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THE BANNATYNE METHOD OF INTERPRETING THE WISC-R

Mercia R. Dison

Johannesburg, 1983

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A research report submitted to the Divisior of Specialised Education, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements of the Degree of Master in Education (School Counselling).

Johannesburg, 1983

DECLARATION :

I hereby declare that this report is my own work and that I have given acknowledgement to sources which I have used. Figures that appear in the text of this report have bean duly checked and are accurate.

M. R. Dison

M.R. DISON.

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ABSTRACT

This study examined Bannatyne's recategorisation of the WISC-R as a means of determining a profile for the assessment of the learning disabled child. The current literature is surveyed. The WISC-R, the Neale Analysis of Reading Ability and the Schonell Graded Spelling Test were administered to one hundred learning disabled children at an assessment centre known as Japari. Results showed that Bannatyne's formula was not applicable in the majority of test profiles of the learning disabled pupils. Areas for future research are discussed. Emphasis is placed on the need to find more homogeneous learning disabled populations in future studies.

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1. Background

A major barrier to investigation into the nature of learning disabilities is the lack of reliable and valid instruments that will differentiate the learning disabled child from a larger school population. In an effort to clarify ambiguous terminology, the following definition of the learning disabled child was formulated by the U.S. National Advisory Committee on Handicapped Children in their annual report to Congress in 1963:
"Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written languages. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling or arithmetic. They include conditions which have been referred to as practical handicaps, brain injury, minimal brain dysfunction (M.B.D.), dyslexia, developmental aphasia etc. They do not include learning problems which are due primarily to visual, hearing or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage." Learning disabled children, therefore, are presumed to possess average to above average intelligence. (Johnson and Myklebust, 1967).

This definition and its implications have been challenged by Hallahan and Kaufman (1976). These authors state that the greatest amount of confusion with regard to the definition of learning disabilities involves the differentiation of children with learning disabilities (L.D.) from children who fall into the categories of Emotional Disturbance (E.D.) or Educable Mental Retardation (E.M.R.) Their major theme is that the similarities among these three areas far outweigh the differences. The diagnostic label attached to the child is of little concern to them.

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Instead, their focus is on the behavioural characteristics of the child. Thus, if the E.D. child, the L.D. child and the E.M.R. child are all hyperactive and have a figure-ground reversal problem, they will all be taught in the same way.

Hallahan et al. (1976, pg.40) state that to limit the term learning disabilities to children of normal intelligence is inappropriate. I.Q. by definition separates the E.M.R. group from the L.D. and E.D. groups of children. Yet it can be questioned what educational and psychological relevance exists when one child has an I.Q. of 90 and the other one of 70 if in all other ways the two are essentially equal? This distinction is even more questionable if the child with the I.Q. of 70 has a higher chronological age and hence represents approximately the same mental age!

For Ross (1977) the key variable in learning disabilities is the problem of developmental lag in "selective attention". The ability to apply attention selectively is one of the most important capacities needed when learning to read. Adelman and Taylor (1971) who espouse an Interactional approach, move away from the medical or defect model of learning disabilities. In their view, only 1% of the L.D. population can be classified under the heading "Specific Learning Disabilities". The remainder of the 10% of L.D. children - though prevalence is established as high as 30% (Hallahan et al., 1976, pg.30) - have learning difficulties due to the problem of the match. This refers to the incongruity between the motivational and developmental status of the pupil and the educational system.

Children who have difficulty in learning, therefore, present complex diagnostic and assessment problems. Wechsler's scales have been closely

.../...

associated with the psycho-educational assessment of learning disabled children and a vast amount of research has been generated using these scales. Sattler (1981) comments that the great assets of the Wechsler Intelligence Scale for Children - Revised (WISC-R) - used exclusively in this study - are its excellent standardisation procedure, its excellent reliability and adequate validity. Although the WISC-R standardisation group of 2,200 did not explicitly include learning disabled students, it can be assumed that school-identified learning disabled children were represented in the standardisation group. (Klatzkin, McNama, Shaffer and Pincus, 1972). This supports the idea that the WISC-R is an appropriate tool for L.D. assessment. There is empirical support for the reliability (Smith, 1976) and for the validity (Anderson, Kaufman and Kaufman, 1976) of the WISC-R for L.D. pupils. Despite this evidence, Galvin (1981) states that a paradox exists. One validity measure of an intelligence test is to predict academic achievement (Salvia and Isseldyke, 1978). The predictive validity of the WISC-R is therefore flawed when it predicts school success in learning disabled pupils with average to above average intelligence who are not achieving at school. Other limitations of the WISC-R relate to issues of culture fairness, test bias and the fact that the Wechsler scales have failed to incorporate the extensive findings in the areas of cognitive development, learning theory and neuro-psychology in the past 25 years. (Kaufman, 1979).

Despite the limitations of the WISC-R, researchers have used it extensively in an attempt to find distinctive profiles for learning disabled children. The following is a discussion of the main ways of analysing the WISC-R :-

.../...

(a) Verbal-Performance Differences

The WISC-R and all the Wechsler scales provide three separate I.Q.'s, that is a Verbal Scale I.Q., a Performance Scale I.Q. and a Full Scale I.Q. Wechsler (1974) suggested the differences between verbal and performance I.Q.'s are statistically significant at the .15 level. Kaufman (1981, pg.523) states that the stereotyped view that Learning Disabled children have WISC-R profiles that are characterised by large Verbal-Performance I.Q. differences and abnormal subtest scatter has been challenged by current research. It is not unusual for normal pupils to have Verbal-Performance differences of 15 or more points. In fact one out of four normal children has a significant verbal-performance difference at the .01 level, that is 15+ points. (Kaufman, 1981, pg. 523). Similarly considerable sub-test scatter is characteristic of normal I.Q. profiles when interpreted in the following way : The normal range between a child's highest and lowest scaled score on the 10 regular WISC-R sub-tests equals 7 points (Kaufman, 1976b). A number of studies have been published comparing the Verbal-Performance discrepancies and subtest scatter of L.D. and other exceptional children. TABLE I (Appendix) summarises these studies. In terms of the data, Verbal-Performance I.Q. discrepancies for L.D. children have tended to be larger than normal values although not overwhelmingly so and some studies have shown no differences at all (Stevenson, 1979; Thompson, 1981). A similar finding has emerged for subtest scatter. This data implies that the size of the Verbal-Performance discrepancy and the size of the scaled score range are not likely to be very useful in the diagnosis of Learning Disability.

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b) Factor Analysis

A further justification for profile interpretation is provided by the empirical technique of factor analysis. Factor analytic work on the WISC and the WISC-R has been extensive. Kaufman (1975) identified 3 factors :

(A) Verbal comprehension This factor appears to measure a variable common to the verbal scale sub-tests. Vocabulary, Information, Comprehension and Similarities have high loadings on the Verbal Comprehansion factor followed by Arithmetic which has a moderate loading (Sattler, 1981).

(B) Perceptual Organisation This factor appears to measure a variable common to the Performance Scale sub-tests. Block Design, Object Assembly and Picture Completion have high loadings, followed by Picture Arrangement and Mazes which have moderate loadings.

(C) Freedom from Distractability Arithmetic and Digit Span sub-tests have high loadings on Freedom from Distractibility factor followed by Information and Coding B which have moderate loadings.

Factor Analytic results strongly support the interpretation of the Verbal and Performance I.Q.'s as separately functioning entities in the WISC-R. Every study to date has supported the construct validity of the Verbal and Performance scales. Verbal Comprehension and Perceptual Organisation factors have emerged for each age group between 6 - 16 (Kaufman, 1975) : for blacks and whites (Gutkin and Reynolds, 1981) and for boys and girls (Reynolds and Gutkin, 1980). They have also emerged for a variety of exceptional populations : mentally retarded (Van Haagen and Kaufman, 1975),

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gifted (Karnes and Brown, 1980), learning disabled (Blaha and Vance, 1979), and for the emotionally or behaviourally disordered (Dehorne and Klinge, 1978). The factor Freedom from Distractibility was not hypothesised by Wechsler but has been found and explored in depth by most researchers (Kaufman, 1981).

The emergence of a Verbal Comprehension and a Perceptual Organisation factor for L.D. and other groups would seem to be advantageous for meaningful interpretation of the Verbal and Performance I.Q. and the difference between them. However, for the L.D. group there are consistent findings of the ACID profile, that is low scores on Arithmetic, Coding, Information and Digit Span (Ackerman, Dykman and Peters, 1976; Kaufman, 1979). Relatively low scores on Information and Arithmetic - both directly related to school learning - will, therefore, often distort the meaning of the Verbal I.Q. and a weakness in Coding will render the Performance I.Q. an inefficient estimate of non-verbal intelligence. Thus despite the support for the construct validity of Wechsler's Verbal-Performance dichotomy, there is reason to doubt the Verbal-Performance discrepancy as being of practical value for L.D. or potentially L.D. children. Kaufman (1979) maintains that since three-quarters of the ACID profile (ACD) correspond to the Freedom from Distractibility factor, it would seem that the third factor may be the key to competent L.D. assessment.

(c) Bannatyne's Approach

Bannatyne (1968) suggested a model based on the recategorisation of the WISC and subsequently the WISC-R in order to identify what he termed

Genetic Dyslexia. Bannatyne (1974) changed the term Genetic Dyslexia to Spatially Competent Learning Disabled Students (S.C.L.D.) and his research findings show that they constitute 60 - 80% of all specific learning disabled pupils (TABLE II, Appendix). In this Table, Bannatyne identified four etiologically different types of dyslexia :

(i) Spatially Competent Learning Disabled Students;

(ii) Minimal Neurological Dysfunction;

(iii) Communicative Learning Disabled Students; and

(iv) Unmotivated Learnind Disabled Students.

This study is confined to Spatially Competent Learning Disabled Children (S.C.L.D.) The strengths of Spatially Competent Learning Disabled pupils relate to their ability to handle spatial relationships of a 3-dimensional nature. Their weaknesses are centred in fine auditory discrimination, auditory sequencing and auditory memory. According to Bannatyne, these children do not seem to have inherited the specific ability to acquire linguistic functions easily. In TABLE II (Appendix), Bannatyne cites 22 characteristics which are typical of S.C.L.D. pupils.

Bannatyne (1968), on the basis of factor analytic research, suggested a formalized and empirically-based system for interpreting sub-test scatter on the WISC and later the WISC-R. He proposed that sub-test scaled scores on the WISC and the WISC-R should be categorised into Spatial, Conceptual and Sequential areas. The Spatial category was derived from summed scores on sub-tests OBJECT ASSEMBLY, BLOCK DESIGN and PICTURE COMPLETION. These sub-tests do not involve sequencing but require the ability to recognise spatial relationships in order to manipulate objects

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in multi-dimensional space, either symbolically or directly. The conceptual category was obtained from summed scores on sub-tests VOCABULARY, COMPREHENSION and SIMILARITIES which together represent verbal fluency, that is general language use and function. The Sequential category consists of the summed scores of the DIGIT SPAN, CODING and PICTURE ARRANGEMENT sub-tests and is thought to measure the ability to retain visual and auditory information within the short-term memory.

Initial studies (Bannatyne, 1968, pg. 213) showed that dyslexic readers scored high in the spatial category, moderate in the conceptual category and lowest in the sequential category. The diagnostic implications of these findings is that students who demonstrated a similar pattern of performance on the WISC, that is Spatial > Conceptual > Sequential, may have a reading problem associated with genetically-induced dyslexia. Data obtained from Family Information forms led Bannatyne (1968, pg. 221) on the basis of recurring evidence, to make the following observations concerning Genetic Dyslexics :

(a) They have slow or slightly defective speech development in infancy, even though other milestones are normal;
(b) A history of writing or spelling disabilities exists in the family, particularly on the male side;
(c) The father is usually in a "spatial" type of occupation such as engineer, doctor, designer, farmer, mechanic or driver.

.../...

(d) Their spelling ages are much lower than their reading ages. On the Neale Analysis of Reading Ability Test (1963) results showed that scores on Reading Comprehension were higher than Reading Accuracy scores.

Rugel (1974) reviewed 20 studies involving the use of WISC with disabled readers and found that as a group, these children did manifest scores with the ranking of spatial > conceptual > sequential. He found, in addition, that the pattern was characteristic not only of Genetic Dyslexics but of the broad spectrum of disabled readers. In TABLE III (Appendix), Rugel (1974) compared individual sub-test scores of disabled readers with those of normal readers. He found that on sub-test Picture Arrangement, the scores of disabled readers were not significantly higher than normal readers in one population. In terms of factor analytic data, this finding suggests that the sub-test Picture Arrangement is misplaced in the Sequential category and has its highest loading on the Spatial Factor. In addition, the scores of disabled readers on the Arithmetic sub-test which was not included in Bannatyne's (1968) Recategorisation Scheme, were significantly lower than normals in 10 populations. An attentional deficit could account for the lowered score on the Arithmetic sub-test. This characteristic is also common to the Digit Span and Coding sub-tests of the sequential category.

On the basis of these findings, Bannatyne (1974) revised the sequential category by dropping the Picture Arrangement sub-test and including the Arithmetic sub-test instead. In addition, he added a fourth category to his scheme known as Acquired Knowledge which consists of a composite score of the sub-tests Information, Arithmetic and Vocabulary (Both the Arithmetic and Vocabulary sub-tests form part of the Conceptual category).

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Bannatyne (1974) did not discuss the relative position of the Acquired Knowledge category in his hierarchical scheme. (Henry and Wittman, 1981).

This fourth category seems to be frequently ignored by clinicians and researchers who utilize this model. Kaufman (1979) states that Acquired Knowledge is potentially the most valuable category for WISC-R interpretation in Bannatyne's scheme. All the sub-tests of this category are school-related, and subject to the influence of home environment and involve long-term memory. Information and Arithmetic are two sub-tests that seem to be characteristically depressed for children with reading disorders (Rugel, 1974; Sattler, 1974) and with learning disorders in general (Smith et al., 1977a). Since Digit Span and Coding are also characteristically low for the group of children with school-related problems, researchers have focussed on the third factor deficit, that is either in terms of Distractibility (Kaufman, 1975) or the Sequencing Dimension (Rugel, 1974). Kaufman (1981) comments that what cannot be discounted is the possibility that the Information/Arithmetic dyad is partly depressed because of an Acquired Knowledge deficit.

Smith et al. (1977b) examined relative performance in the four areas proposed by Bannatyne. The results showed that the learning disabled sample scored significantly highest in the Spatial category, significantly higher on verbal conceptualising tasks than on Sequencing or Acquired Knowledge sub-tests. Thus there is statistical support for the hypothesis that as a group, children with learning problems are deficient in tasks that depend heavily on the acquisition of knowledge. An acquired knowledge weakness therefore seems logical for learning disabled children in view of their school failure.

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A seemingly characteristic Wechsler profile of Spatial > Conceptual > Sequential has been found for groups of reading-disabled children (Rugel, 1974) and learning disabled children (Clarizio and Bernard, 1981; Smith, Coleman, Dockecki and Davis, 1977). However, the consistency of this finding which had come to be accepted as fact, has been challenged by recent investigations (Kaufman, 1981). Some studies have not produced the expected relationships among the three Bannatyne categories for Learning Disabled samples, (Thompson, 1981) or have failed to find significant differences among the group means (Vance and Singer, 1979). Other researchers have shown different Bannatyne patterns when another variable is introduced in addition to the presence of learning disabilities. L.D. pupils with superior intelligence, for example, displayed Conceptual > Spatial > Sequential patterns (Schiff, Kaufman and Kaufman, 1981). Miller (1981) found that the recategorisations have not been successful in differentiating children with visual-perceptual learning disorders from those with auditory-perceptual learning disorders. Gutkin (1977a) found that the usefulness of the recategorisation hierarchy for identifying L.D. children on an individual basis has not yet been demonstrated. Kaufman (1979) states that Spatial > Conceptual > Sequential group patterns have emerged amongst groups other than the learning disabled. Groups such as juvenile delinquents and emotionally handicapped children displayed the same Bannatyne patterns and could not be differentiated significantly from L.D. children on the basis of the characteristic Bannatyne patterning. (Clarizio and Bernard, 1981; Henry and Wittman, 1981; and Thomoson, 1981).

.../...

The above findings show that the earlier optimism associated with Bannatyne's recategorisation scheme for L.D. diagnosis has diminished. However, Bannatyne's contribution cannot be discounted as irrelevant. Kaufman (1981) comments strongly that it provides a framework for the learning disabled child's assets and deficits. The rationale for this study was to examine the usefulness and limitations of Bannatyne's recategorisation scheme so as to render the WISC-R a psychodiagnostic instrument for the discrimination of L.D. pupils in a South African remedial setting. In addition, the validity of Bannatyne's scheme was tested.

2. AIMS

The specific aims of this study were :

A. To discover what percentages of a sample designated as learning disabled fall into the categories suggested by Bannatyne;

B. To test Bannatyne's assumptions that the spelling ages of learning disabled pupils are much lower than their reading ages and that their reading comprehension scores are higher than their reading accuracy scores.

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3. METHOD

3.1 Sample

One hundred subjects were randomly selected from children who are performing significantly lower than class average and who had been referred for assessment between 1981 and 1982 to Japari. Japari consists of a remedial school catering for children from Grade 1 to Standard V and an assessment unit manned by two clinical psychologists and three psychometrists. Referrals were made by General Practitioners, Paediatricians, Headmasters and remedial teachers. The subjects in this study were both male (N = 76) and female (N = 24) and varied in age from 8 years to 12 years at the time of testing. These subjects were at least of average intelligence, of broadly middle class socio-economic status and attended regular elementary schools.

3.2 Procedure

Tests were administered individually by any of the five members of the assessment unit who work on a 'session' basis at Japari. Duration of each testing session was approximately 1 3/4 hours. The parents of each subject filled in a Family Information form which was discussed briefly with the tester, covering important areas such as medical history, school history and family dynamics. Then the child was ushered into the testing session which began with a Draw a Person Test (Goodenough, 1926) followed by the Bender Gestalt Test for Young Children (Bender, 1938). These tests serve as "ice-breakers' and help establish rapport. The WISC-R was then administered.

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On the basis of the subjects' school history and/or previous testing history as well as deficits that were apparent from WISC-R results, a further individualised battery of tests was then administered. This battery may have included tests of motor and visual-perceptual tests, auditory-verbal tests, educational tests, quick neurological screening test and family relations tests. At the end of the testing session the parents, the child and the tester discussed the test findings. Areas of strengths and weaknesses in the child's performance were defined. All the participants jointly explored ways and means of improving the child's school performance by extra remedial lessons, by a change of school or by a home program.

3.3 Measures

For the purposes of this study, the results of the following tests which were administered to each of the 100 subjects, were analysed :-

(1) Wechsler Intelligence Scale for Children (Revised) (WISC-R), (Wechsler, 1974);

(2) Neale Analysis of Reading Ability, (Neale, 1963);

(3) Schonell Graded Spelling Test (South African Norms), (Schonell, 1963).

3.3.1 WISC-R ($6\frac{1}{2}$ - $16\frac{1}{2}$ years)

11 of the 12 sub-tests were administered, six verbal and five performance tests, while the optional performance sub-test Mazes was omitted. The scaled score on the sub-test Digit Span was not included in the Verbal Scale I.Q. but was used for qualitative and diagnostic purposes.

.../...

The WISC-R abilities supposedly measured by Wechsler's sub-tests appear in sources such as Glasser and Zimmerman, (1967) and Sattler (1982). The following is a brief discussion - based on these references - of each sub-test and the influences that are considered to affect an individual's performance on that particular task.

(1) Information is a range of general factual knowledge which requires long-term memory. This test is subject to the influence of cultural opportunities at home, interests, outside reading, richness of school environment and school learning.

(2) Similarities test the ability for logical, abstract thinking and involves verbal expression and verbal comprehension. This test is subject to the influence of outside reading and interests.

(3) Arithmetic A computational skill that requires numerical reasoning, facility with numbers and long-term memory. This test is subject to the influence of attention span, anxiety, concentration, distractibility, school learning and working under time pressure.

(4) Vocabulary involves word knowledge, language development, verbal concept formation and verbal expression. This test is subject to the influence of cultural opportunities at home, outside reading, richness of early environment interests and school learning.

.../...

(5) Comprehension involves social judgment, common sense (cause and effect relationships) and verbal expression. Subject to the influence of cultural opportunities at home and moral and conscience development.

(6) Digit Span Short term memory, facility with numbers and mental alertness. Subject to the influence of attention span, anxiety and distractibility.

(7) Picture Completion involves visual alertness, visual percention and distinguishing essential from non-essential details. Subject to the influence of concentration, working under time pressure and cognitive style (that is field dependence/field independence)[@].

(8) Picture Arrangement Planning ability, temporal sequencing, visual perceptual and organisation and social judgment. It is subject to the influence of cultural opportunities at home, creativity and working under time pressure.

(9) Block Design Spatial organisation and analysis of whole into component parts, visual-motor organisation and visual perception of abstract stimuli. Subject to the influence of cognitive style (field dependence/field independence) and working under time pressure.

[@](Definition : Field dependence is the extent to which the individual's perception is influenced by the surrounding visual field, that is his or her ability to resist the disruptive influence of conflicting contextual cues in his perceptions of visual forms and relationships). (Anastasi, 1968).

.../...

(10) Object Assembly Perceptual organisation, visual motor co-ordination and anticipation of relationships among parts. Subject to the influence of cognitive style (field dependence/field independence) and working under time pressure.

(11) Coding Clerical speed and accuracy, psycho-motor speed, short-term memory, visual-motor co-ordination, visual perception of abstract stimuli (designs and symbols). Subject to the influence of anxiety, distractibility and working under time pressure.

TABLE IV

Bannatyne's Categorisation of the WISC-R Sub-tests

VERBAL COMPREHENSION	SPATIAL	SEQUENCING	ACQUIRED KNOWLEDGE
Similarities	Picture Completion	Digit Span	Information
Vocabulary	Block Design	Coding	Vocabulary
Comprehension	Object Assembly	Arithmetic	Arithmetic

Reliability of WISC-R

The verbal, performance and full scale I.Q.'s of the WISC-R have high reliabilities across the entire age range, the average coefficients being .94, .90 and .96 respectively. Reliabilities for the individual tests are satisfactory with the average co-efficients ranging from .77 to .86 for verbal tests and from .70 to .85 for the performance tests (Wechsler, 1974).

.../...

Validity of the WISC-R

The following is evidence of the high correlations between the WISC-R and the three individually administered tests :

1) Correlation between WISC-R and Wechsler Pre-School and Primary Scale or Intelligence (WPPSI), (Wechsler, 1974, pg. 48)

Correlation between WISC-R full scale I.Q. and WPPSI full scale I.Q. is .82. Similar high correlations are found between the two verbal I.Q.'s and the two performance I.Q.'s.

2) WISC-R and Wechsler Aoult Intelligence Scale (WAIS)

Correlation between WISC-R and WAIS full scale I.Q.'s is .95. Correlation between WISC-R and WAIS verbal scale I.Q.'s is .96. Correlation between WISC-R and WAIS performance scale I.Q.'s is .83.

3) WISC-R and Stanford Binet (Form L M, 1972 norms)

The average co-efficients of correlation of the WISC-R verbal, performance and full scale I.Q.'s with the Stanford-Binet I.Q.'s are .71, .60 and .73 respectively, (Wechsler, 1974, pg. 51).

.../...

3.3.2 Neale Analysis of Reading Ability (Neale, 1963)

The two sub-tests used for this study were Reading Accuracy and Reading Comprehension. The reading accuracy test contains six passages of prose for children from 6 to 12 years of age. There are three equivalent forms A, B and C. After each passage is read, the pupil is asked the comprehension questions. The test is discontinued when the pupil makes 16 errors in a particular passage. The highest possible score for each of the first five passages is 16 and for the last passage it is 20. Each comprehension question answered is given one mark. Total scores are translated into a Reading Accuracy Age and a Reading Comprehension Age.

Reliability of the Neale Analysis of Reading Ability Test (Neale, 1963, pg.14)

Results show that the test has high reliability, the co-efficient being .98.

Validity

The co-efficient was high, being .95 when the test was correlated by Neale (pg,14) with the Holborn Reading Scale, (Watts, 1948), the Vernon Graded Word Reading Test (Vernon, 1938) and the Schonell English Usage and Vocabulary Tests, (Schonell, 1963).

.../...

3.3.3 Schonell Graded Spelling Test (Schonell, 1963)

In the abovenamed test, each word is dictated to the pupil. The tester then uses that same word in a sentence to ensure that the child has understood the meaning of the word. The word is then repeated. The test is discontinued when the child fails ten consecutive words. Correctly spelt words are totalled and translated into age-related scores. South African norms were used in this study.

3.4 Design

This study was designed to determine correspondence between two sources of assessment for learning disabled children.

(1) Results obtained on Bannatyne's recategorisation of the WISC-R; and

(2) Investigation of Bannatyne's hypothesis that children whose WISC-R scores fitted the Spatial > Conceptual > Sequential hierarchy would also perform in terms of the following pattern : Reading comprehension > Reading accuracy > Spelling.

The CHI-square statistical test was used to determine the sigrificance of differences between the non-parametric data, that is the children who fit the Bannatyne recategorisation scheme and those who do not. T-tests were used to assess significance of differences for the parametric (continuous) data scores of the children classified in terms of Bannatyne's formula.

.../..

4. RESULTS

For the sake of clarity, the following categories are defined in terms of their use in this study.

(1) Learning Disabled Children are defined as those who are performing significantly below the average of their class in one or more areas. Their I.Q.'s fall into the average or above average category of intellectual functioning.

(2) Bannatyne (3) category

This refers to those children whose patterns of scores obtained on the WISC-R conform with Bannatyne's recategorised scheme, that is Spatial category > Conceptual category > Sequential category.

(3) Bannatyne (4) category

This refers to those children whose patterns of scores obtained on the WISC-R conform with Bannatyne's revised scheme, that is Spatial category > Conceptual Category > Sequential and Acquired knowledge categories.

(4) The non-Bannatyne Group

This refers to those children whose patterns of scores obtained on the WISC-R do not conform with Bannatyne's (3) and (4) category scheme.

The results of this study are discussed in terms of Aims A and B.

Aim A

By a computer sort procedure of the data, where the computer was asked to find cases according to the Bannatyne WISC-R recategorisation, only 24% of the sample in this study was found to fit the prescribed Bannatyne model.

Results of Bannatyne's (3) Category System

(Spatial > Conceptual > Sequential)

To examine the significance of the sort of the sample into 24 agree : 76 do not agree, a X^2 test was used and the following results were obtained :-

CHI-Square

$O = 76 : E = 50$

$$X^2 = \frac{(O - E)^2}{E}$$

$$= \frac{(76 - 50)^2}{50} + \frac{(24 - 50)^2}{50}$$

$$= 27.04$$

$X^2(1) = 27.04, \quad p. = 0.001$

This suggests that more children are in the non-Bannatyne group than would be expected by chance alone. Thus the Bannatyne differentiation is not applicable in this sample.

.../...

Results of Bannatyne's (4) Category Scheme

(Spatial > Conceptual > Sequential and Acquired Knowledge)

It was found by computer sort procedure that 13% of the cases fit into the scheme and 87% do not. The X^2 value is as follows :

$$X^2(1) = 54.76, \quad p = 0.001$$

This suggests as in the previous analysis that far too many children do not fit into the Bannatyne (4) category.

Further analysis : The issue of Decimal Places

On an average of three sub-tests, a value of 0.5 represents a scaled score of 1.5 which is negligible in terms of the literature. An alternative analysis is therefore produced by using rounded numbers. This raises a criticism of studies on Bannatyne's system which makes use of these small differences for categorising when looking for a child's diagnostic profile.

Bannatyne (3) category system : Rounded Numbers

It was decided to do a procedure sort of the data using rounded numbers. The following results were obtained : 19% of the sample fits the Bannatyne (3) scheme whereas 81% does not.

$$X^2(1) = 38.44 \quad p = 0.001$$

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Bannatyne (4) Category System : (Rounded Numbers)

Results of a procedure sort of the data show that 7% of the sample fits into the Bannatyne (4) scheme whereas 93% does not.

$$X^2(1) = 73.96 \qquad p = 0.001$$

These results suggest that far too few children fit into the Bannatyne (3) scheme and even fewer fall into the Bannatyne (4) scheme.

In an effort to discover where the discrepancies lie, data were further analysed in terms of percentages producing the following results :-

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TABLE V Percentages of Children who fit into Bannatyne's recategorised WISC-R Scheme

CATEGORIES (SCORES)	% OF CHILDREN
Conceptual > Spatial	57%
Sequential > Spatial	76%
Sequential > Conceptual	74%
Conceptual = Spatial	82%
Sequential = Conceptual	83%
Acquired Knowledge = Conceptual	75%
Acquired Knowledge > Conceptual	65%
Acquired Knowledge > Spatial	57%

Bannatyne's hypothesised order of skills in terms of his categories is as follows : Spatial > Conceptual > Sequential and Acquired Knowledge. The results of this study are not consistent with Bannatyne's hypothesis. In fact, the reverse is often true as suggested by the above table. These results show that :

(1) The order is inconsistent;

(2) No differentiation occurs; and

(3) The classification did not work.

Children were separated into Bannatyne groups and into non-Bannatyne groups in terms of Bannatyne's WISC-R classification. The two goups of children were examined and their performance on reading comprehension, reading accuracy and spelling was compared to assess significance of difference between the Bannatyne and the non-Bannatyne groups.

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TABLE VI Results showing $\bar{X}$, for Group 0 and Bannatyne (3) Group :

T-Test Procedure

READING COMPREHENSION			
Bannatyne	3	N	Mean
Non-Bannatyne	0	76	110.59
Bannatyne	1	24	121.08
READING ACCURACY			
Bannatyne	3	N	Mean
Non-Bannatyne	0	76	107.39
Bannatyne	1	24	110.21
SPELLING			
Bannatyne	3	N	Mean
Non-Bannatyne	0	76	105.08
Bannatyne	1	24	105.45

The results of the t-test analysis of the comparison of means showed a significant difference in reading comprehension scores between the Bannatyne (3) group and the Non-Bannatyne group in favour of the Bannatyne group.

$t(98) = 2,28$ $p = 0.05$

Further t-test analysis showed no significant difference in reading accuracy and spelling between Bannatyne (3) group and the non-Bannatyne group (0).

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In terms of the limitations of the findings in this study, it was decided to follow up the 24 children who did fit into Bannatyne's (3) category system in order to see whether :

(1) they had in fact been diagnosed as learning disabled pupils; and

(2) whether they had been given appropriate remediation for their disabilities.

Results of the Follow-up Study

Sample	N = 24
Learning Disabled	N = 21
Emotional Problems	N = 2
Culturally Disadvantaged	N = 1

6 of the Learning Disabled group had been placed in full time remedial classes. The remainder (15) were involved in remedial programs in the afternoons at various remedial centres. The two children with emotional problems were referred for family counselling. The family of the culturally disadvantaged child refused remedial help or counselling.

These results show that even in a select group, that is 24 children who were diagnosed as learning disabled in terms of Bannatyne's WISC-R recategorisation, there were still among them three who were learning disabled due to emotional and cultural deficiencies. These findings are consistent with the views of Kaufman (1981) and Dykman et al. (1981) (see Limitations of this Study) that an important area for research with learning disabled groups is to explore and discover new approaches towards finding more homogeneous samples.

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A furth attempt was made to discover a genetic component among the 21 learning disabled children who fell into the Bannatyne (3) categorised system. The following criteria which Bannatyne (1968) found in his studies with Genetic Dyslexics were investigated :-

1. Slightly defective or delayed speech development;
2. Writing or spelling disabilities in the family, particularly on the male side of the family;
3. Father is in a spatial occupation, for example engineer, doctor designer, farmer, mechanic or driver.

Summary of the Results of the above criteria

Sample	N = 21
Speech defect or delay	N = 19
Writing or spelling disabilities	N = 13
Spatial occupation	N = 15

These results are incomplete. Parents who filled in Family Information forms could not always remember details of speech development or writing/spelling disabilities within the family. Therefore the assumption could be made that there may have been greater numbers in terms of speech defects and writing/spelling disabilities. These findings suggest that there is a trend towards a common genetic factor in learning disabled children who conform with criteria laid down by Bannatyne for genetic dyslexia. Therefore there may be some validity for Bannatyne's recategorisation scheme for the identification of genetic dyslexia rather than for identification of learning disabilities. This is in keeping with the

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attempts of researchers to find homogeneous sub-groups of learning disabled children (Kaufman, 1981) and to move away from the unwieldy and onerous task of defining the total learning disabled population.

Aim B

The data obtained from Aim A was used for further investigation into Bannatyne's classification system in terms of Reading Comprehension, Reading Accuracy and Spelling. The following Table VII examines the frequency of children who fit into the spatial > conceptual > sequential hierarchy and at the same time fit into the reading comprehension > reading accuracy > spelling ranked order as hypothesised by Bannatyne as being characteristic of Genetic Dyslexics.

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TABLE VII: Interaction of the Two Bannatyne Systems :

Frequency Table : (0 = Non-Bannatyne Group; 1 = Bannatyne (3) Group

			0	1	Total
Frequency	Non-conforming to	0	45	10	55
Expect. F	Comprehension> Reading				
	>Spelling		41,8	13,2	55,0
Percentag			45,0	10,0	55,0
equency		1	31	14	45
Expect. Freq.	Comprehension> Reading				
	>Spelling		34,2	10,8	45,0
Percentage			31	14,0	45,0
TOTAL			76	24	100

From the above table it is apparent that :

(1) 76 children do not fit into the Bannatyne (3) group; 24 do

(2) 55 children do not fit into Bannatyne's Comprehension > Reading accuracy > spelling scheme; 45 do fall into this scheme.

(3) In looking at both classifications together, the data show that 31 of the children who do fall into the reading comprehension > reading accuracy > spelling category belong to the Bannatyne group.

(4) Of the total sample of 100 children in this study only 14 satisfy the combined requirements of the Bannatyne scheme, that is Spatial > Conceptual > Sequential and that Reading Comprehension > Reading accuracy > Spelling. Therefore a significantly greater

number do not fit into the Bannatyne scheme.

$$X^2 (1) = 54,76 \qquad p = 0,001$$

This result is not consistent with Bannatyne's formulations for learning disabled children.

5. DISCUSSION

The results of this study show that learning disabled pupils do not exhibit the same profile of abilities that Bannatyne (1974) found for genetic dyslexics, that is highest scores in the spatial category, intermediate scores in the conceptual category and lowest scores in the sequential catetory. The findings of earlier studies (Rugel, 1974; Smith et al., 1977) were consistent with Bannatyne's findings. However, more recent studies (Kaufman, 1979; Rykman, 1981) have challenged these findings and show that although minor similarities in profiles do exist, there is a great deal of variation. The problem with many of the findings is that when a profile is developed, for example Bannatyne's, there is no satisfactory way of comparing the shape and range of scatter with normal children as normal children do not have flat WISC-R profiles (Kaufman, 1976). Kaufman's analysis of the standardisation sample in terms of the range of scaled scores shows that far more scatter exists in the normal standardisation sample than was previously suspected. (TABLE I, Appendix).

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The problem is further compounded because we do not know how many "normal" children display similar WISC-R profiles.

The initial optimism concerning the usefulness of the Bannatyne regroupings for differential diagnosis has been invalidated. (Rykman, 1981; Henry et al., 1981). Reynolds (1981) states that there are many ways of looking at WISC-R sub-tests and that the psychologist's primary task is to find the most meaningful interpretation for the particular child, not to make the child fit a priori determinations. On the other hand, Kaufman (1981) states that even though the characteristic Bannatyne pattern has been rejected for differential diagnosis of the learning disabled child, it is still not irrelevant for L.D. assessment. The groupings do provide a frame of reference for understanding the learning disabled child's strengths and weaknesses. It is useful for clinicians to know that learning disabled children possess relatively good spatial skills, adequate verbal skills, weak sequential skills and deficient skills on tasks involving concentration and attention for a specific period of time. Furthermore, Bannatyne, in an attempt to identify a WISC-R profile for Genetic Dyslexics has moved in the direction of current theory and research that there is a pressing need to identify more homogeneous disabled populations.

On the one hand researchers have channelled their energies into finding a WISC-R profile for L.D. assessment. On the other, many educationists and workers in the field find it a futile quest. Thompson (1981) states that most workers in the educational field more or less accept the point of view that success in academic learning is substantially correlated with

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mental ability as measured by instruments such as the Wechsler scales.

In Thompson's view, it is an American irrationality that holds that everyone ought to be at least average and that everyone ought to be average and above in basic school skills. If a child performs at a lower level then something must be done to bring him or her into line with the average range of performance. Furthermore, those children who cannot or will not reach these average levels have something wrong with them and a label called "learning disabled" is attached to them. Thompson calls this "counter thinking" and views it as the myth of learning disability. In her opinion thousands of children are performing unevenly in school without exhibiting any abnormality or pathology. In the past these children would have been accepted for what they are - slow learners with individual differences in rate, style, aptitudes and motivations. Today they are labelled "learning disabled".

Thompson espouses the view that not more than 2 - 3% of children of all levels of mental ability have "intractible learning aptitude deviations" (pg.235). For these children, major modifications of management and expectations must be made either within the regular classroom, or outside of it or both. The remainder of the so-called learning disabled population of school going children can be accommodated in regular classrooms by improving teacher competence and adjusting the curriculum to fit their individual needs. Teaching methods in the regular classroom must be revised so that all children can be given the opportunity to learn at their own optimal level.

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This view is in keeping with Hallahan et al.'s (1976), Psycho-behavioural approach and with Adelman et al.'s (1971) Interactional approach. In the opinion of these authors the emphasis must shift from mental ability being the key variable in defining learning disabilities. A more crucial focus in their view is to implement change in the school environment in order to bring about behavioural change. In addition, the school system should be restructured so as to provide a match with the child's developmental and motivational needs.

5.1 <u>The Limitations of this study</u> relate to the question of the homogeneity of the sample selected. It is however a limitation that is relevant to many of the studies of learning disabled pupils because the overall population of L.D. pupils is too heterogeneous to warrant an assumption of homogeneity (Hallahan and Kaufman, 1976; Galvin, 1981). L.D. pupils are expected to have differing dysfunctions and individual learning disabilities. Yet all are identified as learning disabled. The only common characteristics among L.D. children in terms of the U.S. National Advisory Committee's definition of learning disabilities, are an average I.Q. and academic deficiencies It follows therefore that different WISC-R profiles should be expected for specific learning disabilities and that a global L.D. profile to identify all L.D. pupils is an elusive quest.

Rykman (1981) suggests that a more appropriate approach would be to identify relatively homogeneous sub-groups of learning disabled children. In terms of this approach, Bannatyne's attempt to identify genetic

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dyslexia rather than search for a single L.D. profile has merit. There would be justification for Bannatyne's recategorisation scheme, which would have to be validated against other external criteria that "genetic dyslexia" rather than L.D. does exist. Kaufman (1981) agrees with Rykman's suggestion that a key variable in L.D. assessment is to investigate L.D. populations that are defined homogeneously. He proposes that a starting point could be with groups of dyslexics categorised in accordance with Boder's (1973) criteria, that is dysphonetic, dyseidetic and mixed dysphonetic-dyseidetic dyslexia.

BODER (1973) CLASSIFICATION	
Dysphonetic Dyslexia	1. Difficulty in integrating symbols with their sounds (or difficulty in learning what letters sound like). 2. Words are read globally rather than analytically. 3. Difficulty in sounding out and blending the component letters and syllables of a word.
Dyseidetic Dyslexia	1. Difficulty in perceiving letters and whole words as configurations or gestalts (or difficulty in learning what the letters of the alphabet look like) because of poor memory for visual gestalts. 2. Reading occurs through a process of phonetic analysis and synthesis. 3. There is a sounding out of combinations of letters instead of recognition of whole word visual gestalts.
Mixed Dysphonetic-Dyseidetic Dyslexia	1. Combinations of the first and second types. 2. These children have extreme difficulty in reading either by sight or "by ear".

In Kaufman's view the more specific the definition, the more likely the distinct Bannatyne patterns will emerge from the analysis.

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In this study, the sample was confined to a middle class socio-economic group. Thus a large section of the school going populations was excluded. As a result, this sample may not be representative of the learning disabled population as a whole, but only of a select group. A further limitation relates to the use of the WISC-R with a South African group of children, that is a test that does not have South African norms. One could argue that the results could have been contaminated in terms of the test items which are American-culture based.

5.2 Areas for Future Research

The ongoing search for identifying relatively homogeneous sub-groups of learning disabled pupils remains a central goal. Another avenue of research proposed by Kaufman (1981) is the exploration of the usefulness of Bannatyne's Acquired Knowledge category which is often omitted in WISC-R studies. There is statistical support for the hypothesis that as a group, children with learning disabilities show deficits in tasks that depend on the acquisition of knowledge, (Smith et al., 1977; Anderson and Kaufman, 1976 and Lutey, 1977). In these studies, lowest values were obtained in Bannatyne's Acquired Knowledge category. Weakness in Acquired Knowledge is thus linked with school failure and Kaufman (1981) suggests that longitudinal research is needed to evaluate changes in learning disabled children's acquired knowledge with increasing age. These scores should decrease with age as the students fall further behind their peers in reading and other school-related skills. The question here is whether poor performance in the acquired knowledge area is more a cause or a reflection of the learning disabled pupils' failure to learn in school!

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A further area for research as suggested by Kaufman (1981) is the theoretical and clinical meaning of strengths and weaknesses as shown by L.D. pupils in the Bannatyne categories. He recommends conducting construct validity investigations of the abilities, traits, processes and behaviours underlying each Bannatyne category. He asks "Does the spatial category in fact reflect the spatial ability, perceptual organisation, simultaneous processing or analytic-field approach?" The answers to this and to other questions which could be of practical use in the classroom would enhance our understanding of the L.D. pupil's strengths and weaknesses. Bannatyne has, in some measure, made a move in this direction. He has translated his theoretical formulations into practice. For example, he states that genetic dyslexic boys have no difficulty in remembering the actual shapes of the letters of the alphabet, that is they have a good memory for designs. Or put another way, they do not have problems with tasks involving visual perception, therefore their scores on sub-test Picture Completion in the spatial category should be relatively high. However, they do have difficulty in remembering which phonene is associated with a given shape in a particular sequential context. In other words, they have poor sound to symbol memory. This weakness may be reflected on low socres on sub-test Coding which falls into the sequential category and in poor reading skills. Thus Bannatyne's findings that genetic dyslexics have strengths in spatial tasks and weaknesses in sequential tasks has practical meaning in school-related skills and provides guidelines for remedial programs in schools. An illustration of this is the following. When children who have difficulty in remembering which phoneme is associated with a given shape in a particular sequential context, then a phonic approach is recommended by Bannatyne in his remedial tuition program.

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5.3 CONCLUSION

In this study, only a small proportion (24%) of the children who were assessed showed WISC-R profiles that correspond with Bannatyne's re-categorised WISC-R patterns. An investigation of the sample shows that in terms of the literature it was not sufficiently homogeneous. The children who were referred for assessment to Jacari and who were included in the sample, had in addition to average I.Q.'s only one common characteristic, that is lack of school achievement. Hallahan et al. (pg. 41) state that lack of school achievement is a common factor amongst emotionally disturbed, educable mentally retarded and learning disabled children. Thus the failure to find a larger number of children who had distinctive Bannatyne WISC-R profiles could relate to the heterogeneity of the sample selected for this study.

Other factors that may have influenced the findings are :

(i) the fact that the children selected for this study were of middle class families and thus not representative of the whole learning disabled population; and

(ii) The use of the WISC-R which is not standardised for South African children and thus it may not have been a culture-fair test.

The emergence of a group of 24 children whose WISC-R patterns did match Bannatyne's WISC-R patterns for genetic dyslexics points to the possibility

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that a more homogeneous sample might have yielded even greater correspondence with Bannatyne's recategorised scheme.

Although Bannatyne's diagnostic scheme utilising WISC-R scores was not found in the majority of WISC-R profiles of this so-called learning disabled sample, nevertheless the scheme does have useful features. The large body of research based on Bannetyne's recategorisation has enlarged our knowledge of the WISC-R as a dynamic tool for L.D. assessment and enhanced our understanding of the learning disabled child's strengths and weaknesses.

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Table 1 (Kaufman, 1981)

Table 1. WISC-R Verbal-Performance (V-P) IQ Discrepancies and Subtest Scatter Indexes for a Variety of Samples

Source	N	Description of sample	Mean V-P IQ discrepancy (regardless of sign)	Mean scaled-score range (high minus low scaled score—10 subtests)
Kaufman (1976b, 1976c)	2200	Normal standardization sample	9.7	7.0
Anderson, Kaufman, & Kaufman (1976)	41	Learning disabled	12.5	7.5
Gutkin (1979b)	51	Learning disabled	11.9	7.7
Naglieri (1979)	20	Learning disabled	13.6	8.5
Stevenson (1979)	55	Learning disabled	10.1	7.2
Tabachnick (1979)	105	Learning disabled		7.7
Thompson (1980)	64	Learning disabled	10.0	7.6
Ryckman (1981)	100	Learning disabled		8.2
Schill et al. (1981)	30	Learning disabled (superior IQ)	18.6	9.1
Gutkin (1979b)	23	Minimally brain injured	11.8	7.3
Wiener & Kaufman (1979)	46	Referrals for learning and or behavior problems	9.2	7.3
Strickfaht & Love (1979)	40	Referrals for learning disabilities	9.8	7.3
Moore & Whelan (1981)	434	Referrals for reading problems	11.2	7.6
Naglieri (1979)	20	Mentally retarded	9.6	6.6
Gutkin (1979b)	10	Mentally retarded	8.5	6.0
Thompson (1980)	14	Mentally retarded	7.6	5.9
Gutkin (1979b)	17	Emotionally disturbed	12.9	7.8
Thompson (1980)	51	Psychological or behavioral disorder	8.4	7.2
Ollendick (1979)	121	Juvenile delinquents		7.3
Naglieri (1979)	20	Normal control group	12.6	8.0

Table I (Kaufman, 1981)

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Gutkin (1979b)	17	Emotionally disturbed	12.9	7.8
Thompson (1980)	51	Psychological or behavioral disorder	8.4	7.2
Ollendick (1979)	121	Juvenile delinquents		7.3
Naglieri (1979)	20	Normal control group	12.6	8.0

TABLE II (Bannatyne, 1968) READING & OTHER ACADEMIC SKILL LEARNING DIFFICULTIES

GROUP	Emotionally Disturbed	Mentally Retarded	ALL SPECIFIC LEARNING DISABILITIES 15%-50% of School Popn.	Deaf and Hard of Hearing	Blind and Partially Sighted	Etc
DISABLED GROUPS						
LEARNING DISABILITY GROUPS	SPATIALLY COMPETENT L.D. STUDENTS (SCLD) School Incidence 60%-80% of L.D.		MINIMAL NEUROLOGICAL DYSFUNCTION (MND) School Incidence 15%-30% of L.D.	COMMUNICATIVE (LANGUAGE) L.D. STUDENTS (CLLD) School Incidence - Local Area	UNMOTIVATED L.D. STUDENTS (UMLD) School Incidence - (?)	
CHARACTERISTICS	1. Spatial (right) hemisphere of brain usually dominant 2. Competent Visual Spatial Abilities 3. Good memory for designs 4. Mirror imaging tendency (R. Horn) 5. Dislike disciplining of L. to R. eye movement necessary for competent reading (Prefers 3-D) 6. Directional inconstancy R. to L. tracking tendencies 7. Word reversals caused by (6) 8. Maturational lag 9. Slow speech and language development in many cases 10. Auditory vocal (phonemic) sequencing memory 11. Auditory closure difficult 12. Sound blending difficult 13. Phoneme to opeme (sound to symbol) memory poor 14. Word splitting into articulemes difficult 15. Auditory discrimination of vowels may be poor 16. Spelling (coding skills) poor 17. Motor/Kinesthetic maturational lag often present 18. Clumsiness and poor eye hand coordination may result from (17) 19. Hyperactivity (restlessness) may result from all above characteristics - or inherited 20. Secondary emotional disorders may also result 21. Sometimes passive-aggressive or weak 22. Often have anxiety or even school phobia		A. Auditory Vocal Processing Disabilities 1. Language development 2. Speech and articulation development 3. Auditory Sequencing memory 4. Auditory discrimination 5. Sound blending and word splitting 6. Sound to symbol association B. Visual Processing Disabilities 1. Memory for designs, symbols and images 2. Visual discrimination C. Oculomotor Disorders 1. Convergence and image fusion 2. Left to right tracking 3. Saccadic movements and fixation 4. Point in space location (eg. new lines) 5. Nystagmus (tremor) D. Motor Kinesthetic Dysfunction 1. Visual motor incoordination 2. Tremor and other mild CP disorders 3. Balance 4. Hyperactive E. Cognitive, Thought/Memory Process Deficits 1. Reasoning inadequate 2. Memory for principles poor 3. Memory for factual content poor 4. Rote memory skills inadequate F. Emotional Problems 1. Labile emotional states	A. Language Processing 1. Poor language development 2. Telegrammatic language 3. Inadequate syntax 4. Limited vocabulary 5. Children's vocabulary 6. Vocabulary different B. Cultural Factors 1. Bilingual L.D. 2. Dialect non-standard 3. Foreign language speaking care giver	1. Disinterested in learning 2. Anxieties and phobias 3. Non-academic interests Original Causes of Academic Failure 1. Father disinterested in education 2. Father absent 3. No anxiety to learn 4. Oppressed parents 5. Disinterested parents 6. Angry parents Requirements for Motivation 1. Positive reinforcing motivations 2. Step by step success (task analysed program) 3. High interest stories, games, etc. 4. Humor, etc.	

NOTES:

1. In any category only a portion of the characteristics need be present in any one student.
2. Most cognitive L.D. problems are Aud. Vocal MEMORY DEFICITS.
3. The groupings are not mutually exclusive. Any given student may have characteristics across more than one group. (Eg. An SCLD student may also be MND and/or CLLD, etc.)
4. Incidence of L.D. depends on nature of L.D. sample and local area population characteristics.

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TABLE III Disabled reader-normal reader subtest comparisons in populations RUGEL 1974,

	Disabled Readers Significantly Lower Than Average Readers	Disabled Readers Significantly Higher Than Average Readers
DeBruler	Digit Span, Coding, Arithmetic	Picture Completion
McLeod	Digit Span, Coding, Information, Vocabulary	Picture Completion
Belmont et al.	Arithmetic, Information, Vocabulary	Object Assembly
Reid et al. (Average readers)	Arithmetic	Picture Completion
Reid et al. (Above average readers)	Digit Span, Arithmetic, Similarities	Picture Completion
Neville	Digit Span, Arithmetic, Information	Block Design, Picture Arrangement
McLean	Digit Span, Coding, Arithmetic, Information, Vocabulary	Picture Completion
Ackerman et al.	Arithmetic	
Hunter et al.	Digit Span, Coding, Arithmetic, Information, Vocabulary, Similarities	
Lyle et al.	Coding, Arithmetic, Information	Block Design, Picture Arrangement, Comprehension
Coleman et al.	Arithmetic, Information	Object Assembly

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