THE ANALYSIS OF WISC PROFILES AND BENDER-GESTALT
PROTOCOLS OF A SAMPLE OF ELEMENTARY SCHOOL
CHILDREN WITH READING DISABILITY

by

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SIGNED: Helen Cook Wright

APPROVAL BY THESIS DIRECTOR

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Assistant Professor of Psychology

Date
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ABSTRACT

Forty children of average or above-average intelligence selected for remediation of reading disability were administered the Bender-Gestalt Test and the Wechsler Intelligence Scale for Children to determine what, if any, relationship may exist between poor reading performance and patterns of performance in these two tests. Information, Arithmetic, and Digit Span were characteristically lower than other WISC Verbal subtests. Coding was found to be relatively low while other Performance subtests, notably Block Design and Object Assembly, were relatively high. The Bender protocols disclosed more than the average number of errors of rotation, and other figure alterations considered characteristic of poor readers. Performance on the test was slower than the average at this grade level. Responses such as perseveration, although common among brain injured, were rare among these disabled readers. Response patterns appear to have more predictive value at earlier grades. Early diagnosis may be useful in preventing subsequent reading failure. Training in visual-motor skills is seen as a possible method to improve reading. Case studies were included to illustrate the necessity of studying the whole child and the way he organizes for tasks such as those presented by the WISC, the Bender, and the act of reading.
Problem

There is no generally acceptable single theory to account for reading disability in otherwise apparently normal children.

So much has already been written about the plight of the disabled reader that as a consequence he is perhaps viewed less clearly, being obscured by mountainous tracts of conflicting opinions. The chief unanimity of opinion about him lies in an acknowledgment that there is no single causal factor in his reading disability.

Meanwhile, despite the concern of many, this waste of human resources continues. The perennial illiteracy of 12 to 15% of the elementary school population challenges our culture.

Conservation of human resources must be sought in place of rehabilitation, prevention in place of remediation. The earliest possible identification of potentially disabled readers is being pressed back to attempts to find at the pre-school level a characteristic pattern of behavior associated with impending failure.

Where failure has not been averted, ever more discriminating diagnosis is required as a precursor to
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appropriate treatment. The earlier the disabled reader is identified, the more likely and expeditious his rescue.

Recovery is seldom spontaneous. The child whose remediation has been delayed is at an educational and social disadvantage. Audio-visual aids and classroom discussion cannot compensate for his inability to read the texts. He undergoes impoverishment in the midst of cultural plenty. He may even be exposed to physical hazards incurred by his failure to read warnings and directions.

Socially he experiences loss of status with his peers. There has been increasing criticism of the effects of ability-grouping in this regard. General loss of confidence further damages the personality of the disabled reader. Bond and Tinker (1957 pp. 79, 80) have defined the disabled reader as "one who has had opportunity to learn to read, but who is not reading as well as could be expected by his aural verbal ability, his mental capacity, and his success in nonreading learnings."

On the assumption that sharpening the existing diagnostic tools may be preferable to devising new ones, this study aims to assist in clarifying the image of the disabled reader, and to describe his response patterns in two standard instruments of diagnosis, the Wechsler Intelligence Scale for Children (hereafter: WISC) (Wechsler, 1949), and the Bender Visual-Motor Gestalt Test (hereafter: Bender) (Bender 1938).
History

The concern of researchers with the early diagnosis of reading retardation has been reflected in the work of DeHirsch (1952; 1954; 1957) at the Pediatric Language Disorder Clinic of the Columbia-Presbyterian Medical Center. DeHirsch has attempted to identify personality and behavior patterns in pre-school children who subsequently failed in reading. Both the Bender and the WISC were given. The former test identified children who at three to five years of age showed exceptional immaturity of visuomotor function, lack of manual control, and difficulty with spatial relationships, especially in the placement of figures (DeHirsch, 1957). Severe language disturbance usually was present. Dyslexia was suspected.

A substantial number of these children returned to the clinic at nine or ten years of age for failure in reading (DeHirsch, 1954). They showed lower Verbal than Performance scales by 20 to 30 points, low Coding, and inferior auditory memory span. Their striking immaturity in synthesizing Bender figures persisted.

The search for diagnostic significance of a WISC profile for retarded readers was begun by other researchers. Altus (1955) attempted to isolate WISC signs of reading
retardation in the profiles of 25 children. Sheldon and Garton (1959) made a study of the differential performance of 11 readers whose retardation had been demonstrated independently of the WISC profile. Dockrell (1960) noted the limitations of these early studies because of the small number of subjects and the variations of statistical treatment. Graham (1952) compared subtests within the same scale, and found that unsuccessful readers scored their greatest successes in subtests most remote from suggestions of the classroom. Burks and Bruce (1955) found that poor readers have difficulty with abstractions, and score lowest on subtests most dependent on memory function.

Dockrell (1960) summarized these related studies, documenting the consistency of low performance of poor readers on Information and Arithmetic in the Verbal Scale, and on Coding in the Performance Scale. Digit Span, which other researchers also have found to be consistently low, was not included as a test. Dockrell found that Similarities and Comprehension tended to be higher than other Verbal subtests. He hypothesized that "Coding measures this visual discrimination and memory skill that is so important in learning to read (p. 90)," and that low Coding is therefore a diagnostic sign of importance. He noted the looseness of the term "retarded reader", when it is used as a gross classification without explicit causal significance.

The work of these and other researchers has been
critically reviewed and summarized by Coleman (1963). Investigators agree on a pattern of low scores in the subtests although their explanations vary. Neveille (1961) added a low Digit Span. He found Picture Arrangement and Block Design subtests to be significantly high, which he attributed to their dissimilarity to formal, school-type learning, basing his interpretation on Cohen's (1959) factor analysis of WISC subtests. Hirst (1960), using a two-way analysis, divided his subjects into severe and mild reading disability groups, and found the same low patterns for each. Picture Arrangement and Picture Completion were high for all groups. A question was raised as to whether Coding is not a measure of the rate of new learning.

Kalloso et al (1961) reported the same patterns of low scores. They offered the hypothesis that retardation in motor skills, such as those involved in Coding, may be a primary cause of reading disability. They also suggested that low Arithmetic and Information may reflect conditions in home or school which promote reading disability.

Subtests which yield significantly high scores have not been as consistently documented. Varied reasons have been assigned but there is general agreement that those subtests resembling school tasks rank lower. Coleman (1963) concluded that there appears to be a definite tendency for those with learning disorders to make significantly
high scores on Picture Arrangement, Picture Completion, and Block Design, along with an almost universally confirmed pattern of significantly low scores on Coding, Arithmetic, Digit Span, and Information.

Coleman found a distinctive pattern, characteristic of underachievers in reading and basic school subjects and consistent with his findings which applied the factorial studies of Cohen (1959) and Gault (1954). He noted difficulty in those subtests which were most highly related to school-type learning (Information and Arithmetic), which required sustained concentration (Digit-Span), and which were heavily loaded with the memory factor (Coding, Arithmetic and Digit Span). A tendency to significantly higher scores in tests heavily loaded with incidental learning (Comprehension, Picture Completion) and what he calls perceptual organization (Block Design) was noted. However, factor loadings on these subtests are not entirely consistent.

Four other studies have assigned an important role to both short-term and long-term memory as a factor in the WISC profile of retarded readers, while echoing the same low subtest patterns summarized by Coleman. Muir (1962) found severely retarded readers poorer in subtests requiring immediate and long term memory of processes and information. Sandstedt (1964) accorded memory span a role both in the diagnosis of reading disability and in the
assessments of global intelligence. She reported Stauffer's definition of memory span (p. 248) as a "manifestation of concentration, sustained attention, and associability necessary for immediate reproduction."

Robeck (1960) also stressed symbolization as a task resembling reading. Coding demands motor skills, visual perception, and memory of abstract symbols, abilities required in reading. She noted that Information requires memory for detailed factual material; Arithmetic demands long-term memory of computational facts, immediate memory of problem, and ability to select and complete computational processes mentally; Digit Span involves immediate recall.

Robeck (1962) compared profiles of twenty children who showed undue tension in oral reading with another twenty retarded readers who did not show tension. These subjects were drawn from a reading clinic population without serious emotional problems. Twenty-seven factors associated with reading difficulty were identified from case histories. Of these poor visual memory was highest in frequency and poor auditory memory was third highest and together accounted for an incidence of 25 out of a total incidence of 159.

Koppitz (1958b) found that learning problems in first and second grades seemed primarily related to slow development and to immaturity in visual-motor perception as measured by the Bender and by the WISC Performance I.Q.
Learning problems on third and fourth grade levels involved verbal factors and general intelligence as well as visual-motor perception. Highly significant relationships were found between all Performance subtests (except Coding), Arithmetic, WISC full scale I.Q., Performance I.Q., and (to a lesser degree) Verbal I.Q. when related to the Bender protocols. Koppitz reported, further, that the Bender can differentiate significantly between above and below average students in the first four grades of school.

Smith and Keogh (1962) correlated the Bender with reading readiness for 221 kindergarten children, and one year later with reading achievement test measures for 149 of the same population at end of first grade. They hypothesized that there are aspects of beginning reading which are associated with the level of development of visual-motor function, and that thus the Bender may be of more diagnostic value at this early age. DeHirsch (1957) has made similar use of the Bender, believing it an important index of visual-motor function, manual control, and ability to cope with spatial relationships, and most significantly as an instrument to disclose potential reading difficulties.

As early as 1945 Fabian attested that the development of reading ability was dependent upon the same factors that result in perceptual-motor maturity. He noted that severely retarded readers (especially those who reverse
symbols and words) persist in the tendency to rotate horizontally oriented Bender figures to the vertical. Silver (1950) found difficulty in angulation as well as verticulizations in both reading disability cases and in children who lag in language function. He considered the Bender as more than an index of visual-motor maturation; he viewed it as an instrument which clearly revealed defects in children with reading disability.

Bender, in a foreword to Tolor and Schulberg (1963), noted the contributions to the evaluation of children with learning problems and to early prediction of reading ability or disability made by DeHirsch (1957), Silver (1950; 1958; 1960), and Koppitz (1958a; 1959; 1960).

Bender also noted two recent studies which may contribute considerably to the knowledge of localization and hemispheric dominance of cerebral function and may have some bearing on laterality in reading. Riklam and Diller (1961) with hemispherectomized patients found the visual motor Gestalt function more closely related to the intactness of the right hemisphere. Hirschenfeng (1960) found hemiplegic subjects with pathology in the non-dominant hemisphere had more disturbance in the Bender results than those with pathology in the dominant hemisphere.

Lachman (1960) was unable to find that the retardation in perceptual-motor functioning could account in full for reading disability, although there were more
distortions in the Bender protocols of his reading disability group than in those of his normal readers. He noted five distortions which Bender had considered as suggestive of immaturity in perceptual-motor development when produced above the age of eight years, angulation, rotation, primitivation, separation, and slant. He related all of them to reading disability.

Lachman further regarded perceptual-motor functioning as more than visual perception. He saw it also as the expression of that perception, reflecting the quality of the perception plus the motor impulsivity, and the attempts at its control. He considered these receptive and expressive factors as an inseparable whole. Koppitz (1964) also saw visual-motor perception as including visual perception and "motoric" expression (reproduction). The latter is not to be confused with motor coordination.

Tolor and Schulberg (1963, p. 18) distinguished between perceptual and motor factors in evaluating a Bender protocol. "A particularly intriguing problem... is whether a subject perceives the designs accurately and then distorts them in reproduction; or does he misperceive the design and then more or less accurately reproduce the distortion."

The Bender performance is thought of as a work sample which involves the cortical capacity to perceive the designs and the psychomotor capacity to reproduce them.
Furthermore, "deviations in individuals of normal intelligence without demonstrable brain damage reflect the individual's attitude toward reality," and this attitude they believed a function of the integrative capacity of the organism, the ego (Pascal and Suttell, 1951, p. 9).

In an earlier study, Koppitz (1958) found seven of Pascal and Suttell's twenty scoring categories which differentiated good from poor students. These Koppitz (1964) divided into thirty scoring items which she related to achievement in the first four grades (or up to age 11). She regarded the Bender as a nonverbal intelligence test, related to the WISC in five of its nine subtests, and relatively culture free (according to her method of scoring). In this same study, she observed that children with reading problems have difficulties with the Bender which distinguish them from poor achievers in arithmetic. "Children with reading problems have difficulty in discriminating between dots and circles, and between angles and curves. They also exhibit more incidents of rotation in their drawings of Bender designs. It appears that good reading ability is related to the correct perception of the direction and the shape of forms and designs (p. 66)." She further notes that "Perceptual problems may be the single most important factor contributing to poor reading ability (p. 64)," and "The child with specific problems in
visual-motor perception may require special training in visual perception and would profit from remedial reading lessons. He has to learn to compensate for his problems and to use the channels of perception and learning which are open to him. A child of superior intelligence is often able to achieve this...if given time and encouragement. A less capable child will need help if he is to overcome his perceptual handicap (p. 64).

"The various factors contributing to poor reading achievement...rarely occur in isolation; more often they will be combined with others. A child with reading problems is likely to have not only poor visual-motor perception, but also show signs of emotional problems; in addition he may be somewhat slow in his development (p. 65)."

The WISC is a reliable instrument for assessing cognitive abilities in children. If the WISC profile is also found to have diagnostic value and yield a common pattern in reading disability, its service is further extended.

Apart from the patterning of subtests, the WISC is a vastly important instrument in its own right for evaluating the mental ability of children with severe reading problems for whom group intelligence tests do not yield accurate or satisfactory results. The limitations of group tests in estimating the child's mental ability are recognized even for children without reading difficulty.
No child with a reading problem can reveal his potential adequately in a group test.

Moreover, there is grave risk in making decisions about children based on group tests when important factors such as reading disability, level of motivation, visual or auditory defects, or other individual circumstances may play such an important part in how the child responds.

Individual tests, such as the Stanford-Binet or WISC, on the other hand, permit a trained examiner to make inferences about these factors based on behavioral cues from the child himself.

Use of the Bender test to assess development of perceptual-motor skill in children, as an ability essential to learning to read, gives it increasing diagnostic value apart from its clinical significance. It is believed that response patterns on the Bender should continue to reveal perceptual-motor immaturity in children of normal intelligence through fourth grade levels.

It is also believed that greater refinement in the use of these existing tests about which a great deal is already known may fill current needs more satisfactorily than would efforts to devise new tests.
Subjects and Procedure

The subjects were forty children in fourth grade in Tucson Public Schools who had been selected for individualized reading remediation. Most of these children had attended Tucson District I schools for two or more years so that longitudinal records were available for them. These records included the results of several group tests of achievement and of mental ability, general health records (including reports on tests of vision and on audiometer readings), as well as teachers' estimates of school adjustment and of general academic standing. In some cases there were reports of individual psychometric testing in previous years.

Parent occupation, language spoken in the home, number and sex of siblings, and the position of the child in the family were all known.

All children had I.Q.'s of 90 or better.

Ages ranged from 9 years 3 months to 11 years 7 months at the time of testing (see Table 1).
TABLE 1
Age Composition of Subjects

<table>
<thead>
<tr>
<th>Ages in years</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>9 1/2</td>
<td>11</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>10 1/2</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>over 11 1/2</td>
<td>1</td>
</tr>
</tbody>
</table>

Of the forty subjects, 33 were boys and 7 were girls. Children are customarily selected for remedial reading in Tucson District I on the basis of a gap of two or more stanines between mental ability and reading ability. Other additional criteria are specified below. This procedure had been followed in the selection of these subjects.

Tests of mental ability used were the Lorge-Thorndike Level II-Form A Primary Battery (1957) in third grade, and/or the Lorge-Thorndike Level I-Form A Primary Battery (1957) given in first grade.

Stanine scores on these tests were compared with norms for the reading sections of successive Metropolitan Achievement Tests (1959, Revised) expressed in stanines. In second grade Primary II Battery, Form A is used; in third grade Elementary Battery, Form A; in fourth grade Elementary Battery, Form B.
Selection was based to some degree also on observation of an increasing disparity between reading achievement and mental ability scores. In other words, the reading retardation was becoming more marked from year to year.

Referrals also were based on teacher estimates which noted the particular reading problems encountered by the student as evidenced in the classroom. Each referral was reviewed successively by the school principal, the elementary intermediate supervisor, and the supervisor of special education.

In addition, each child as a further condition of acceptance for remedial teaching was given an informal inventory test by the remedial teacher in order to determine his instructional level, and such other diagnostic tests as she deemed necessary. Often included were a test of basic word recognition, the Botel Test of Word Opposites (which compared reading and listening skills), Durrell's Analysis of Reading Difficulty, and an inventory of phonetic skill.

In all cases the reading difficulty was found to be severe enough to justify the attention of the remedial teacher and to warrant the student's absence from regular class for special help.

Forty children were chosen from among those selected for remedial reading as described above. They were
given first the Bender followed by the WISC.

All the children were tested alone in a quiet room, without interruptions, and almost entirely during school hours.

Since all these children were already accustomed to their own remedial teachers, rapport was readily established. When told that they would not be asked to do any reading in the tests, they were cheerful and even eager.

The Bender Visual Motor Gestalt Test consists of nine figures or designs selected from those which Wertheimer had used to demonstrate the principles of Gestalt psychology in perceptual situations both in space and in time. Bender (1938) has summarized the maturational process as illustrated in perception, and has shown typical reproductions of these figures (Bender, 1946) at the various age levels by normal children who are not clinical cases. Although Loretta Bender used a developmental approach and provided a chart of typical responses at different age levels, she offered no system for objective scoring of the test.

Pascal and Suttell (1951) used a scoring system developed for adults and from adult test data which they recommended for use only with those 15 to 50 years of age. Hutt and Briskin (1960) used the Bender as a projective test and interpreted the drawings in accordance with psychoanalytic theory. Neither of these scoring systems is suitable for non-clinical use with children.
Various other attempts at objective scoring have all been
designed for use with adult psychiatric patients or with
retarded institutionalized children. It remained for
Koppitz (1964) to devise a simple and acceptable scoring
system for use with young children of normal intelligence
which was based on a developmental approach.

Koppitz selected the following scoring categories:
distortion of shape, rotation, circles for dots, persevera-
tion, integration of parts, angles in curves, and incorrect
angles. Most of these categories apply to more than one of
the Bender figures. In addition to scoring errors in these
categories, Koppitz noted the time taken to complete the
figures, the organization and placement of figures, varia-
tions in size of figures, and the amount of total space used.

Each child was given one sheet of letter-size paper
and asked to write his name in the upper left corner. The
paper was then placed directly before him with the lower
edge parallel with the table.

In the present study Bender's Instructions for the
use of Visual Motor Gestalt Test (1946) were followed. The
child was told, "Here are about nine figures or designs for
you to copy. Just copy them the way you see them. You
may wish to begin up here (indicating the upper left section
of paper)". Design A was then placed before him directly
above the paper and also parallel with the table. As soon
as he was finished, Figure 1 was substituted, and so on.

Although Bender did not expect the test to be timed and there are no explicit limits, Koppitz (1964) has suggested critical time limits which appear as average limits for each age group. At the fourth grade level these extend from four to eight minutes. Children were not aware of being timed.

Koppitz (1964) considered a very slow performance (beyond eight minutes) to be associated with a perfectionistic subject, or with one working hard to compensate for a defect in visual-motor perception. In either case such a child will experience difficulty in school achievement because he will be unable to complete his work.

On the other hand, a subject performing with undue haste was believed to be impulsive or lacking in adequate effort or coordination for satisfactory completion of this test and of school work in general.

In addition to the Bender all the children were given the Wechsler Intelligence Scale for Children. The ten subtests customarily used in computing the I.Q. were given, namely: Information, Comprehension, Arithmetic, Similarities, Vocabulary, Picture Completion, Picture Arrangement, Block Design, Object Assembly, and Coding.
The Digit Span subtest also was given as an extra subtest but was not prorated or included in the verbal scale. Unusual responses or comments and deviant behavior were noted throughout.
Results and Discussion

The advantage of using children all of whom were in regular fourth grade classrooms does not accrue from the age factor alone. These children had had backgrounds of relatively similar classroom experiences. Their expected range of skill development was generally comparable. They could be regarded as roughly similar in the expected range of growth and behavior patterns. As previously stated, their socio-economic backgrounds were not significantly different from the average population. There were no known brain-injured, or emotionally disturbed children, and none with defective vision or hearing. None were physically disabled, or had health problems of any sort. English was the language spoken in each child's home.

Bender-Gestalt

The nine figures drawn by each child were compared with the plates.

The Developmental Bender Scoring system devised by Koppitz (1964, pp. 15-32) was used to score the test. Her normative data were derived from 1104 public school children (p. 33). In the present study the number of errors ranged from a perfect score of 0 to a high score of 10 errors. Koppitz has found a mean score of 1.7 errors.
at fourth grade level. A majority of her fourth graders scored 0, 1, 2, or 3.

In the present study, 28 of the 40 subjects had scores of three or less. Twelve had scores of four or more (See Table 2 below).

TABLE 2
Relation of the Scores to Numbers of Subjects.

<table>
<thead>
<tr>
<th>Number of children</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
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<td>3</td>
<td>6</td>
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<td>2</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Errors may be classified as to types.

Forty children scored 128 errors on 30 scoring items (See Table 3 below).
<table>
<thead>
<tr>
<th>Bender Scoring Item</th>
<th>Total errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure A</td>
<td></td>
</tr>
<tr>
<td>1a Distortion</td>
<td>3</td>
</tr>
<tr>
<td>1b Disproportion</td>
<td>0</td>
</tr>
<tr>
<td>2 Rotation</td>
<td>11</td>
</tr>
<tr>
<td>3 Integration</td>
<td>0</td>
</tr>
<tr>
<td>Figure 1</td>
<td></td>
</tr>
<tr>
<td>4 Circles for dots</td>
<td>4</td>
</tr>
<tr>
<td>5 Rotation</td>
<td>5</td>
</tr>
<tr>
<td>6 Perseveration</td>
<td>1</td>
</tr>
<tr>
<td>Figure 2</td>
<td></td>
</tr>
<tr>
<td>7 Rotation</td>
<td>3</td>
</tr>
<tr>
<td>8 Row added omitted</td>
<td>0</td>
</tr>
<tr>
<td>9 Perseveration</td>
<td>1</td>
</tr>
<tr>
<td>Figure 3</td>
<td></td>
</tr>
<tr>
<td>10 Circles for dots</td>
<td>8</td>
</tr>
<tr>
<td>11 Rotation</td>
<td>10</td>
</tr>
<tr>
<td>12a Shape lost</td>
<td>4</td>
</tr>
<tr>
<td>12b Lines for dots</td>
<td>0</td>
</tr>
<tr>
<td>Figure 4</td>
<td></td>
</tr>
<tr>
<td>13 Rotation</td>
<td>6</td>
</tr>
<tr>
<td>14 Integration</td>
<td>1</td>
</tr>
<tr>
<td>Figure 5</td>
<td></td>
</tr>
<tr>
<td>15 Circles for dots</td>
<td>4</td>
</tr>
<tr>
<td>16 Rotation</td>
<td>10</td>
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<tr>
<td>17a Shape lost</td>
<td>1</td>
</tr>
<tr>
<td>17b Line for dots</td>
<td>0</td>
</tr>
<tr>
<td>Figure 6</td>
<td></td>
</tr>
<tr>
<td>18a Angles in curves</td>
<td>16</td>
</tr>
<tr>
<td>18b Straight line</td>
<td>1</td>
</tr>
<tr>
<td>19 Integration</td>
<td>0</td>
</tr>
<tr>
<td>20 Perseveration</td>
<td>1</td>
</tr>
<tr>
<td>Figure 7</td>
<td></td>
</tr>
<tr>
<td>21a Disproportion</td>
<td>2</td>
</tr>
<tr>
<td>21b Incorrect</td>
<td>14</td>
</tr>
<tr>
<td>22 Rotation</td>
<td>9</td>
</tr>
<tr>
<td>23 Integration</td>
<td>2</td>
</tr>
<tr>
<td>Figure 8</td>
<td></td>
</tr>
<tr>
<td>24 Incorrect Angles</td>
<td>6</td>
</tr>
<tr>
<td>25 Rotation</td>
<td>3</td>
</tr>
</tbody>
</table>
Scores are presented below in order of frequency.

Most common errors were the substitution of angles for curves, incorrect angles, rotation (often from horizontal to vertical), and the substitution of circles (or loops) for dots (called primitivization by Bender (1938), Lachman (1960).

**TABLE 4**

Frequency of Errors for Each Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency of Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>18a Angles in curves</td>
<td>16</td>
</tr>
<tr>
<td>21b Incorrect angles</td>
<td>14</td>
</tr>
<tr>
<td>2 Rotation</td>
<td>11</td>
</tr>
<tr>
<td>16 Rotation</td>
<td>10</td>
</tr>
<tr>
<td>11 Rotation</td>
<td>10</td>
</tr>
<tr>
<td>22 Rotation</td>
<td>9</td>
</tr>
<tr>
<td>10 Circles for dots</td>
<td>8</td>
</tr>
<tr>
<td>13 Rotation</td>
<td>6</td>
</tr>
<tr>
<td>24 Incorrect angles</td>
<td>6</td>
</tr>
<tr>
<td>5 Rotation</td>
<td>5</td>
</tr>
<tr>
<td>4 Circles for dots</td>
<td>4</td>
</tr>
<tr>
<td>12a Shape lost</td>
<td>4</td>
</tr>
<tr>
<td>15 Circles for dots</td>
<td>4</td>
</tr>
<tr>
<td>1a Distortion of shape</td>
<td>3</td>
</tr>
<tr>
<td>7 Rotation</td>
<td>3</td>
</tr>
<tr>
<td>25 Rotation</td>
<td>3</td>
</tr>
<tr>
<td>21a Disproportion</td>
<td>2</td>
</tr>
<tr>
<td>23 Integration</td>
<td>2</td>
</tr>
<tr>
<td>6 Perseveration</td>
<td>1</td>
</tr>
<tr>
<td>9 Perseveration</td>
<td>1</td>
</tr>
<tr>
<td>14 Integration</td>
<td>1</td>
</tr>
<tr>
<td>17a Shape lost</td>
<td>1</td>
</tr>
<tr>
<td>18b Angles in curves</td>
<td>1</td>
</tr>
<tr>
<td>20 Perseveration</td>
<td>1</td>
</tr>
</tbody>
</table>

Time taken to copy the Bender figures varied from 4 to 12 minutes. Thirty one children took four to eight
minutes. None took more than eight minutes. No subjects took less than four minutes (See Table 5 below).

TABLE 5
Number of Children Exceeding the Critical Time Limit

<table>
<thead>
<tr>
<th>Number of Children</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

The forty children in this study showed many more errors than average fourth graders in their Bender tests. Their errors fell into categories associated primarily with reading difficulty, and not with retardation, brain injury, or emotional problems as such. Both Bender (1946) and Koppitz (1964) consider that there should be little if any difficulty in accurate reproduction of the figures at this age and grade level. In addition, these children tended to be somewhat older than the average population of fourth graders. Nearly one-fourth of the subjects took longer than the critical time limits expected of fourth graders.

WISC

Full Scale I.Q. scores ranged from 93 to 128. Of the forty subjects, 65% had average mental ability. Of the remaining 35%, 22 1/2% were classified as bright normal,
and 12 1/2% were superior. Twenty-five children had verbal I.Q. scores which exceeded their Performance I.Q.'s by one to 28 points. Of these, 7 showed a difference of 15 points or more. One child had the same score for both scales.

A completely consistent pattern of lower subtest scaled scores for Information, Arithmetic, Digit Span, and Coding was produced by 13 children. A pattern consistent in respect to all but one subtest was shown by 15 more, or a total of 70% of all subjects.

The pattern of high subtests was not as consistent. Picture Arrangement was scored above the mean by 24 of the children. Object Assembly higher than the mean was shown by 25 children. Block Design was higher than the mean for 23 children, and lower than the mean for 12 others (See Table 6 below).

**TABLE 6**

Numbers of Subjects who Received Scaled Subtest Scores Below the Mean, At the Mean, and Above the Mean.

<table>
<thead>
<tr>
<th>Subtest</th>
<th>I</th>
<th>C</th>
<th>A</th>
<th>S</th>
<th>V (DS)</th>
<th>PC</th>
<th>PA</th>
<th>BD</th>
<th>OA</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Scores below the Mean:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number at Mean:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number above the Mean:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Although Wechsler (1958 p. 170) commented that "low Digit Symbol plus low Arithmetic plus poor Digit Span may, other things equal, merely indicate neurotic anxiety," he appears to be talking about differential diagnosis of adult clinical cases and not about the child who is a disabled reader.

The large number of investigators whom we cited in the History above agree on a pattern of lower subtest scores associated with reading disability. Many of them also find high scores in some of the Performance subtests as Block Design and Object Assembly and/or Picture Arrangement or Picture Completion. Comprehension and Similarities are believed by some to exceed other Verbal Scores.

Koppitz has raised the interesting point (Koppitz, 1964, pp. 49-50) that some of the WISC Performance subtests measure different abilities at different age levels. At fourth grade level she considers Block Design as a task closely related to the Bender in which the child must perceive and analyze designs. At earlier grades the child is asked only to copy simple designs involving chiefly solid squares of color. In Object Assembly regardless of age the child is required to analyze and integrate parts into wholes and to reproduce figures, all closely related to his task on the Bender. Both Picture Arrangement and Picture Completion for older children (including
fourth graders) are not as closely related to perception (or to performance on the Bender) but are increasingly tests of detail, social awareness, and social understanding.

Koppitz does not mention Coding as a test of short term learning and the substituting of symbols, and consequently related to reading, as does Robeck (1960). She instead, regards it as a test solely of the ability to persist, to concentrate, and to work fast.

Arithmetic at fourth grade level involves more whole-part relationships as well as number concepts. The child must analyze and remember principles. At this level the test is closer to the task set by the Bender than at earlier ages.

Both the Bender and the WISC are tests of cognitive functions and of perceptual-motor development. The Bender has the advantage of being relatively culture free. Some of the language of the WISC appears to be outdated, or at least ambiguous to the fourth graders in the study. The responses by the subjects to some items either indicates their lack of conceptual sophistication, the influence of regional bias, or that some of the terms are simply outdated. For example, in Information most children concluded that "fireworks" are celebrated on the Fourth of July. None knew what C.O.D. stood for. The average American was adjudged to be six feet tall. Chile suggested Mexican food. How much reality was attached to
shipwreck when women should be saved first because "they have to get dinner" or "because ladies go first"? It was considered better to pay by check than by cash because "most of the time you don't have money" and "you can run out of cash." In the Vocabulary subtest a belfry is "something in your head."

Koppitz (1964) uses the Bender Developmental Scoring System for her analysis of achievement, of intelligence, and of learning difficulties (including reading). She uses a separate series of items in scoring indicators of emotional problems. She uses a still different grouping of factors from both scoring systems to describe the patterns which she considers point to possible brain damage. All these scoring systems have been used in the discussion of the Bender scores appearing in the case histories.

Wechsler subtest scores should be interpreted within the context of other subtest scores, or, for that matter, other cognitive measures. Since all children were of average mental ability or better, their mean subtest scores might be expected to be higher than Wechsler's mean of 10. The pattern of low (or high) subtests suggesting reading difficulty should be understood in relation to the average or mean of the subtests in the same scale.

1. Case History: David

David has a Verbal I.Q. of 116 which exceeds his
Performance I.Q. of 101 by 15 points. This bright youngster has a Full Scale I.Q. of 110.

All Verbal subtests score 10 or above. Nevertheless, David's profile in its relative values is characteristic of the profile of poor readers. Information (10) and Digit Span (10) are lower than the rest of the Verbal Scale. Arithmetic (12) is lower than Comprehension (16) or Similarities (13). Vocabulary (12) is no higher than Arithmetic. In the Performance Scale, Coding (9) and Picture Completion (9) are lower than any other subtests. Block Design (13) is the highest Performance subtest. Scatter between highest and lowest subtest is seven.

David is not only slow in Coding, but also slow in the Bender-Gestalt Test (10 minutes), and extremely slow in reading.

David's Bender score of three includes the rotation of Figure 3, angles in curves in Figure 6, and incorrect angles in Figure 7. David is scored for the small size of his figures which Koppitz (1964 p. 137) regards as a symptom of "anxiety, withdrawal, constriction, timidity."

David has very poor word attack skills which frequently bring him to a standstill to ponder a word. He is also distractable in that he is alert, responsive to any and all stimuli. David is anxious to succeed, enjoys school, and is a responsible citizen.

David is small of stature. He has seven siblings.
Father is immature, unskilled, a dreamer, who likes to travel and camp. He drifts from job to job and does not provide adequately. David sells papers, is energetic, businesslike, and personable.

Other siblings have reading problems. One brother was in Fort Grant. However, these children go to two churches. Mother, although overburdened and vague, manages to keep the home together.

2. Case History: Bob

Bob could illustrate the directionally confused perceiver. His reading scored at early second grade level and was characterized by reversals and transpositions of words. Bob preferred his right hand and his left eye.

Bob scored eight errors on the Bender, seven of which were rotations. His figures were scattered across the page without logical sequence or order. "Confused order" has been considered by Koppitz (1964, p. 132) to be related in brighter-older children to "mental confusion". Bob also reproduced some figures in small size.

In the WISC Bob received a Full Scale I.Q. of 104. His Verbal I.Q. of 110 exceeds his Performance Scale of 96 by 14 points. Arithmetic (9) and Digit Span (9) were low. Information (11) was lower than the remaining verbal subtests except Comprehension (10). Coding (8) was lowest of the Performance Scale. Block Design (11) was highest of the
Performance Scale. Similarities (15) and Vocabulary (13) were at superior levels.

In Object Assembly Bob assembled the manikin upside down.

Family situation is complicated by an authoritative, punitive father (a professional man) who is vastly disappointed in his son. Mother tries to act as a buffer, babies Bob, even holds him on her lap. Sisters are older.

In school Bob is distractable and at times does not try.

3. Case History: Michael

Michael also illustrated directional confusion. Of eight errors on the Bender, seven were rotations. Overwork and reinforced lines suggest impulsivity. Reduced size of some figures was a noticeable error.

Errors in reading included many reversals. Michael preferred his right hand but left eye and left foot. In the WISC he completed one block design upside down and rotated it into correct position.

Michael followed the consistent pattern of low scores associated with reading disability. Block Design, Object Assembly, and Picture Completion were high.

Full Scale I.Q. was 111. Verbal I.Q. was 108; Performance Scale was 113.
Case History: Roy

Even after his reading had improved Roy remained a directionally confused speller who used the correct letters in ever-varying order. Roy preferred his left eye and right hand and foot.

His Full Scale I.Q. was 108. Performance Scale of 111 exceeded the Verbal Scale of 104.

The pattern of subtests was consistent except that Block Design was lower than Coding.

Roy worked the Block Designs with both hands at once, and thus frequently made corrections with one hand and new errors with the other.

Roy was 9 years, 4 months of age, and among the youngest of the children.

In the Bender Roy produced six errors, four of which were rotations and two of which were errors in angles, both characteristic of poor readers. Figures were crowded together at the top of the page. Some were of small size; some were overworked.

Overwork is an emotional indicator associated with impulsiveness and aggressiveness and occurs frequently among children who act out their feelings (Koppitz 1964).

Case History: Brad

Brad has always been a perfectionistic child with a very slow motor performance in writing and in reading. Brad
will not be hurried despite prodding. He was slow to respond to toilet training, and his mother finally became angry and punished him. Otherwise family have been accepting (the father especially) and have defended his rights against the encroachments of his slightly older sister. Brad has great difficulty finishing his school work with the rest of the class.

Brad came to the test armed with a drawing pencil and an eraser. He whispered to himself and took 10 minutes to complete the Bender.

Brad has his own unique way of thinking. He has a vivid imagination. Examples from the WISC Verbal Scale are as follows:

A brick house gives "better protection from bullets"
Where is Chile? = "The cold kind?"
A pound and a yard = "both take up space on earth"
A mountain and a lake = "from bottom to top both look deep"

On Block Design Brad muttered, "It takes me a few minutes, "I get it now", "I've got it now for sure". His score was low. He has been termed a "worry wart" by his family.

Brad had a Full Scale I.Q. in the bright normal classification.

<table>
<thead>
<tr>
<th>Scale Type</th>
<th>I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Scale I.Q.</td>
<td>110</td>
</tr>
<tr>
<td>Verbal Scale I.Q.</td>
<td>111</td>
</tr>
<tr>
<td>Performance Scale I.Q.</td>
<td>107</td>
</tr>
</tbody>
</table>
There was scatter of 10 points between his highest and lowest subtest.

The pattern of low scores characteristic of the poor reader was exhibited except for Information which was higher than Comprehension but lower than other verbal scores. Block Design was low (9). Arithmetic was very low (5). Coding and Digit Span were 8.

Brad's score on the Developmental Bender was 2, and consisted of circles for dots in Figures 1 and 5. Brad also reworked and erased most figures. His figures were confined to the left side of the paper and closely spaced although not significantly reduced in size. Figures were numbered (which was his unique idea).

Brad was the only child to score a wavy line in Figure 2. Koppitz (1964, p. 133) considers this an expression of instability in motor coordination and in personality. "It may reflect emotional instability resulting from poor coordination and poor integrative capacity in a child, or poor motor control due to tenseness in a child with serious emotional disturbances."

Brad is reported to have had one convulsive seizure at the onset of flu a year ago.

6. Case History: Joey

Joey was the only child to show perseveration on two Bender figures, and one of only two who showed perseveration
at all. Perseveration has been regarded as "highly significant diagnostically" of brain injury (Koppitz 1964 p. 79) and "by age eight was only found among the brain injured group". His other two errors were also common among brain injured. In addition to a Developmental Bender score of 4, Joey showed confused order in the placement of figures which may be indicative of mental confusion. He made a second attempt at reproducing a figure (8), an attempt made by none of the rest. In so doing he may have shown impulsiveness, anxiety, too much lack of inner control to finish. Or Figure 8 may have been "regarded as a phallic symbol" and "associated with a threatening idea or impulse" (Koppitz 1964 p. 129).

Joey showed a 28 point disparity between a high average verbal scale and a dull normal performance scale.

- Full Scale I.Q. = 94
- Verbal Scale I.Q. = 108
- Performance Scale I.Q. = 80

The pattern of low scores was consistent except that Digit Span was higher than Similarities. All performance subtests were very low.

In Object Assembly Joey was unable to assemble the face below the forehead. In Block Design he was also slow and appeared unaware of his errors in the final form. Joey.
thus had trouble both in visual perception and in motoric expression.

Joey has three older siblings. His working mother considers him dull and a slow learner. Joey had superior scores in Vocabulary (14) and Comprehension (13).

7. Case History: Paul

Paul was another child with regard to whom the question of brain injury was raised. Although a neurologist found one slight deviation in brain waves on an EEG, he did not consider it diagnostically significant. There was an RH factor in infancy.

Paul actually regressed in reading in third grade. His behavior has been strange and some of his explanations have been bizarre. His mother says, "Some days he's just not there." Paul carefully avoids all dissension.

Paul has three grown siblings much older than he. His brother also had a reading problem and showed a similar lack of persistence and drive.

Paul's oral reading is very poor, with numerous reversals. He reads almost as readily upside down.

In the Bender Paul scored seven errors which included distortions, circles for dots, angles for curves and rotations. His reproduction of figures reduced in size may illustrate anxiety, withdrawal, constriction, or timidity.

Paul at 11 years 3 months of age is one of the oldest
of the forty children. His WISC pattern showed the characteristic lower scores of the poor reader, except that Information was unusually high and Similarities was low. Coding (6) was especially slow and crude, as were his Bender figures. Block Design and Object Assembly were high (13).

Paul, with his hyperactivity, poor perceptual-motor control, possible brain damage, and extremely poor reading and poor enunciation in speech, might qualify as a dyslexic child.

8. Case History: Ted

Ted has been chosen to illustrate a probable "language handicap" on the basis of the extreme disparity of 30 points between his high Performance Scale (120) and his Verbal Scale of 90 (Cronbach, 1960, p. 199). A WISC in January 1962 found similar disparity between Verbal and Performance Scales. Ted's Full Scale I.Q. is 104.

The pattern of low subtest scores was intact. All performance scores were high except Coding. Ted was extremely slow though not unwilling on the verbal scale. It was almost impossible to get responses in Vocabulary. Ted was also slow in some of the Performance subtests and showed some inability to make decisions in Picture Completion.

Ted's Developmental Bender had no errors, although some figures were reduced in size, indicating anxiety or timidity.

Up until two years ago, this family lived on a
Midwest farm. Ted's mother states that he has been unhappy ever since they left the farm where he had animals he dearly loved.

Koppitz (1964 p. 175) considers a low Verbal I.Q. in a somewhat similar situation as reflecting a "mild depression". Certainly emotional problems may be suspected.

9. Case History: John

John's poor reading could have begun with poor auditory perception in first and second grades during sinus attacks, and could have been built up through fear of failure which prevented his making an all-out effort. Despite some remedial help toward the end of second grade he remained two years below his grade level. Arithmetic achievement has been average.

John has been large for his age, deliberate of movement, and not much motivated.

His Full Scale I.Q. of 120 disclosed superior mental ability. Verbal Scale = 128; Performance Scale = 108. There is disparity between the scales and scatter between the subtests. Information, Arithmetic, and Digit Span are lowest among generally high Verbal subtests. Block Design (7) is as low as Coding (7). Picture Completion and Picture Arrangement, Comprehension, Similarities, and Vocabulary all were high.

John's Bender was crowded onto the top third of the
paper. His score of four contained rotations, loss of shape, and disproportion. Reduced size of figures could indicate anxiety and withdrawal.

John has three older sisters and a working mother. Father, "a builder of fine homes," is often unemployed. Family have a mule breeding farm where John is entirely happy. John had one brush with police over damage to property in a rock-throwing episode involving several boys. His second grade teacher felt that John's emotional problems were more serious than the family admitted and that adequate supervision at that time was lacking.

It should be emphasized that the role of the reading specialist should be one of extreme caution in drawing any clinical inferences.
Conclusion

The Bender and the WISC supplement each other and between them yield scores related to verbal ability, perceptual-motor functioning, symbolization, abstract reasoning, short- and long-term memory, concentration, persistence, attention, practical judgment, planning ability, speed and accuracy of learning new associations, the ability to synthesize and to analyze, and so on.

In addition to this more or less direct information these tests permit inferences to be drawn from the Bender protocols and the WISC profiles regarding receptive and expressive neural functioning, reading and language disabilities, dyslexia, brain injury, emotional problems, delayed neural maturation, and motivation.

An intensive study of the individual child focuses upon the characteristic ways in which he organizes and responds to the stimuli presented to him by the tests.

In reading diagnosis a number of tests are often required as there is no single characteristic pattern that emerges from any one test. Causal factors in reading disability are so complex and varied as to defy their isolation by means of a single instrument. The WISC has succeeded in combining in a single test both verbal and non-verbal
factors important in the careful assessment of potential ability especially for disabled readers. Some years ago it required the Stanford-Binet and the Arthur Point Performance Scale together to accomplish some of the same results. The verbal sections of the WISC may in time demand revision due to cultural and language changes. However, there is at the present no more effective test. In addition, the wealth of information and material resulting from the many studies of both the WISC and the Bender greatly enhances their value. Refinement of the Bender for developmental and personality assessment appears to have just begun.

A further and longitudinal study would be valuable. Because the Bender is considered more predictive of school achievement and of reading success or failure at earlier grade levels (Koppitz, 1964), it would be interesting to give the Bender and the WISC to children with reading disability at second, third, and fourth grades along with the remediation indicated. If Bender protocols and WISC profiles faithfully identify children whose reading disability originates in poor visual-motor perception, could these patterns be expected to change as the reading is improved? Should not the remediation include training to aid in the development of perceptual-motor skills, especially in the primary grades?

Specific techniques for helping children with reading
problems due to perceptional malfunctioning have been sug-
gested by Strauss and Lethinen (1947), and by DeHirsch
(1952, 1957). Others, as Leavell (1954), Delacato (1959),
and Radler with Kephart (1960), have offered programs of
varying degrees of credibility in visual motor training and
even have assayed to recapitulate some developmental tasks,
like crawling, which were considered not properly learned
at the appropriate time, as an aid in motor and directional
maturation and in the correction of reading problems. If
one were to assume that their approach is appropriate, the
basic movement patterns of recreational dance might furnish
another, as yet untried avenue of approach.

Koppitz's theory that WISC subtests measure different
abilities at different age levels (Koppitz, 1964) makes
the study of earlier grade and age levels even more desir-
able. The prevention, at least of such reading disability
as may be caused by immature-motor perception,
becomes a possibility.

If there were opportunity for first hand diagnosis,
with observation and remediation over a suitable period of
time of children whose reading problems are present at
second or third grade levels, it is believed that a study of
more usefulness should result.

The WISC and the Bender tests appear to be valuable
instruments which can strengthen and give further depth of
understanding to the diagnosis of reading problems in children of elementary school age.

Members of many disciplines survey the child with a reading handicap. The school nurse may suspect over-heavy doses of medication for an allergy; the speech pathologist may suggest an anomaly in swallowing. The psychiatrist scrutinizes the parents' behavior. The neurologist finds an irregular pattern on his EEG and facial tics. The pediatrician may note infected tonsils and a heart murmur. To each his problem presents different aspects depending upon the insights, the emphases, and the responsibility or charges upon the particular discipline. Perhaps the remedial teacher has both the best opportunity intimately to study the individual and whole child as a functioning, organizing entity, and the need to do that which will be effective to help him.

Only by penetrating the facade of the child's behavior, which does not necessarily reveal his motives, concepts, and feelings, and by trying to share some of his experiences and attitudes, can the remedial teacher hope to identify the measures which will be effective for any particular child. The most useful tools of the remedial teacher are her ability to give the child confidence to try again and her skill to enable him to succeed in sufficient measure to prove to himself that he can do so.
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