>Dynamic Balance</td>
<td>M 4.20a</td>
<td>3.20</td>
</tr>
<tr>
<td>Balance</td>
<td>SD 0.57</td>
<td>1.01</td>
</tr>
<tr>
<td>Catching</td>
<td>M 8.15b</td>
<td>8.25</td>
</tr>
<tr>
<td>Target Throw</td>
<td>M 2.40c</td>
<td>2.70</td>
</tr>
<tr>
<td>Standing</td>
<td>SD 0.90d</td>
<td>0.97</td>
</tr>
<tr>
<td>Long jump</td>
<td>SD 0.32</td>
<td>0.47</td>
</tr>
<tr>
<td>Running</td>
<td>M 5.20a</td>
<td>4.90</td>
</tr>
<tr>
<td>SD 1.14</td>
<td>1.14</td>
<td>1.16</td>
</tr>
</tbody>
</table>

*p < .05; Reported in: a = number of steps; b = number of successful catches; c = target scores; d = in meters; e = in seconds; f = sum from rating scale.

Discussion

Reliability of the Formal Test Items

The reliability coefficients for the qualitative and quantitative components of the five formal test items with the autistic subjects were generally quite high, yielding average correlations of .84 and .71, respectively (Table 3). The functionally retarded subjects were also reliable in their motor performance, with .85 and .96 average coefficients resulting from quantitative and qualitative analyses, respectively. The magnitude of these reliability coefficients would appear to be acceptable, according to Guilford (1954) and Guilford and Fruchter (1973), and compare favorably with the average gross motor reliability coefficient of .81 for the Bruininks-Oseretsky (1978) test battery.

In general the qualitative reliability coefficients were higher than the quantitative coefficients. This is due probably to the nature of the qualitative rating scales. The maximum range of the motor patterns was 9 points on the qualitative scale. However, it would be highly unlikely that a subject would vary over trials more than 2 or 3 points since larger variance would indicate that on one trial the subject demonstrated an immature pattern while on the next trial a mature pattern was approximated; such variability would not be expected. The quantitative measures could vary substantially but the qualitative counterpart might not be sufficiently sensitive to detect any change. Thus the higher qualitative reliability coefficients were due likely to the psychometric properties of the measurement scales.
The Pearson Product Moment correlations between qualitative scores in the guided play and formal test setting for the autistic subjects were generally quite high (Table 4) with the exception of the throwing task. This indicates that, in general, formal test items reflect the motor performance evidenced by the autistic subjects in less structured settings. Therefore the precision of data collection procedures demanded in formal norm referenced testing may not be detrimental, at least to high functioning autistic persons. Thus the potential drawback of previous research (e.g., Reid et al., 1983), in which autistic subjects might not have understood the task requirements and/or performed typically because of the nature of formal testing, was not likely evident in the present investigation.

The target throw did not produce a significant correlation between formal testing and guided play conditions. This may be explained by differences inherent in some of the activities used to elicit the overhand throw during the two conditions. While the focus of the formal test was almost solely accuracy, many activities during guided play placed equal emphasis on distance as well as accuracy. It was apparent that some subjects used a “dart throw” overhand action in order to increase their score. The qualitative rating scale, which included shoulder and trunk rotation as well as a shift of weight, was biased toward a throw for distance. Future research should modify the rating scale to be more consistent with the throwing action, or change the quantitative test so that it reflects distance as well as accuracy.

Observations During Test Administration and Guided Play

Since this study is one of very few systematic analyses of the motor patterns of autistic individuals, several practical issues related to the administration of the formal testing and guided play should be discussed. With regard to formal testing, the autistic group required minimal prompting in order to perform; they appeared to understand the task requirements. Although it has been previously suggested that formal testing would be difficult to administer to autistic subjects (Reid & Morin, 1981), little resistance was noted during this study. Some self-stimulatory behavior was evident, but occurrences were infrequent and did not interfere with the normal administration of the test items. If the subjects experienced elevated anxiety due to responding in a novel environment (Koegel, Dunlop, & Dyer, 1980), it was not evident in this study. The relative ease of the testing might be explained by two factors: the familiarity of the autistic subjects with the tester, and the high functioning level of the subjects in the autistic group.

Since the structure of each guided play session allowed for some free play, numerous superfluous motor behaviors were observed. The suggestion that self-stimulatory behavior would increase during nondirected activity (Black et al., 1975; Strain & Cooke, 1976; Watters & Watters, 1980) was demonstrated by the majority of the subjects. Also evident in numerous autistic subjects was the repetitive, nonfunctional use of gross motor materials, characteristic of this population (Strain & Cooke, 1976; Strain & Weigerink, 1975; Tilton & Ottinger, 1964). However, two of the subjects chose to “shoot baskets” whenever given the opportunity to play freely.

Perhaps most unusual was the imaginative free play of the highest functioning autistic subject, who demonstrated simulated pole vaults using a stick and played scoopball using an inverted cone and tennis ball. This imaginative play contradicts commonly observed characteristics of autistic play behavior (Black et al., 1975; Wing, 1976). A solitary manner of play was apparent with all autistic subjects. They made no verbal or gestural
Comparison of the Autistic and Functionally Retarded Groups

The autistic subjects demonstrated significantly superior performance qualitatively on dynamic balance. Observations of the performance of the autistic subjects during the balance test and balance activities during guided play suggested a reason why: Virtually all autistic subjects moved at a noticeably slower, more controlled speed, as compared to the nonautistic subjects.

No significant differences were apparent between the groups in terms of ball catching. DeMyer (1976) and Geddes (1977) have suggested that autistic persons may be particularly weak in tasks involving functional objects such as balls. However, the present data suggest this may not be true for higher functioning autistic individuals who have had many opportunities to play ball. It is also possible that the catching tasks were not difficult enough to differentiate between the groups.

The functionally retarded were superior to the autistic subjects on the qualitative scoring of the target throw item, while no difference appeared on the quantitative dimension. The target throw, as noted, seemed not to depend on a mature throwing pattern. Yet the functionally retarded group scored 4.69 qualitatively, while the autistic group scored only 1.83 out of a maximum possible score of 9. This would suggest a very elementary throwing pattern for the autistic subjects, a finding which corroborates the data of Reid et al. (1983).

The groups did not differ qualitatively or quantitatively on the standing long jump or running items. However, the autistics tended to score more poorly on the qualitative dimensions than the functionally retarded group. Perusal of the results from the individual components of the standing long jump (arm swing, body flight, and lower body action) pointed to greater use of the arms by the functionally retarded individuals. The suggestion of an immature jumping pattern by the autistic subjects concurs with Reid et al. (1983). Although arm movement by the autistic group was evident in running, it was frequently erratic and nonfunctional. The presence of extraneous arm action has previously been reported with respect to autistic motor behavior (Reid et al. 1983; Wing, 1976).

In summary, the autistic subjects were qualitatively superior on balance when compared to a matched group of functionally retarded persons, although they performed very slowly. Their motor patterns in throwing, jumping, and running could be characterized as immature, with inappropriate and nonfunctional arm movements being common. The autistic subjects were significantly inferior to the functionally retarded males on the throwing item, and the trend was similar for standing long jump and running. Thus the condition of autism may be a deterrent to qualitative motor behavior beyond that of mental retardation.

The autistic subjects were not inferior to their matched peers from a quantitative perspective. It is possible, however, that the autistic adolescents might not have fared so well on more complex motor tasks, considering their immature motor patterns. The five motor tasks selected for the present study were quite static and possibly too easy from a quantitative standpoint, and more advanced motor skills may further differentiate between the two groups. Also, the power of the study may have been too low, given the small number of subjects. Yet the present data are encouraging inasmuch as the autistic subjects did perform quantitatively as well as their matched peers, possibly reflecting their
exposure to physical activities in school programs. It would appear that higher functioning autistic persons are capable of purposeful, goal-directed motor performance.

The motor performance of autistic people appears to be quite poor. Practitioners are faced with this reality. However, most previous descriptive efforts have confounded autism and mental retardation. The results of the present study suggest that the depressed motor behavior of lower functioning autistic subjects described by Reid et al. (1983) and others might be more a reflection of accompanying mental retardation than autism per se.

References


