1982

# An Examination of the Verbal-Performance Differences and the Bannatyne Pattern of the Wechsler Intelligence Scale for Children-Revised

Susan Hanft Bowyer
*Eastern Illinois University*

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An Examination of the Verbal-Performance Differences and the Bannatyne Pattern of the Wechsler Intelligence Scale for Children - Revised

(TITLE)

BY

Susan Hanft Bowyer

# THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science in Education

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1982
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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# An Examination of the Verbal-Performance Differences and the Bannatyne Pattern of the Wechsler Intelligence Scale for Children - Revised

Susan Hanft Bowyer

Eastern Illinois University

Running Head: An Examination of the Verbal-Performance Differences

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Abstract

Many psychologists use the Wechsler Intelligence Scale for Children - Revised (WISC-R) in the diagnosis of learning disabilities. They often place the results of the WISC-R into either the Bannatyne pattern or use the difference between the Verbal IQ and Performance IQ to help determine whether the child is learning disabled or non-learning disabled. This paper examined the feasibility of using either of these methods in determining learning disabilities. The case files of 300 children (211 males and 89 females) between the ages of 5 years, 10 months and 17 years, 3 months (X CA = 10.73 years, SD = 2.82) were examined. These children's case histories were obtained from a large rural special education cooperative which encompasses an eight county region in east central Illinois. These children had been diagnosed as learning disabled on the basis of a psychological examination. The WISC-R was administered as part of that evaluation. A one tailed t-test for independent means was performed on the difference between the Verbal IQ and the Performance IQ between Wechsler's standardization sample and the learning disabled sample. An analysis of variance (two factor mixed design) was done using Bannatyne's pattern. Results showed a significant difference between the learning disabled sample and Wechsler's sample in both methods. These results agreed with the results of other studies discussed in this paper.

# An Examination of the Verbal-Performance Differences and the Bannatyne Pattern of the Wechsler Intelligence Scale for Children - Revised

In the diagnosis of children with learning disabilities, several different Wechsler Intelligence Scale for Children - Revised (WISC-R) subtest score patterns have been used. The WISC-R is an intelligence test that is used by many school psychologists as part of a psychological evaluation to identify children for special services. The relatively easy administration of the WISC-R has made it increasingly popular with school psychologists and examiners. There are six patterns which have been used by psychologists in the identification of children with learning problems. The patterns which have been used include the Bannatyne pattern (with some researchers making variations, but generally maintaining the basic pattern), Keogh's method, the scaled score differences between the Verbal IQ and the Performance IQ, C > IA pattern and the Wills - Banas approach. The researchers using these various approaches have attempted to show that if a child's scores fall into that pattern, then that child can be accurately diagnosed as learning disabled (LD).

Bannatyne's pattern consisted of four categories: Spatial, Conceptual, Sequential and Acquired Knowledge. His Spatial Ability category consisted of the scaled scores of the Picture Completion, Block Design and Object Assembly subtests of the WISC-R. With this category Bannatyne evaluated the subject's ability to recognize spatial relationships, manipulate objects either directly or symbolically in a multidimensional space. The Verbal Conceptualizing Ability (Conceptual) consisted of the

Comprehension, Similarities and Vocabulary subtests. Bannatyne used this category to measure general language use and function. The Coding, Arithmetic and Digit Span subtests made up the Sequencing Ability category. Bannatyne measured the subject's ability to retain visual and auditory information within short-term memory with this category. The last category was Acquired Knowledge and consisted of the Information, Arithmetic and Vocabulary subtests. Each one of these categories had an average scaled score total of 30 points. Bannatyne then placed these four categories into a pattern that he stated was indicative of children with learning disabilities. Bannatyne stated that individuals identified as reading disabled or learning disabled exhibit the pattern of scores in which Spatial are greater than ( > ) Conceptual category scores > Sequential category scores > Acquired Knowledge category scores (Webster & Lafayette, 1978). (See Chart 1)

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Insert Chart 1 about here

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Keogh's method grouped the subtest scaled scores in three categories instead of Bannatyne's four. Keogh's first category was Attention-Concentration, which was the sum of the Digit Span, Arithmetic and Coding subtests. His second category was Intellectual and summed the Block Design, Picture Completion and Object Assembly subtests. Keogh's final category was Verbal Comprehension. Verbal Comprehension consisted of the summed scale scores of Vocabulary, Information and Comprehension (Miller, Stoneburner and Brecht, 1978).

Chart 1

| WISC-R Verbal Subtests | WISC-R Performance Subtests |
|---|---|
| Information | Picture Completion |
| Similarities | Picture Arrangement |
| Arithmetic | Block Design |
| Vocabulary | Object Assembly |
| Comprehension | Coding |
| Digit Span | Mazes |

All subtests have a mean scaled score of 10, with a standard deviation of 3.

Bannatyne Pattern

| Spatial | Conceptual | Sequential | Acquired Knowledge |
|---|---|---|---|
| Picture Completion | Similarities | Arithmetic | Information |
| Picture Arrangement | Comprehension | Digit Span | Arithmetic |
| Object Assembly | Coding | Coding | Vocabulary |

The scaled scores total of the Spatial category is greater than the scaled scores total of the Conceptual category which is greater than the scaled scores total of the Sequential category, which, in turn, is greater than the scaled scores total of the Acquired Knowledge category.

Several researchers used neither Keogh's or Bannatyne's patterns but instead used all the subtest scores obtained from the WISC-R. Miller, Stoneburner and Brecht (1978), Hutcherson (1971), Zingale and Smith (1978), Richman (1979), and Kaufman (1976) used the difference between the Verbal IQ and Performance IQ to determine whether the subjects were to be labeled learning disabled. Tierney, Ames and Teasdale (1976), Webster and Schenk (1978), Anderson, Kaufman and Kaufman (1976), Tabachnick (1979), Hutcherson (1971), Smith, Coleman, Dokecki and Davis (1977a), Zingale and Smith (1978) and Smith (1978) examined subtest scatter to determine if there was a predominant pattern for learning disabled subjects. Scatter is defined as the difference between subtest scaled scores (Tabachnick, 1979).

Three other approaches are the ICA pattern, the Wills - Banas approach and the Verbal Comprehension/Perceptual Organization factors. The ICA pattern looked at the Comprehension, Information and Arithmetic subtests of the WISC-R and placed them in the order in which Comprehension is greater than Information and Arithmetic (C > IA). The Wills - Banas approach suggested charting the subtest scaled scores and analyzing the strengths and weaknesses of the child. The last approach, the Verbal Comprehension/Perceptual Organization factors took the two factors that were found in the WISC-R by Wallbrown et al. (1975) and Cohen (1959) (Schooler, Beebe and Koepke, 1978).

The two factors corresponded directly with the Verbal and Performance sections of the WISC-R. The Verbal subtests loaded most heavily (or influenced) on the Verbal Comprehension factor; the Vocabulary subtest was the heaviest loading Verbal subtest for the learning disabled

students. The Performance subtests influenced the Perceptual Organization factor most heavily with the Object Assembly subtest having the most influence (Schooler, Beebe and Koepke, 1978).

## Review of the Literature

### Wechsler's Approach

Wechsler (1974) did not recommend any of these approaches. He stated that the information obtained from his test is relevant only because "it establishes and reflects whatever it is one defines as overall capacity for intelligent behavior" (p. 1). He stated that psychological diagnosis can be useful, but that the school psychologist must be knowledgeable and familiar with literature on the subject of syndrome patterns and psychological diagnosis. Wechsler also wrote about score differences and stated that for a difference between subtest scores to be considered significant, the school psychologist must look at the subtests involved and the reliability and standard error of measurement ($SE_m$) of each subtest involved. Wechsler stated that generally, a difference of three points or more is needed between subtests for the difference to be considered significant and at least fifteen points are needed between the Verbal IQ and the Performance IQ to be considered significant.

Piotrowski and Grubb (1976) disagreed with Wechsler's statements concerning significant differences between the Verbal IQ and the Performance IQ and between the subtest scaled scores. Wechsler's Table 13 - "Differences between Verbal and Performance IQ's Required for Statistical Significance at the 15% and 5% levels of Confidence, by Age" (p. 35)

was thought to be too high by Piotrowski and Grubb; they felt that the level of significance should be at least at the .05 level. Wechsler's Table 12 - "Differences between Scaled Scores Required for Statistical Significance at the 15% Level of Confidence" (p. 35) used the average sub-test standard error of measurement for all eleven age groups and ignored the fact that subtest $SE_m$ can differ substantially at the different age levels. Piotrowski and Grubb stated that the $SE_m$ should be given for each subtest at each age level. The authors stated that usually a three to five point difference is needed at the .05 level of significance and four to six points at the .01 level between subtests. (They also added that a 14 to 16 point discrepancy is needed for significance at the .01 level between the Verbal score and the Performance score.) The range was three to seven points between subtests at the .01 level of significance. The seven point difference between subtests usually involved the Mazes subtest as one of the two subtests.

Piotrowski and Grubb found that it was very important to look at the the subtests being compared and "the chronological age at which they are being compared in determining the size of the scaled score different necessary for significance" (p. 203). The authors used the example of the Vocabulary and Information subtests. At the .01 level of significance, a difference of only three points was needed between the two tests at the 15½ year age while a difference of six points was needed using the same comparison at the 6½ age level. Piotrowski and Grubb concluded that an examiner must keep in mind that any difference may be due to perceptual problems, cognitive problems or personality or sociocultural factors. They stated that only the most tentative diagnosis should be made; this

diagnosis should be reinforced with more formal and informal diagnosis, teacher reports, classroom observation, work samples and an understanding of the child's background. The information obtained from these sources would be used not only to diagnose the child but also to help in the writing or implementation of the Individual Educational Plan.

Bannatyne's Pattern and Variations

Bannatyne's approach differed from Piotrowski and Grubb's. Rather than critiquing Wechsler's approach, Bannatyne (1974) reorganized the WISC-R subtests into four categories: Sequential (Coding, Digit Span, Arithmetic), Spatial (Picture Completion, Block Design, Object Assembly), Conceptual (Comprehension, Similarities, Vocabulary) and Acquired Knowledge (Information, Arithmetic and Vocabulary). Bannatyne intended the recategorization to be used as a diagnostic tool and stated that this method is a "more useful and statistically valid format" than Wechsler's Verbal and Performance categories (p. 273). Bannatyne then went on and called for more research in cluster analysis techniques which would separate disabled readers into subgroups so that differences between the subgroups could be investigated. He also stated that the demographic study, which would identify "clusters of learning disabled characteristics in children, their overlaps, nature and incidence," was needed (p. 272).

Smith, Coleman, Dokecki and Davis (1977b) administered the WISC-R to 208 children who had been diagnosed as LD by the school and had a Full Scale IQ of 75 or more on previous testing. In another study using the same population sample, Smith, Goleman, Dokecki and Davis (1977a) examined

the test scores in terms of the Verbal IQ, Performance IQ, Full Scale IQ and subtest scaled scores. However, in the Smith, Coleman, Dokecki and Davis (1977b) study, they recategorized the scaled scores into Bannatyne's pattern. The purpose of the study was to evaluate the usefulness of Bannatyne's recategorization for learning disabled children and also determine if it is consistent with learning disabled childern of different IQs. Smith et al. (1977b) organized the data according to Bannatyne's pattern except for one difference: the Digit Span subtest was not administered. The recategorized Sequential score consisted only of Arithmetic and Coding. The Spatial, Conceptual and Acquired Knowledge categories remained the same. The results showed that Bannatyne's pattern (Spatial > Conceptual > Sequential) showed up on the total sample, the high IQ group (Full Scale IQ of at least 76 and with a Verbal or Performance IQ of at least 90) and the low IQ group (all children who did not meet high IQ group's criteria). A fourth group consisted of a subgroup of the low IQ group. This group was labeled EMH by the researchers (though they were in an LD class) and consisted of children who had a Full Scale IQ of 75 or below. This fourth group's scores did not fall into Bannatyne's pattern. Smith et al. (1977b) then ranked the three recategorized scores of each child from highest to lowest. This showed that 70% of the children had their highest score in the Spatial category and 62% of the children scored lowest in the Sequential category. A total of 43% of the children had the Spatial > Conceptual > Sequential pattern. Only 17% could be expected to obtain this by chance. In addition, only the children with Full Scale IQs of 75 or below did not

show the Spatial > Conceptual > Sequential pattern. The authors felt that these children probably should have been classified as EMH rather than LD. Overall, this research supported past research concerning Bannatyne's pattern and its applicability for learning disabled children according to the authors.

Smith, Coleman, Dokecki and Davis (1977a) tried to provide a "composite intellectual profile in terms of Verbal IQ, Performance IQ, Full Scale IQ and subtest scaled scores" (p. 353). The WISC-R was administered to 208 children in learning disabilities classrooms. The sample was then divided into two groups. The high group consisted of scores with a Full Scale score of at least 76 and a requirement of a Verbal or Performance IQ of at least 90; the low group consisted of the students who did not meet those criteria. Smith and his colleagues found that 37% of the sample did not meet the criterion of normal intelligence. They found that the Performance IQ was consistently higher than the Verbal IQ for the whole sample. Both subgroups had the Comprehension subtest as the highest mean Verbal subtest, with Arithmetic and Information the lowest. The highest Performance subtests were Object Assembly and Picture Completion for both groups; the lowest subtest score was Coding. Results of this study showed some support for Bannatyne's recategorization. The depressed scores on Coding and Arithmetic and the higher scores on Block Design, Object Assembly and Picture Completion go along with Bannatyne's statement that a learning disabled child will score highest in Spatial (Block Design, Object Assembly, Picture Completion) and lower on Sequential (Coding, Arithmetic and Digit Span).

Webster and Lafayette (1978) ordered the subtest scores of 401 elementary age students who had been identified as learning disabled, emotionally disturbed (ED) or educable mentally handicapped into the Bannatyne pattern with one variation: they used the Picture Arrangement subtest instead of the Arithmetic subtest in the Sequential category. They found that 99.7% of the students who were labeled learning disabled would again be labeled LD on the basis of the Bannatyne pattern. One learning disabled child would be labeled emotionally disturbed according to the Bannatyne pattern. More significantly, 100% of the emotionally disturbed (ED) and educable mentally handicapped (EMH) students would be predicted to be LD. The Bannatyne pattern has little value in differentiating LD from EMH and ED according to Webster and Lafayette. The problem is that the maximum difference between the largest mean (ED, Spatial) and the smallest mean (EMH, Acquired Knowledge) is only 3.384 points. Webster and Lafayette stated that Bannatyne's recategorization may be an aid in differentiating normal from handicapped children but has no use in distinguishing specific areas of handicapped.

There should be some caution in accepting Webster and Lafayette's (1978) statement. Webster and Lafayette (1978) did not have a random sampling of their 401 students. They also had approximately only one third of the number of LD children in the total number of the ED and EMH group. Because of this, there should be some concern about their statement that the Bannatyne pattern should not be used to differentiate handicapped students (LD from EMH, etc.). There were only 36 EMH and 71 ED as opposed to 294 LD students. These lopsided numbers make it difficult to draw a valid conclusion that is not skewed.

Gutkin (1979) conducted research concerning the Bannatyne pattern (Spatial > Conceptual > Sequential) and Mexican-American children and Caucasion children. The subjects were 53 Caucasion children and 87 Mexican-American Children, all of whom had been labeled LD. All subjects were given the WISC-R. The Spatial, Conceptual and Sequential scores of each group were analyzed with repeated measures of analysis of variance and with post-hoc Newman-Keuls procedure. As a group, the Caucasion children exhibited the Spacial > Conceptual > Sequential pattern described by Bannatyne. The sample of Mexican-American children did not show this pattern; they exhibited a Spatial > Sequential > Conceptual pattern. Gutkin then reviewed all individual scores and found that 70% of the Caucasian children and 80% of the Mexican-American children did not demonstrate the Spatial > Conceptual > Sequential pattern. It was shown that for an individual child, a difference of seven points or more was needed between each of the three possible pairs of Bannatyne's categories to be significant at the .05 level. Only 2% of the Caucasian sample and 0% of the Mexican-American sample showed statistically significant differences between the three categories in the predicted direction. Gutkin stated that the Bannatyne pattern would be of little value when attempting to diagnose learning disabilities in individual children. The results of this study concerning the Caucasian group of children did replicate previous studies in that the children as a group did show the Spatial > Conceptual > Sequential pattern. Because the Mexican-American children showed a Spatial > Sequential > Conceptual pattern and were LD, examiners should not interpret the absence of the Spatial > Conceptual

> Sequential pattern as being non-learning disabled in Mexican-American children. Gutkin concluded that there should be serious doubt concerning the use of the Bannatyne pattern in the diagnosis of learning disabilities.

Vance and Singer (1979) used Bannatyne's four categories and added a fifth. Their fifth category of Distractibility is composed of the summed scores of the Arithmetic, Digit Span, Coding and Mazes subtests. In this study, the authors reorganized 98 learning disabled children's WISC-R scores into Bannatyne's four categories and their fifth category. Their results showed a significant pair-wise comparison between the Distractibility score and the Sequential, Spatial, Conceptual and Acquired Knowledge scores. The children's scores from highest to lowest were Spatial, Conceptual, Sequential, Acquired Knowledge and Distractibility. Sixty-one percent of the LD children scored highest in the Spatial category. Seventy-one percent scored lowest in the Distractibility category, and 26% had their lowest scores in the Sequential category. The Spatial > Conceptual > Sequential > Acquired Knowledge > Distractibility pattern was obtained by 39% of the children. Only 20% could be expected to obtain this by chance. The results showed some support for the Bannatyne pattern. From the results of their study, Vance and Singer hypothesized that children with learning disabilities have good spatial skills but are weak in skills involving general comprehension and attention. The authors felt that using this recategorization method is questionable because each diagnostic group (i.e. LD, EMH, ED) may have several different profile patterns. They stated that examiners must have "familiarity with various

knowledge concerning psychological and educational theories of development and learning" (p. 68).

Miller, Stoneburner and Brecht (1978) conducted a study examining the effectiveness of the Bannatyne pattern, Keogh's method and Verbal-Performance scores. The study involved 121 elementary age children who were learning disabled. The examiners found that 73 had primarily a visual perceptual deficit and 48 had primarily an auditory perceptual deficit. The authors did not specify what tests other than the WISC were used to make the diagnosis; however, they did state that other tests were used. The results showed that the Bannatyne pattern correctly classified 83.6% of the visual perception deficits and 39.6% of the auditory perception deficits. This gave a correct classification of 66.12% of the children. Statistical analysis of the results showed that the Bannatyne pattern did discriminate significantly between the two categories. The authors cautioned that even though the Bannatyne pattern did discriminate significantly between the two categories, they did not find any subtest profiles that could be of use to the school psychologist or learning disabilities teacher. Miller, Stoneburner and Brecht inferred several important implications in this study. More than half of the auditorally perceptually handicapped could not be discriminated from the visually perceptually handicapped disability. The results did not show Bannatyne's recategorization to be credible in the diagnosis of learning disabilities. Results of the study concerning Verbal-Performance scores and Keogh's recategorization will be discussed later in this paper.

WISC-R Subtest Scatter

Many researchers have examined scaled scores of the subtests of the WISC-R. They have attempted to find patterns that children with learning disabilities would exhibit in their WISC-R scores. The examiners focused on differences between the various subtests and labeled these differences "scatter" or used the term "differential diagnosis". The following studies discuss their results concerning WISC-R scatter.

Tierney, Ames and Teasdale (1976) examined differences between the subtests scaled scores of the WISC-R to see if it was efficient enough for valid subtest comparison at various age levels. The authors' results showed that only 47% of the possible comparisons across the subtests at all age levels have some diagnostic value. Because of this, the authors did not recommend the use of the WISC-R in differential diagnosis (comparing subtest scores). Any diagnosis would have to involve using the authors' table to check which tests have any diagnostic value. They stated that an individual would need to be extremely cautious in interpreting subtest scatter or their results and suggestions would probably be misdirected.

The case files of 1,524 children were examined by Webster and Schenck (1978). As a result of diagnostic assessment, these children were all placed into one of four categories: (a) learning disabilities, (b) emotionally disturbed, (c) educable mentally handicapped, and (d) "other". Webster and Schenck used the ten subtests of the WISC-R, the mean scaled scores of the Verbal and Performance secions and the three grade equivalent scores of the Wide Range Achivement Test (WRAT). A

series of discriminant functions analyses were done on different combinations of the above information. Only 58.48% of the cases were correctly diagnosed using this data. Sixty-nine percent of the children who were diagnosed as EMH, ED and multi-handicapped were said to be LD based on this data. Only the EMH group could be diagnosed from the other groups; this was done with 52% accuracy. Because these results failed to provide any information concerning test performance differences between the groups, the authors placed further constraints on the analyses to reduce any external sources of variance. These constraints included the "elimination of the multi-handicapped group, a minimum IQ level of 75 to reduce the influence of low IQ scores (and theoretically the EMH group), an MA range of 6 to 17 years and a CA range of 6 to 17 years" (p. 76). All proved to be ineffective in differentiating learning disabilities from the other categories.

The results showed that if a child is of average ability but is functioning at a low grade level (as measured by a reading achievement test), he will probably be labeled learning disabled. If the child's intelligence is at a borderline or dull normal level, and his word analysis skills are at expected performance level, he will be labeled EMH. A child will be labeled ED if he is of average intelligence and is close to grade level in reading but is still having learning problems. Webster and Schenck concluded that the WISC-R, WRAT, and other tests may not be totally useless in the discrimination of learning problems. It must be kept in mind that "at different age levels and under different IQ levels, different facets of the testing are attended to more than

others" (p. 78). The three most significant variables across all diagnostic groups appeared to be the "child's reaction to and stated behavior in various social situations as measured by the Comprehension and Picture Arrangement subtests of the WISC-R, a general estimate of cognitive ability and potential as measured by the WISC-R Full Scale IQ score and the ability to analyze phenomically and synthesize words as measured by performance on the Word Recognition subtest of the WRAT" (p. 78).

Forty-one children who had previously been diagnosed learning disabled were given the WISC-R by Anderson, Kaufman and Kaufman (1976). The first analysis involved a comparison of test scatter of these 41 children to test scatter of normal children. The index of scatter was the difference between the highest and lowest scaled scores of the WISC-R computed on the Verbal, Performance and Full Scale scores. The mean indexes of scatter between the two groups were compared; the significance was determined by a t-ratio. The results showed that the WISC-R functioned the same way for the children with learning disabilities as for the normal children. The children with learning disabilities scored about one standard deviation below the normative mean on the WISC-R and showed characteristic strengths and weaknesses. The average range (scatter) for children with learning disabilities on the Verbal subtests was 4.8 (s.d. of 1.9), on the Performance subtests was 5.7 (s.d. of 2.1) and a Full Scale subtest range of 7.5 (s.d. of 2.3). A typical child with learning disabilities had scaled scores ranging from four to 11 or 12 on the ten subtests; this was often diagnosed as considerable scatter. When the mean ranges were compared (4.5, 5.5, 7.0 respectively for nor-

mal children) there were no significant differences. The researchers stated that an examiner must know the amount of scatter in normal profiles in order to recognize and interpret unusual scatter patterns. The scatter for the learning disabled group as a whole was basically normal and could not be used for diagnostic purposes for any exceptionality. However, the scatter could be used for planning the child's remediation program.

Tabachnick (1979) also looked at subtest scatter of the WISC-R. She conducted a study involving 105 previously diagnosed learning disabled children. She computed the range (scatter) between the five regular Verbal subtests, the five regular Performance subtests and between all ten subtests. She paired combinations of eleven subtests (including Digit Span) and defined a discrepancy of three points or more between any two subtests as significant. Tabachnick found that the means of the range (scatter) of the scaled scores on the ten subtests were significantly greater for the learning disabled group than the normal group. The range of the learning disabled scaled scores showed greater variance. Tabachnick stated that the difference in WISC-R scatter between learning disabled students as a whole and normal students as a whole is reliable. Learning disabled children as a group showed consistently more scatter with Performance subtests and between Verbal and Performance subtests but not within Verbal subtests. Tabachnick noted that children with learning disabilities tend to have a Coding subtest scaled score that deviates substantially from all other subtests. She theorized that this low Coding score may be of "singular diagnostic import" (p. 628). She

also noted that these children may also show large differences between Vocabulary and Block Design or Digit Span and between Digit Span and Picture Arrangement. An average learning disabled child, according to Tabachnick, is inconsistent in the skills that are measured by the Performance subtests. She closed with a recommendation that scatter should not be the basis for a label of learning disabled. She makes this recommendation because there is a strong overlap between learning disabled and normal scatter on the WISC-R and that some children with learning disabilities have low scatter. However, she did state that these subtest score ranges may add diagnostic information for an individual child. Also, she suggested that scatter may help sway a borderline or questionable diagnosis toward the classification of learning disabled.

Smith (1978) examined WISC-R subtest pattern stability for children with learning disabilities. He administered the WISC-R to 161 children who were in learning disabilities classrooms, in both October and May. The test and retest profiles were almost identical (except for Vocabulary, which dropped .9 of a point). The test-retest reliability using a Pearson Product-Moment Correlation was 0.94, $p < .0001$. Smith did not discuss a particular pattern for children with learning disabilities, but simply noted that this pattern was stable for children identified as learning disabled.

Hutcherson (1971) opened with the statement that most educators agree that LD children exhibit a peak and valley subtest profile of the WISC-R, while EMH children have a subtest profile that is flat with little variation between the subtests' scores and the mean of the subtests.

His study examined "the significance of subtest and Verbal-Performance scale score range differences on the WISC-R" for groups of children labeled EMH (IQs of 61 through 80) and children labeled as being LD (IQs of 81 through 100) (p. 4). The 103 subjects of the study were labeled either LD or EMH and had a Full Scale IQ range of 61 to 100. They were grouped in IQ ranges of five points. Ranges of the subtest scale scores and Verbal-Performance IQs in each IQ range were computed and then compared to each other to "determine the significance of the heterogeneity of their variances" (p. 5). The results showed that there was no significant difference between the expected variability between the Verbal-Performance or subtest profiles of the EMH and LD groups. Also, the IQ did not affect either the Verbal-Performance sections or the subtests score ranges. Hutcherson also found the EMH children do not necessarily have a "flat profile" and LD children do not always have a "peak and valley profile." Hutcherson closed with the statement that examiners must be careful not to overinterpret WISC-R score scatter. Instead, the teacher should use the scatter information to adjust the methods of instruction, regardless of the IQ score.

WISC-R Verbal/Performance Differences

Another way the WISC-R has been utilized is to use the difference between the Verbal IQ and the Performance IQ to determine whether a child is learning disabled. Most researchers feel that a Performance IQ will be higher than the Verbal IQ. Several studies discuss Verbal/Performance differences.

Miller, Stoneburner and Brecht (1978) also looked at Verbal/Per-

formance patterns in addition to their examination of the Bannatyne pattern and Keogh's categorization. Their study involved 121 students identified as learning disabled. Of this group, there were 73 with visual deficits and 48 with auditory deficits. The authors stated that from a "strictly statistical viewpoint, significant discriminating ability was shown" by the subtest scatter (p. 451). However, they added that "a wide discrepancy between Verbal and Performance scores was not found to be greatly indicative of a learning disability" (p 451). The Verbal/Performance approach correctly classified 80.8% of the visually impaired and 37.5% of the auditorally impaired. This gave a composite score of 63.64%.

Zingale and Smith (1978) examined the relationship between learning disabilities subtest patterns and socioeconomic status (SES) at three different levels. The study involved children from eight elementary schools in a large metropolitan school system who were in self-contained learning disabilities classrooms. The study showed a strong SES/WISC-R relationship among children with "serious academic deficiencies" (p. 203). Zingale and Smith showed that "SES and WISC-R were significantly related, subtest score differences were independent of SES, and significant PIQ > VIQ discrepancies existed regardless of SES level" (p. 203). They also added that the generalization of the above statement depends upon how representative the sample is of the population of children with learning disabilities. Throughout this study Zingale and Smith made the assumption that the WISC-R scatter pattern for learning disabilities is true and reliable. At the end of the article they added that more re-

search is needed to confirm this scatter pattern for learning disabilities. They also recommended that the examiner who makes a diagnosis on the basis of Verbal/Performance discrepancies (they did not mention subtest scatter) did not need to worry about SES interacting with the LD scatter pattern.

Richman (1979) did not use the term learning disability but did refer to terms such as verbal expression deficit, verbal reception deficit and sequential memory. He opened the discussion of reading disabilities with the statement that the school psychologist may have difficulty providing a reading level estimate when children have a low Verbal/high Performance score of the WISC. Richman stated that there were three ways to base a reading level when this situation arises. The first choice was to base the reading level on the Verbal score since many psychologists consider that the verbal skills have a higher correlation with reading ability. The second possibility was that the higher Performance score provides a clue to the potential achievement, and the reading expectations should be based on the Performance IQ. The third approach ignored the differences between the Verbal and Performance IQs and used the Full Scale IQ as the predictor of reading skills. Using any of these approaches ignores the fact that additional testing needs to be done. Richman's study examined the possibility of using a model for further evaluation of a child with the low Verbal-high Performance profile. He suggested that this WISC pattern may be a specific language problem, a general language problem or a verbal expression deficit with possibly a verbal reception deficit. He examined the verbal reception and mediation skills of the sub-

jects and asked if there is a relationship between the measures of those language variables and reading achievement. The subjects in this study had a minimum of 15 points below the Performance. The Peabody Picture Vocabulary Test, the Hiskey-Nebraska Test of Learning Aptitude and the Wide Range Achievement Test (WRAT) were also administered. Each subject was then placed into one of five reading groups based on the WRAT grade equivalent scores. Results showed that the Full Scale IQ, the Performance IQ and the Verbal IQ did not provide any relationship between any one of the tests and reading level or ability. The low Verbal-high Performance profile is not indicative of a reading disability; Richman advised caution in using this profile in predicting reading ability.

Wechsler's normative sample of 2200 children was used by Kaufman (1976) to determine if a 9, 12 or 15 point discrepancy between the Verbal and Performance IQs is significant. Kaufman wanted to know what percentage of normal children have a 15 point or more difference. Kaufman's results showed that slightly less than half of the normative sample (48%) have discrepancies of nine or more points. Approximately one third had a 23 point or more difference, and about one fourth had a 15 point or more difference. Also, the significant Verbal > Performance differences were about as frequent as the Performance > Verbal discrepancy scores. Kaufman reported a mean discrepancy score of 9.7 points (S.D. of 7.6) for the entire standardization sample. The average child of the normative sample had a significant ($p < .15$) Verbal-Performance IQ difference. Sixty-nine percent of the total sample of the WISC-R had a discrepancy of 12 points or less; 31% had 13 points or more. Kaufman used an example of a

WISC-R Verbal IQ of 98, Performance IQ of 86 and a Full Scale IQ of 91. This 12 point discrepancy is significant at the 5% level of confidence, but it is not an abnormal discrepancy since 30% of the normative sample had an equal or larger discrepancy. This information can help the clinician interpret the discrepancy and use that knowledge to plan a remedial program for the child.

In addition to examining subtest scatter patterns, Smith, Coleman, Dokecki and Davis (1977a) examined Verbal/Performance patterns. Their study involved 208 students in learning disabilities classrooms who were given the WISC-R. The children had been previously diagnosed as learning disabled by the school system. These children were divided into two groups. The high group children had a Full Scale score of at least 76 with a Verbal or Performance IQ of at least 90. The low group consisted of the children who did not meet those criteria. Both of these groups had a mean Performance IQ that was significantly greater than the mean Verbal IQ. The high IQ group's mean discrepancy approached 10 points. Both groups had four of the five Performance subtest mean scores that were greater than the highest Verbal subtest mean score. Also, the fifth Performance subtest (Coding) was almost as low as the lowest Verbal subtests (Information and Arithmetic) for both groups.

In examining Verbal/Performance differences Hutcherson (1971) looked at the scores of 103 children who were labeled as EMH (IQs of 61 through 80) or LD (IQs of 81 through 100). He found that there was "no significant difference between the expected variability between Verbal/Performance" profiles of the EMH and LD groups (p. 6). Hutcherson's results

showed that IQ does not affect the Verbal/Performance differences on the WISC-R. He stated that an examiner using the Verbal/Performance discrepancy may be unfairly discriminating if he does not apply his interpretation of the Verbal/Performance discrepancy to a child with a Full Scale IQ of 80 or below and who may or may not be labeled EMH.

Verbal Comprehension/Perceptual Organization Factors

Schooler, Beebe and Koepke (1978) organized the WISC-R into two factors: Verbal Comprehension and Perceptual Organization. The authors used the Verbal IQ, Performance IQ, Full Scale IQ and the ten subtests' scores of 199 children. These children had been identified as learning disabled, educable mentally handicapped, emotionally disturbed, other (children who needed special services but did not meet criteria for the above) and none (children who did not need special services). Schooler et al. did a principle components factor analysis and intercorrelated the subtest scores for the WISC-R. A one-way analysis of variance was done to compare the test scores among the five groups. Significant differences were few. "The WISC-R factor structure is remarkably similar for all clinical groups" (p. 483). One significant difference was that the subtest scores and IQ scores of the EMH group were significantly lower when compared to the other groups. The learning disabled group showed few scaled score of IQ differences when compared to the other groups. Schooler et al. stated that perhaps the most important differences were the significantly lower Verbal IQ and Full Scale IQ for the LD groups as compared to the None group.

ICA Pattern

Griffiths' 1977 study with 208 boys and girls showed a specific pattern with some of the subtests. She found this pattern in several other studies and called it the ICA pattern. This pattern is present when Comprehension is higher than both Information and Arithmetic (C > IA). Griffiths noted that Picture Completion and Picture Arrangement were usually above average while Coding was usually low. Griffiths concluded that Information and Arithmetic are sums of the child's learned information. Griffiths gave no statistical analyses concerning her pattern.

Wills-Banas Approach

Wills and Banas (1976a) took an entirely different approach toward the WISC-R and its subtest scores. They suggested that the teacher or diagnostician chart the subtest scaled scores along with other pertinent information. They resisted the attempts to label chilrden and downplayed the concern with IQ scores. Instead they focused on the subtest scaled scores and the differences between them and the strengths and weaknesses of the child. They felt if the school psychologist makes an analysis of the strengths and weaknesses of the subtest scores and then applies those to academic tasks, the academic strengths and weaknesses can be predicted. Interfering factors can then be isolated, and the strong areas for learning can be identified. They noted that poor vision or poor motor coordination can affect and possibly invalidate the test results.

In a series of seven articles by Wills and Banas (1976a, 1976b, 1977a, 1977b, 1977c, 1978a, 1978b) the authors began by listing each

subtest and then told what it measures, requires and influences. They also told the school psychologist or teacher what could influence the subtest, i.e. emotional status, maturity, anxiety, school background or auditory memory or discrimination, etc. They also gave tests or subtests that would cross check that particular subtest, compensations, remedial ideas and activities. Five articles took two subtests, one Verbal and one Performance, and then gave the diagnosis, prescription and a program of instruction using the subtests. The subtests are grouped as follows: Information and Picture Completion, Comprehension and Picture Arrangement, Arithmetic and Block Design, Similarities and Object Assembly, and Digit Span and Coding. The concluding article discussed why Mazes and Vocabulary were not included (1978b). Mazes is a supplementary subtest and is not included statistically in measuring the Performance IQ. Banas and Wills (1976a) also said that the Mazes subtest used too many skills and is not useful for diagnosis and remediation. Vocabulary was not included because the authors (1978b) found it to be a measure of memory rather than a measure of learning ability. They also found that Vocabulary does not consistently fall into any pattern with any other subtest. Banas and Wills (1978b) recommended a less structured and more visual study of strengths and weaknesses patterns. They felt that this study/graph approach is more practical and useful.

Keogh's Method

Miller, Stoneburner and Brecht (1978) examined Keogh's method in addition to the Verbal/Performance scores and the Bannatyne pattern. Keogh grouped the Digit Span, Arithmetic and Coding scaled scores into

an area called Attention-Concentration, the Block Design, Picture Completion and Object Assembly subtests into an area labeled Intellectual; the last grouping, Verbal Comprehension, concisted of the Vocabulary, Information and Comprehension subtests. The authors took the WISC-R scores of 121 children who had been identified as learning disabled (73 with visual perceptual deficits, 48 with auditory perceptual deficits). Keogh's method correctly identified 80.8% of the visual perceptual deficits, and 43.7% of the auditory perceptual deficits; this gave a total of 66.12% being correctly identified. Statistically, the Keogh method did show significant discriminating ability, but the authors stated that the results "did not lend credibility to recategorizing subtests, at least in regard to techniques developed" by Keogh (p. 451, 452).

Dudley-Marling, Kaufman and Tarver (1981) examined 24 studies that had been on the WISC, WISC-R, or the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). In examining the high Performance IQ-low Verbal IQ syndrome they found that a discrepancy between Verbal and Performance was just as likely in normal children as it was in learning disabled children. Four studies identified the three combinations of Verbal/Performance IQs (high Verbal IQ-low Performance IQ, high Performance IQ-low Verbal IQ and Verbal IQ approximately equal to Performance IQ). These studies found that a high Verbal IQ-low Performance IQ is associated more highly with better reading achievement than either of the other two patterns. Five studies dealt with subtest scatter. Two studies compared the scatter of a learning disabled sample to Wechsler's normative

data; only one of these two found more scatter in the LD sample. Another study that used a normal control group rather than Wechsler's found equal scatter in both groups. One study reported that the LD group had more scatter than ED or EMH groups; the last study found no difference in the scatter between an LD group and a group of normal, low-achieving children. Dudley-Marling et al. did not suggest scatter as a further area of research. They stated that even if scatter could discriminate learning disabilities, it is improbable that the knowledge could "improve the diagnosis and remediation" of LD children "since it would fail to identify the source of the variation" (p. 317). There was general support for Bannatyne's recategorization in the studies. Most articles reviewed showed that learning disabled children will score relatively well on Picture Completion, Block Design and Object Assembly and would do poorly on Arithmetic, Digit Span, Coding and Information. Dudley-Marling, Kaufman and Tarver concluded by agreeing with Huelsman's statement that even though learning disabled children as a group may have a characteristic WISC-R profile, few learning disabled chilrden may actually have that pattern. They stated that the WISC-R is still one of the most valid and reliable IQ tests available, but differential diagnosis should not be based on the WISC-R patterns.

The studies previously reviewed appear to have some mixed conclusions. In looking at the studies concerning the Bannatyne pattern it is found that Smith, Coleman, Dokecki and Davis (1977a and 1977b) found the Bannatyne pattern was useful for the diagnosis of children with learning disabilities. All other studies, Webster and Lafayette, (1978); Gutkin,

(1979); Vance and Singer, (1979); and Miller, Stoneburner and Brecht, (1978), also found this but none of them (including Smith, Coleman, Docecki and Davis) recommended it for use in the diagnosis of an individual child with learning disabilities. The results concerning subtest scatter on the WISC-R schowed that there was no significant difference between an Ld group and a normal group's scatter. Tierney, Ames and Teasdale (1976); Webster and Schenck (1980); Anderson, Kaufman and Kaufman (1976); and Hutcherson (1971) did not recommend the use of scatter in diagnosing learning disabilities. Tabachnick (1979) was the only researcher who found a significant difference, but she also did not recommend it for individual diagnosis. Most variations between the studies concerned the Verbal/Performance differences on the WISC-R. Miller, Stoneburner and Brecht (1978) found that there was a significant difference, but they did not recommend using a Verbal/Performance approach. Kaufman (1976) also found that the Performance IQ was significantly greater than the Verbal IQ for children with learning disabilities. Hutcherson (1971) found no significant difference, and Richman (1979) found that a difference between the Verbal IQ and Performance IQ was not indicative of a reading disability and advised caution in using it as such. Zingale and Smith (1978) found that SES did not affect the Verbal/Performance scores of children with learning disabilities.

## Statement of Purpose

The purpose of this study was to examine further WISC-R subtest score patterns in an attempt to alleviate some of the ambiguity in that area. The following null hypotheses were tested: (a) there is no significant

difference between Wechsler's normative sample and a learning disabled sample when using the difference between the Verbal IQ and the Performance IQ; (b) there is no significant between Wechsler's normative sample and the learning disabilities sample using Bannatyne's pattern.

## Method

### Subjects and Setting

In order to examine the differences between Wechsler's normative sample and a learning disabled sample, the case files of 300 children labeled learning disabled were examined. There were 211 males and 89 females between the ages of 5 years, 10 months and 17 years, 3 months in the sample. When the Bannatyne pattern was used, the LD category consisted of 280 rather than 300 because 20 children had not been given the Digit Span subtest, which is included in the Bannatyne pattern. These children, who had been diagnosed as learning disabled on the basis of a psychological evaluation, were students in learning disabilities programs in east-central Illinois. The WISC-R had been administered as part of that evaluation.

### Data Collection

These children's case histories were on file at the central offices of a large rural special education cooperative which encompassed an eight county region in east central Illinois. The information obtained from each file included age, sex, the date the WISC-R was administered, the Full Scale, Performance and Verbal IQs and each scaled score on each subtest.

Analysis

The range, mean and standard deviation (SD) of the Verbal IQ, Performance IQ and the Full Scale IQ were computed for the learning disabled sample. The Verbal IQ of each student with learning disabilities was subtracted from their Performance IQ, or the reverse was done if the Performance IQ was less than the Verbal IQ. No IQ scores were prorated for the LD sample. Table 6 - "Means and Standard Deviations of Sums of Scaled Scores on the Verbal, Performance and Full Scales, by Age, for the Standardization Sample" (p. 23) and Table 20 - "IQ Equivalents of Sums of Scaled Scores" (p. 151) were used to show the difference between the Verbal IQ and Performance IQ of Wechsler's sample. The mean sum of the Verbal scaled scores (Table 6) was converted to the Verbal IQ (Table 20) for each age category. (Wechsler's normative sample consisted of 2200 children divided into 11 age categories, i.e. 6½ years, 7½ years, etc.) The same was done with the Performance sum of scaled scores. The Verbal IQ was then subtracted from the Performance IQ, or the reverse was done if the Performance IQ was less than the Verbal IQ. The difference of each age category was then multiplied by 200 in order to obtain 2200 scores. These difference scores for each group (the LD sample and Wechsler's standardization sample) was then tested for significant differences between groups by the use of a one-tailed t-test for independent means.

An analysis of variance (two factor mixed design) was done using Bannatyne's pattern. For the analysis of variance, Table 14 - "Intercorrelation of the Tests, by Age Group" (p. 36) of the WISC-R manual was

used to place Wechsler's sample in the Bannatyne pattern. The mean scaled score of each subtest was placed into the Bannatyne pattern. The three scaled scores of the subtests in each age category were then added to give a single score for each of Bannatyne's categories (Spatial, Conceptual, Sequential, Acquired Knowledge). This was done for each of the 11 age groups. Each of the four scores in each age category was multiplied by 200 to obtain the 2200 scores of Wechsler's standardization sample.

## Results

The range, standard deviation and mean of the Verbal IQ, Performance IQ and Full Scale IQ were determined for the learning disabled sample. The Verbal IQ range was 64 to 137 with a mean Verbal IQ of 91.09 and a standard deviation of 11.90. The range of the Performance IQ was 58 to 133 with a mean Performance IQ of 96.38 and a standard deviation of 12.92. The Full Scale IQ range was 64 to 139 with a mean Full Scale IQ of 92.43 and a standard deviation of 11.39. (See Table 1)

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Insert Table 1 about here

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The results of the t-test done on the difference (Verbal IQ minus Performance IQ or Performance IQ minus Verbal IQ) between the Verbal IQ and Performance IQ between Wechsler's standardization sample and the learning disabled sample showed that there was a significant difference at the .0005 level (t=6.529, df=2498 or 0). The learning disabled sample had a significantly higher difference (mean difference - 11.55

Table 1

Range, Mean, Standard Deviation of

Learning Disabilities Sample

(300 Children)

| | Range | Mean | S.D. |
|---|---|---|---|
| Verbal IQ | 64-137 | 91.09 | 11.90 |
| Performance IQ | 58-133 | 96.38 | 12.92 |
| Full Scale IQ | 64-139 | 92.43 | 11.39 |

points) between the Verbal IQ and the Performance IQ than Wechsler's normative sample (mean difference - .545 points). Therefore, based on this data, the null hypothesis: There is no significant difference between Wechsler's normative sample and a learning disabled sample when using the difference between the Verbal IQ and the Performance IQ, was rejected because there is a significant difference at the .0005 level.

The results of the analysis of variance showed there is a significant difference at the .001 level between Wechsler's normative sample's Bannatyne pattern and the learning disabled sample's Bannatyne pattern. Table 2 depicts these results. Therefore, based on this data, the null hypothesis: there is no significant difference between Wechsler's normative sample and the learning disabilities sample using Bannatyne's pattern, was rejected.

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Insert Table 2 about here

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## Discussion

The results of this study concerning the Verbal IQ and the Performance IQ difference agreed with the results of the studies conducted by Smith, Coleman, Dokecki and Davis (1977a, 1977b), Webster and Lafayette (1978), Gutkin (1979), Vance and Singer (1979), Miller, Stoneburner and Brecht (1978), and Kaufman (1976). The difference between the Verbal IQ and the Performance IQ is significantly higher for the LD sample. The results of this study appeared to support the results of the other studies discussed in this paper in that it is felt that a

Table 2

Analysis of Variance Between Wechsler's Normative Sample and the LD Sample Using Bannatyne's Pattern

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Total | 44,884.9 | 9919 | --- | --- | --- |
| Between Subjects | 37,510.1 | 2479 | --- | --- | --- |
| LD/Wechsler | 15,184.4 | 1 | 15,184.4 | 1685.47 | .001 |
| $Error_b$ | 22,325.7 | 2478 | 9.009 | --- | --- |
| Within Subjects | 7,374.8 | 7440 | --- | --- | --- |
| Categories | 230.8 | 3 | 65.933 | 82.105 | .001 |
| Categories x LD/W | 175.25 | 3 | 58.416 | 62.332 | .001 |
| $Error_w$ | 6968.75 | 7434 | .937 | --- | --- |

SS - Sum of squares

df - degrees of freedom

MS - test of significance

p - level of significance

diagnosis of learning disabilities should not be made on the basis of the differences between the Verbal IQ and Performance IQ alone. Although, there was a significant difference between the two samples, this difference was found between a learning disabled sample as a whole group and a sample without learning disabilities as a group, not between individual children. Care must be taken in interpreting the results since an individual child may not show a significant difference. There is no conclusive difference between the Verbal IQ and the Performance IQ that can be said to separate the scores of the learning disabled students from the scores of the non-learning disabled students.

One child with learning disabilities may exhibit no difference at all between the Verbal IQ and Performance IQ; another child with learning disabilities may exhibit a 15, 20 or even greater difference between the Verbal IQ and Performance IQ. The same can be true for children without learning disabilities. This is not to say, however, that the WISC-R Verbal IQ-Performance IQ difference should be ignored. Rather, it should be used in addition to the child's other test scores. The child's other test scores should be examined and interpreted. In addition to all test scores, an observation of classroom performance should be made, along with an examination of classwork and papers. Teacher observation and psychologist observations should also be noted. If an obvious or clearcut diagnosis cannot be made after compiling and evaluating all the information available, the difference between the Verbal IQ and Performance IQ may aid in making a final diagnosis.

The Verbal IQ-Performance IQ difference can be used by the learning

disabilities teacher. The learning disabilities teacher can use the difference as an indicator of the child's strengths and weaknesses. This knowledge can be valuable in writing the child's Individualized Education Plan (IEP) and in planning the remedial program. The learning disabilities teacher can also look at the individual subtest scores of the WISC-R and use these subtest scores to help in the writing and implementation of the IEP. The WISC-R results can also be shared with the classroom teacher. Knowledge of the child's strengths and weaknesses (i.e. the Verbal IQ-Performance IQ difference) can be invaluable in determining how material should be presented to the child (written, orally or both). This knowledge can also help determine how the child should be evaluated concerning mastery of skills or knowledge of new material. It can aid in determining what type of projects or assignments would be most profitable for the child. The Verbal IQ-Performance IQ difference and subtest scores can help the teacher determine if the child should do an oral report, a written report or a hands-on project. Use of the WISC-R scores are not limited to the scores of children who are learning disabled. The scores of any child who has been administered the WISC-R can be used to find the most effective way of learning for that child.

Prior research, as mentioned earlier in this paper, has shown that children who are learning disabled may show little or no difference between their Verbal IQ and Performance IQ or they may show a 15 or 20 or even greater point difference. The same is true for children without learning disabilities. Because prior research has been consistent in

this conclusion, it is doubtful if further research will prove any different unless some new approach or technique is developed. It is concluded that the Verbal IQ-Performance IQ difference of the WISC-R should not be the sole diagnostic tool in the diagnosis of learning disabilities.

The Bannatyne pattern of Spatial > Conceptual > Sequential > Acquired Knowledge has been shown to be significantly different when comparing Wechsler's standardization sample to the learning disabilities sample. Webster and Lafayette (1978), Gutkin (1979), Vance and Singer (1979), Smith, Coleman, Dokecki and Davis (1977a, 1977b), and Miller, Stoneburner and Brecht (1978) all found that the Bannatyne pattern did significantly discriminate a learning disabled sample (as a group) from a non-learning disabled sample (as a group) as did this study. The Bannatyne pattern alone should not be used to determine a diagnosis of learning disabilities since a child with a learning disability may not exhibit the Spatial > Conceptual > Sequential > Acquired Knowledge pattern. Children who are not learning disabled may fall into that pattern. The Bannatyne pattern can be used with other tests, teacher and psychologist observations and classwork examination to aid in evaluating a child. It can give important information concerning the child's learning patterns, strengths, and weaknesses as did the Verbal IQ-Performance IQ difference. The learning disabilities teacher can use the child's Bannatyne pattern to aid in writing the Individualized Education Plan (IEP) and in developing specific lesson plans for the child. The classroom teacher can use the Bannatyne pattern to help determine which mode

of learning is the best for the child. The teacher can determine whether the Spatial category, the Verbal category or the Sequencing category (visual and auditory sequential memory) is the strongest mode for the child and then use that mode/category to teach the child and to give assignments for the child to complete utilizing that mode.

Learning disabilities teachers and classroom teachers can use both the Verbal IQ-Performance IQ difference and the Bannatyne pattern to help them. Using both of them yields a great deal of useful information such as strengths, weaknesses, and learning modes of the child. This information can be used to help the teacher aid the child in every facet of his education.

The results of this study supported the findings of the studies previously mentioned. The Verbal IQ-Performance IQ difference and the Bannatyne pattern did significantly discriminate the learning disabilities sample from Wechsler's normative sample. All studies agreed, and this study also concurred, that a diagnosis should not be made on the basis of this information alone but that all factors and information available should be considered. Some examiners may have the desire to place the WISC-R scores into the Bannatyne pattern or to look only at the Verbal IQ-Performance IQ difference and make the diagnosis based on that single factor; this should not be done as there is a strong possibility that the wrong diagnosis may be made. The Bannatyne pattern and Verbal IQ-Performance IQ difference have been found to be true for a sample as a group, not necessarily for an individual. More research needs to be done before a definitive statement concerning either the

Bannatyne pattern and learning disabilities or Verbal IQ-Performance IQ difference and learning disabilities can be made.

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# Appendix

## Form used for information

## gathered on each learning disabled student

To be used with each WISC-R

Sex:

Age:

Date Administered:

Full Scale IQ:

Verbal IQ:

Performance IQ:

VERBAL SUBTESTS SCALED SCORES:

Information

Similarities

Arithmetic

Vocabulary

Comprehension

Digit Span

PERFORMANCE SUBTESTS SCALED SCORES:

Picture Completion

Picture Arrangement

Block Design

Object Assembly

Coding

Mazes