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ABSTRACT

This study investigated (1) relationships between reading comprehension, IQ, and equivalence range (ER) and (2) categorizing styles through multidimensional scaling and varimax rotation analysis. One hundred and six male and 97 female sixth-graders comprised three reading groups according to Metropolitan Achievement Test, Reading subtest, and Otis Quick Scoring Mental Ability Test. Alternate forms of Object-Sorting Test determined categorizing ability. Results show reading comprehension relates to two ER measures for female poor readers; intellectual ability to one ER measure for female good and poor readers and to another ER measure for overall good, overall poor, and male poor readers. Multidimensional scaling and varimax rotation disclose somewhat similar categorizing styles of good and average readers, while both seem different from that of poor readers. (Author)

Multidimensional Scaling of the Cognitive Control Principle-Equivalence Range and Implications for Reading Comprehension

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Psychologists and special educators, notably those concerned with children who have learning disabilities, are investigating likely connections between cognitive processes and reading. Their work stems from previous studies by Thorndike (1917), Adler (1940), Larsen and Feder (1940), Gates (1949), Stauffer (1969), and others, who view reading as a mode of thinking.

Fundamental questions emerge as extensions of the research on thinking and reading. According to Spache and Spache (1969), they include: What are the thinking abilities most intimately involved with reading comprehension? Are the thinking processes the same for good and poor readers? Are these processes of equal significance at different school ages? And what are the implications of underlying concepts with respect to classroom practices and reading methodology [p. 27]? To these perhaps still another question should be added: How can the knowledge gained through current investigations of thinking and reading be used effectively by psychologists and educators concerned with the assessment and remediation of learning disabilities?

As affirmed by Bateman (1967), reading disabilities com-

prise the most prevalent of learning problems. Later, addressing himself to the issue of psychological correlates and reading disability, Zamm (1973) states, "A theory of cognitive integration is one answer to this problem [p. 95]." This leads him to a discussion of reading and cognitive development in terms of mechanical and ideational (comprehensional) aspects of reading. In this view, reading must be taught with due consideration paid to cognitive development as essential to the process. See also Stauffer (1969) and Lerner (1971).

In her observation of children with reading problems, Lerner (1971) concludes that difficulties may be associated with "a deficit in cognitive and conceptual functioning [p. 231]." The likelihood of the existence of such a deficit has led several investigators to the concept of cognitive style and its implications for reading. According to Shouksmith (1970), cognitive style is "an individual variable, typifying a particular subject's approach to problems . . . . Cognitive styles may be said to determine, or refer to, long-term strategies which are dependent on the personality and motivation of the individual [p. 93]." See also Messick (1968), Hertig (1971), and King (1972).

Research on Cognitive Style

The literature contains reports of research addressed, in general, to the cognitive styles of preschool children (Zucker & Stricker, 1968; Hallahan, 1970), young children

(Nuessle, 1972), late adolescents (Gaines, Mc Allister & Swift, 1973), exceptional children (Santostefano, 1964a; Witkin, Faterson, Goodenough & Birnbaum, 1966; Filbert, 1967; Witkin, Birnbaum, Lomonaco, Lehr & Herman, 1968; Keogh & Donlon, 1972; Wolitzky, Hofer & Shapiro, 1972), and education (Witkin, 1965).

Cognitive Style and Reading

As early as 1963, Kagan, Moss, and Sigel remarked that the cognitive style dimension analytic-nonanalytic may be important in the etiology of reading problems [p. 111. Kagan (1965) postulated that another dimension of cognitive style reflection-impulsivity may also be important in reading. (See King, 1972). Santostefano (1964b) studied the cognitive control dimension leveling-sharpening in relation to reading; and in 1965 Santostefano, Rutledge, and Randal investigated other cognitive controls and reading, i.e., focusing-scanning, leveling-sharpening, and constricted-flexible. (See also Stuart, 1967; Peterson & Margaro, 1969; and Wineman, 1971.) Serafica and Sigel (1970) studied the categorization style of boys with reading disability, finding that "major differences between non-readers and readers were in their conceptual and integrative abilities [comprehension] [p. 113]."

Sigel and Coop (1974) offer the most recent view of research on sex differences and cognitive style [p. 258]. (See also King, 1972, pp. 16-17; Wallach & Kogan, 1965, and Cici-

relli, 1973). Gardner, Jackson, and Messick (1960) discuss the relationships between cognitive control principles and intellectual abilities. Overall, what seems clear from the research is that reading is indeed a mode of thinking and that thinking involves, among other vital activities, categorizing or classifying [Bruner, 1973, pp. 7-9]. Consistent with their findings, Serafica and Sigel's (1970) basic premise is, briefly, that there is a significant relationship between styles of categorizing and reading comprehension. (See Santostefano, 1970, pp. 95-98.)

In recent years, most of the work on cognitive styles has been carried out by Witkin, Kagan, and their associates and followers. Their findings indicate that cognitive styles are stable differences in individual environmental information-processing. Focusing their attention on cognitive controls, Klein, Gardner, and Santostefano expand and modify this concept of style.

This study will follow the research advanced by Santostefano (1970), which involves his Developmental Model of Cognitive Controls. This model depicts levels of such controls from (earliest) focal attention to (latest) equivalence range, that is, from developmentally early global-diffuse to developmentally advanced differentiated-integrated hierarchic levels. Its seems probable that, with respect to reading, movement is thus from mechanics (at the focal attention level) to comprehension (at the equivalence range level), as with the

cognitive controls specified [Santostefano, 1971]. The distinguishing mark of the equivalence range principle is "that symbols or labels are introduced to interrelate bits of information allowing objects to be dealt with in terms of categories or classes [Santostefano, 1970, pp. 91-92]." This dimension, in conjunction with reading comprehension, is the focal issue of this study.

Purpose of the Study

The purpose of this study was to determine the relationship between reading comprehension and categorizing style in male and female sixth-graders, approximately twelve years of age. They were chosen as subjects because it was assumed that categorizing ability is sufficiently developed at that level. It was anticipated that good, average, and poor readers, respectively, possess individually different categorizing styles which may correspond to their ability to understand what they are reading. Furthermore, this study attempted to discover how intellectual ability was related to categorizing style and to reading comprehension. It attempted also to discover significant differences among the three reading groups with respect to reading comprehension, intellectual ability, and categorizing style.

To achieve a corollary purpose, that is, to disclose possible implications for reading comprehension, the analysis of data was expanded to include multidimensional scaling and

varimax rotation analysis. Multidimensional scaling attempts "to position items in a spatial configuration in such a way as to represent best, simultaneously, all pair-wise relations among items [Napier, 1972, p. 165]," with specific pertinence to the sorting task used in this study. Varimax rotation analysis served to make the multidimensional scaling matrix more amenable to interpretation.

Procedures

Two elementary schools participated in the research. 203 male and female sixth-grade pupils were tested. Their ages ranged from 11 to 14 years, with the mean at 12 years. The subjects were placed in good, average, and poor reading groups on the basis of the Metropolitan Achievement Test, Intermediate, Form G, Reading subtest, which had been administered when they were in the fifth grade. I.Q.'s were determined by the Otis Quick Scoring Mental Ability Test, Form J, which had been given when they were fourth-graders. To test their categorizing style, seven intact classes of subjects were given words-for-objects sorting tasks in alternate forms, during practice and test sessions. In each instance, a deck of 50 word cards was used.

Measures

The practice form of the words-for-objects sorting task was a modification of a pictorial version (child-form) developed by Cicirelli (1973) from the object-sorting test; and the

test form was a modification, also pictorial (child-form), employed by Wallach and Kogan (1965), who had derived their test from the paper-and-pencil test (adult-form) of Clayton and Jackson (1961).

The 50 word cards were presented to the subjects in the following prearranged sequences during practice and test sessions:

PRACTICE SESSION	TEST SESSION
1. BIRD	1. ARROW
2. PINS	2. PICTURE
3. HOE	3. THREAD
4. BUSH	4. GLASS
5. CAR	5. JACKET
6. FOUNTAIN PEN	6. FLASHLIGHT
7. TULIP	7. REFRIGERATOR
8. RIFLE	8. SLED
9. SLED	9. SCREWDRIVER
10. CORK	10. POT
11. BASEBALL BAT	11. CLOCK
12. STRING	12. HANGER
13. CIGAR	13. FLOWER
14. FOOTBALL	14. LAMP
15. MEASURING SPOON	15. PENCIL
16. BICYCLE	16. WALLET
17. TELEPHONE DIRECTORY	17. LIPSTICK
18. STOOL	18. PURSE
19. COMB	19. PISTOL
20. CANDLE	20. CANDLE
21. SAILBOAT	21. LAMP POST
22. CLOCK	22. COMB
23. PLIERS	23. RULER
24. SCREW	24. FORK
25. BEE	25. CHAIR
26. UMBRELLA	26. CUP
27. MITTENS	27. BOOK
28. FORK	28. STOVE
29. HAIRBRUSH	29. DOOR
30. SWORD	30. ROWBOAT
31. YARDSTICK	31. LETTER
32. CAP	32. TREE
33. PAN	33. CIGARETTE
34. NAIL FILE	34. RAKE

35. LIGHTER	35. SCISSORS
36. SHIRT	36. RUG
37. FISH	37. SHOE
38. TELEPHONE POLE	38. HAMMER
39. SLIPPER	39. WATCH
40. SAW	40. HAT
41. BOOT	41. TELEPHONE
42. PHONOGRAPH	42. SPOON
43. SPEAR	43. CANOE
44. PHOTOGRAPH	44. BASEBALL
45. JACKET	45. TV SET
46. PENNY	46. GOLF CLUB
47. THERMOMETER	47. RADIO
48. SHIP	48. TIRE
49. SCOTCH TAPE	49. COIN
50. AIRPLANE	50. KEY

From the raw data were computed, for all subjects, the total number of groups (stacks), the number of words left ungrouped, the frequency of particular words left ungrouped, and the mean number of words per group.

Alternate-forms reliability coefficients were computed for three of the four equivalence range measures used: Total number of groups = .53; number of words ungrouped = .72; and the mean number of words per group = .57. These reliabilities are somewhat lower than the alternate-forms reliability coefficients reported by Cicirelli (1973), for number of groups = .82, number of ungrouped items = .89, and mean number of items per group = .84. To this, Sloane, Gorlow, and Jackson (1963) add: Number of groups = .75. However, the reliability cooefficients achieved in the present study proved to be lower, as anticipated, since the object-sorting test was administered to intact classes, and not to subjects on an individual basis, as in other experimental investigations. Additionally, words-

for-objects rather than pictures-for-objects or the objects themselves were employed.

In order to determine the interrelationship between the same three measures of equivalence range, Pearson product correlation coefficients were computed as follows: Total number of groups and number of words ungrouped = -.0448; total number of groups and mean number of words per group = -.8419; and number of words ungrouped and mean number of words per group = -.2727. As found by Cicirelli (1973), it seems that here different aspects of categorizing behavior are being measured; however, the three measures themselves are interrelated [p.135] in the single, general task of sorting to produce groups.

RESULTS AND DISCUSSION

This section presents, first, the results of the several statistical analyses performed in attempting to answer the research questions of this study and, secondly, a discussion of these results.

Analyses of Data from School Records

Information collected from the school records of the subjects provided the data for the following analyses. Tables 1, 2, and 3 show ranges, means, and standard deviations of ages, reading comprehension scores, and I.Q.'s for good, average, and poor sixth-grade readers.

Insert Tables 1, 2, and 3 about here

Analyses of Data from Object-Sorting Task

Data derived from the object-sorting behavior of the subjects were analyzed. Tables 4, 5, and 6 show ranges, means, and standard deviations of equivalence range measures for good, average, and poor sixth-grade readers.

Insert Tables 4, 5, and 6 about here

Several words (11 of 50) had high frequencies of being left ungrouped for all readers. Table 7 shows frequencies, means, and standard deviations for the ungrouped words recurring ten or more times. The numerical designations of these words and the words are: 2. picture, 3. thread, 12. hanger, 13. flower, 29. door, 31. letter, 33. cigarette, 36. rug, 48. tire, 49. coin, and 50. key.

Insert Table 7 about here

Pearson product moment correlation coefficients were computed to determine the relationships existing between reading comprehension scores and equivalence range measures, between reading comprehension scores and I.Q.'s, and between I.Q.'s and equivalence range measures. These relationships are shown in Table 8.

Insert Table 8 about here

To test for significant differences between means, one-way analyses of variance were computed for good [and] average, good [and] poor, and average [and] poor readers in reading comprehension, I.Q., and equivalence range measures: total number of groups, number of words ungrouped, and mean number of words per group. The results are shown in Tables 9, 10, and 11.

Insert Tables 9, 10, and 11 about here

No significant difference was found among good, average, and poor readers in reading comprehension and equivalence range when the I.Q. was controlled.

Ex Post Facto Analyses

This section contains the results and discussion of ex post factoanalyses involving (1) multidimensional scaling and (2) varimax rotation analysis, which were conducted during this study. Multidimensional scaling provided maps or pictures of the categorizing styles of good, average, and poor readers, which were later viewed through varimax rotation analysis.

The Shepard-Kruskal technique of multidimensional scaling was used to analyze the data. This technique does not require scores to form interval or ratio scales; scores can be treated as constituting ordinal or rank-order scales. D'Andrade, Quinn, Nerlove, and Romney (1972) report:

> The basic accomplishment of the Shepard-Kruskal multidimensional scaling procedure is that it gives a representation of the degree of similarity between every pair of items in terms of distance measures that are monotonically related to the original similarity scores (the greater the distance between any two items, the less the similarity score for these items) [p. 32].

The computer program that carried out this nonmetric procedure was the M-D SCAL, IV, Formula 2, developed by Kruskal. The results of this analysis indicate that six dimensions can account reasonably well for the words-for-objects sorting data. D'Andrade, Quinn, Nerlove, and Romney (1972) resume:

> Each time the program calculates the interpoint distances for some particular number of dimensions, a goodness of fit measure, called "stress," is given--the larger the stress figure, which ranges from .0 to 1.0, the worse the fit between the interpoint distances and the original similarity scores [p. 32].

Table 12 shows the stress values for the Euclidean solutions for good, average, and poor readers. In view of the elevated two-dimensional stress values, the solution involving one-dimensional scaling was not attempted.

Insert Table 12 about here

Figures 1, 2, and 3 depict the two-dimensional configurations, or multidimensional scaling maps, of word locations. According to Kruskal (1972),

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Insert Figures 1, 2, and 3 about here

> Briefly, the method places each object in a particular position. The map produced by scaling, though not a real map, shares many characteristics of real ones. For example, we are free to turn it and look at it from may direction we please; it has no particular direction that is truly up. Also we are free to enlarge (or diminish) the map, change the scale, so to speak, though our maps do not really have any scale. Convenience dictates how big we make the map.
> . . . . We place objects on a map with the goal of having objects that are close together to be very much alike, and having objects that are far apart to be very different. In other words, small distances should correspond to small dissimilarities, and large distances to large dissimilarities; or vice versa for similarities. In brief, the goal while constructing the map is a good relationship between the map distances and the input (dissimilarities or similarities) [pp. 187-188].

Given the picture or map, the next step is the interpre-

tation of spatial configuration. Napier (1972) says,

> First, we can look for substantively meaningful clusters or "local structure" in the solution. Items that are relatively close to each other in the Euclidean sense are considered to be members of a common group or cluster. The problem here is to interpret the meaning of "close." [p. 168]

There are clustering models, such as Johnson's diameter method (1967), which attempt to place items in discrete groups in a manner that best discloses measures of similarity among them. However, in the present study this procedure was not done. As an alternative procedure, varimax rotation analysis was acoomplished to render more interpretable the multidimensional scaling matrix.

The multidimensional scaling maps or pictures revealed visual differences among the categorizing styles of the three reading groups. As advanced by Napier (1972), such solutions

> . . . can achieve great compression of the data without severe distortion; furthermore, two- and three-dimensional configurations can be interpreted quite easily using physical models and intuitive visual processes [pp.172-173].

Thus what follows here is an "intuitive visual" interpretation of the data. Subsequently, varimax rotation analyses will lead to physical interpretation of the scaling matrix.

The use of quadrants as locations in this discussion is a matter of convenience, to indicate, especially, distances between words and clusters. The grouping or clustering of words-for-objects is of primary importance, and it may spread over one or more quadrants in the case of a given group or cluster. An examination of the scaling maps for the three reading groups reveals that each has its own, somewhat characteristic clustering of words in the four quadrants formed by vertical and horizontal axes. Thus it seems feasible to equate such emerging "pictures" with the essentials of categorizing style belonging to good, average, and poor readers. The differences between the alleged categorizing styles of the three groups will be discussed according to their respective clustering and placement of words-for-objects in one or more of these quadrants.

Upper-Right Quadrant

As displayed in Figures 1, 2, and 3, the upper-right quadrant for the three reading groups contains 13 words for good, 14 for average, and 14 for poor readers. Some of the words are the same but in different locations and/or clusters. Certain words, cigarette, key, and coin, appear in this quadrant only for poor readers; and only cigarette and key are closely grouped. The word scissors occurs in this quadrant only for average readers. Baseball, golf club, rowboat, canoe, and sled are clustered in approximately the same

fashion in this quadrant by all three groups. Arrow, rake, hammer, pistol, screwdriver, and tire are most clearly and tightly clustered for good readers. Although these words are also clustered for average readers, they are more widely dispersed. For poor readers, the same words are even more widely scattered, with hammer and screwdriver in the lower-right quadrant.

Upper-Left Quadrant

Moving now to the upper-left quadrant, 18 words were found for good, 11 for average, and 11 for poor readers. Some of the words are the same for good and average readers, but in different locations and/or clusters. For poor readers, however, the words in this quadrant are entirely different. The word flower is found here for poor readers, but it appears in the upper-right quadrant, close to the word tree, for good and average readers. Moreover, lamp post, lamp, candle, and flashlight are tightly clustered in this quadrant for good readers. These words are also clustered here for average readers, but somewhat more widely spread. For poor readers, the same words appear in the lower-left and lower-right quadrants, but in approximately the same cluster as that of average readers.

Radio, TV Set, and telephone appear clustered in this quadrant for good and average readers. These words are in the lower-left quadrant for poor readers, with only radio and

TV set clustered. Refrigerator, stove, cup, pot, fork, spoon, glass, and clock are clustered in this quadrant for good readers. Similar clustering is found for average readers, but in the upper-left and lower-left quadrants. These words are clustered for poor readers only in the lower-left quadrant. Thus clustering of these words is essentially the same for all three reading groups.

Lower-Left Quadrant

In the lower-left quadrant, 6 words were pinpointed for good, 11 for average, and 16 for poor readers. The only word that is the same for good and average readers is picture, but its location is different. Here good and poor readers did not cluster any of the same words; however, average and poor readers did. Scissors, book, pencil, ruler, and letter, with picture a bit removed, cluster in this quadrant for good readers. However, for average readers, these words are widely spread in the upper-right, lower-left, and lower-right quadrants. For poor readers, book, pencil, letter, and scissors clustered, with picture away from the cluster. Ruler, even farther away, is in the upper-right quadrant.

Lower-Right Quadrant

Finally, in the lower-right quadrant, there are 13 words for good, 14 for average, and 9 for poor readers. Here several of the same words occur for good and average readers, but in different locations. Key, watch, and hanger appear in this

quadrant for good, but not for average readers; however, no words appearing for good readers are found also for poor readers. Furthermore, concerning average and poor readers, letter, pencil, and book are pinpointed in this quadrant, with letter and pencil at approximately the same location.

Cigarette, key, hanger, thread, and coin are clustered in this quadrant for good readers. They appear more widely clustered for average readers, in the lower-left and lower-right quadrants, and similarly clustered for poor readers as average readers, between upper-left and upper-right quadrants. Watch, comb, lipstick, wallet, and shoe are clustered for good readers, with purse, jacket, and hat fairly close, though probably in a separate cluster. For average readers, hat, lipstick, shoe, jacket, wallet, and purse are clustered, with comb at considerable distance, almost in the upper-right quadrant, and watch at a distance in the lower-left quadrant. Interestingly, poor readers clustered these words in the upper-left quadrant in an almost two-by-two pattern, that is, jacket-hat, wallet-purse, excepting shoe at a distance, lipstick-comb, with watch alone at a distance.

It was ascertained that 11 words out of the 50 comprising the sorting task were most often left ungrouped by all readers; and the multidimensional scaling maps under discussion reveal that many of these words were difficult to categorize or cluster for those subjects who attempted to do so. For instance, door, rug, thread, and flower. In general,

Multidimensional scaling suggests that the categorizing styles of good and average readers are more alike than different and that both styles are possibly different from that of poor readers.

This section contains the results and discussion of varimax rotation analysis of the multidimensional scaling matrix. This analysis was accomplished to provide a more in-depth view of the data, by rendering more interpretable the matrix and thus affording better understanding of the categorizing styles of good, average, and poor readers. The results for the three reading groups are shown in Tables 13, 14, and 15. For good readers, five dimensions accommodated

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Insert Tables 13, 14, and 15 about here

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the data; for average and poor readers, six dimensions. The highest correlation for each word was used as an estimate of commonality. Those factors which contained at least one item with a loading greater that $\pm$.40 were selected for examination. Each word-for-object in this study had a loading greater than this in the three reading groups. Although not bi-polar in the dimensions considered, clusters of words tended to exhibit inherent similarities, while dissimilarities existed between clusters. That is, each dimension involved two clusters (with one exception--Poor Readers, Dimension 4 A); and the words-for-objects comprising each may be

tentatively identified by a class denominator reflecting inherent similarities. This was performed in the present study and indicated in Tables 13, 14, and 15. Moreover, the varimax rotation analysis disclosed categorizing differences in the three reading groups, by showing in physical or statistical terms what had been presented visually by multidimensional scaling.

The varimax rotation analysis presented the data in five dimensions for good readers, and in six dimensions for average and for poor readers. As shown in Tables 13, 14, and 15, clustering, which seems indicative of categorizing style, is more orderly and internally consistent with good readers than with the other two groups. Class denominators and traces of bi-polarization appear more obvious in the five dimensions employed by the good readers than elsewhere.

Multidimensional scaling and varimax rotation offer novel and extremely interesting ways of handling data to be categorized; however, caution needs to be exercised, not only respecting the performance of subjects in this or similar research, but also respecting the present state of the art of development of adequate computer programs. In the present study, varimax rotation analysis suggests the "shape" of categorizing styles associated with good, average, and poor readers; and it indicates tentatively the presence of such styles in connection with the words-for-objects sorting task

and with reading comprehension.

Recapitulation of Results

The findings of this study are that:

1. A relationship exists between reading comprehension and two equivalence range measures for female poor readers;

2. A relationship exists between reading comprehension and intellectual ability for overall good readers, overall average readers, male good readers, male average readers, female good readers, and female poor readers;

3. A relationship exists between intellectual ability and two equivalence range measures for overall good readers, overall poor readers, and male poor readers;

4. There were significantly different means in reading comprehension as well as intellectual ability for good [and] average, good [and] poor, and average [and] poor readers. Moreover, there were significantly different means in all three equivalence range measures for good [and] poor readers;

5. There were significant sex differences in the three equivalence range measures with good [and] poor readers; and

6. There were no significant differences in adjusted means when I.Q. was controlled for good, average, and poor readers.

With respect to the ex post facto analyses employing multidimensional scaling and varimax rotation, it was found that there were differences in the categorizing styles of

good, average, and poor readers, which were visually and statistically discernible.

Multidimensional scaling and varimax rotation analysis gave the clearest picture of the categorizing styles of the three reading groups. Although reading comprehension and intellectual ability appear in some elusive way to be related to equivalence range, further research needs to be done. Additionally, more research should be undertaken to determine relationships between reading comprehension, intellectual ability, and the other cognitive controls.

Prospects for Future Research

Research findings in the literature seem to indicate that cognitive controls do operate with respect to reading comprehension. Of the cognitive controls specified, equivalence range, at the highest developmental level, is probably the most critical; but it is about equivalence range that least is known. Undoubtedly, more research needs to be done. Hopefully, such statistical techniques as multidimensional scaling and varimax rotation analysis may ultimately provide the answers to many questions which persist concerning equivalence range, as well as other cognitive controls, and reading comprehsnion.

References

Adler, M. J. How to read a book. New York: Simon & Schuster, 1940.

Bateman, B. Learning disabilities--Yesterday, today, and tomorrow. In E. C. Frierson & W. B. Barbe (Eds.), Educating children with learning disabilities: Selected readings. New York: Appleton-Century-Crofts, 1967.

Bruner, J. S. On perceptual readiness. In J. M. Anglin (Ed.), Jerome S. Bruner: Beyond the information given: Studies in psychology of knowing. New York: W. W. Norton, 1973.

Buros, O. K. (Ed.). The seventh mental measurements yearbook. Vol. I. Highland Park, N. J.: Gryphon Press, 1972.

Cicirelli, V. G. Effects of sibling structure and interaction on children's categorization style. Developmental Psychology, 1973, 9, 132-139.

Clayton, M. B. & Jackson, D. N. Equivalence range, acquiescence, and overgeneralization. Educational and Psychological Measurement, 1961, 21, 371-382.

D'Andrade, R. G., Quinn, N. R., Nerlove, S. B., & Romney, A. K. Categories of disease in American-English and Mexican-Spanish. In A. K. Romney, R. N. Shepard, & S. B. Nerlove (Eds.), Multidimensional scaling: Theory and applications in the behavioral sciences. Vol. 2. Applications. New York: York: Seminar Press, 1972.

Durost, W. N., Bixler, H. H., Hildreth, G. N., Lund, K. W., Wrightstone, J. W. (Eds.). Metropolitan Achievement Tests: Intermediate battery, Form B--Manual. Yonkers-on-Hudson, N. Y.: World Book Co., 1959.

Durost, W. N., Bixler, H. H., Wrightstone, J. W., Prescott, G. A., & Balow, I. H. (Eds.). Metropolitan Achievement Tests: Intermediate battery, Form G--Teacher's Handbook. New York: Harcourt Brace Jovanovich, 1971.

Fiebert, M. Cognitive styles in the deaf. Perceptual and Motor Skills, 1967, 24, 319-329.

Gaines, L.S., McAllister, D. R., & Swift, E. Relationships between dimensions of cognitive styles: Field articulation control and stimulus-intensity control. Perceptual and Motor Skills, 1973, 36, 391-394.

Gardner, R. W., Jackson, D. N., & Messick, S. Personality organization in cognitive controls and intellectual abilities. Psychological Issues, 1960, 2 (4) (Monograph 8), 1-148.

Gates, A. I. Character and purposes of the yearbook. Reading in the elementary school. Forty-eighth yearbook of the National Society for the Study of Education. Part II. Chicago: University of Chicago, 1949.

Hallahan, D. P. Cognitive styles--Preschool implications for the disadvantaged. Journal of Learning Disabilities, 1970, 3, 4-9.

Hertzig, M. E. Aspects of cognition and cognitive style in young children of differing social and ethnic backgrounds. In J. Hellmuth (Ed.), Cognitive studies. Vol. 2. Defects in in cognition. New York: Brunner/Mazel, 1971.

Johnson, S. C. Hierarchic clustering schemes. Psychometrika, 1967, 32, 241-254.

Kagan, J. Reflection-impulsivity and reading ability in primary grade children. Child Development, 1965, 36, 609-628.

Kagan, J., Moss, H. A., & Sigel, I. E. The psychological significance of styles in conceptualization. In J. C. Wright & J. Kagan (Eds.), Basic cognitive processes in children. Monograph of the Society for Research in Child Development, 1963, 28, 73-112.

Keogh, B. K. & Donlon, McG. Field dependence, impulsivity, and learning disabilities. Journal of Learning Disabilities, 1972, 5, 16-21.

King, I. B. An experimental investigation of reflection-impulsivity as a determinant of success in early reading achievement. Unpublished doctoral dissertation, Boston College, 1972.

Kruskal, J. B. The meaning of words. In J. M. Tanur (Ed.), Statistics: A guide to the unknown. San Francisco: Holden-Day, 1972.

Larsen, R. P. & Feder, D. D. Common and differential factors in reading and hearing comprehension. Journal of Educational Psychology, 1940, 31, 241-252.

Learner, J. W. Children with learning disabilities. Boston: Houghton Mifflin, 1971.

Messick, S. The criterion problem in the evaluation of instruction: Assessing possible, not just intended outcomes. Princeton, N. J.: Educational Testing Service, 1968.

Napier, D. Nonmetric multidimensional techniques for summated ratings. In A. K. Romney, R. N. Shepard, & S. B. Nerlove (Eds.), Multidimensional scaling: Theory and applications in the behavioral sciences. Vol. I. Theory. New York: Seminar Press, 1972.

Nuessle, W. Reflectivity as an influence on focusing behavior of children. Journal of Experimental Child Psychology, 1972, 14, 265-276.

Peterson, S. & Magaro, P. A. Reading and field dependence: A pilot study. Journal of Reading, 1969, 12 (4), 287-294.

Santostefano, S. Beyond nosology: Diagnosis from the viewpoint of development. In H. E. Rie (Ed.), Perspectives in child psychopathology. New York: Aldine-Atherton, 1971.

Santostefano, S. Cognitive controls and exceptional states in children. Journal of Clinical Psychology, 1964, 20, 213-218. (a)

Santostefano, S. Cognitive controls versus cognitive styles: An approach to diagnosing and treating cognitive disabilities in children. In S. Chess & A. Thomas (Eds.), Annual progress in child psychiatry and child development. New York: Brunner/Mazel, 1970.

Santostefano, S. A developmental study of the cognitive control leveling-sharpening. Merrill-Palmer Quarterly, 1964, 10, 343-360. (b)

Santostefano, S., Rutledge, L., & Randall, D. Cognitive styles and reading disability. Psychology in the Schools, 1965, 2, 57-62.

Serafica, F. C. & Sigel, I. E. Styles of categorization and reading disability. Journal of Reading Behavior, 1970, 2, 105-115.

Shouksmith, G. Intelligence, creativity and cognitive style. London: B. T. Batsford, Ltd., 1970.

Sigel, I. E. & Coop, R. H. Cognitive style and classroom practice. In R. H. Coop & K. White (Eds.), Psychological concepts in the classroom. New York: Harper & Row, 1974.

Sloane. H. N., Gorlow, L., & Jackson, D. N. Cognitive styles in equivalence range. Perceptual and Motor Skills, 1963, 16, 389-404.

Spache, G. D. & Spache, E. B. Reading in the elementary school. Boston: Allyn & Bacon, 1969.

Stauffer, R. G. Directing reading maturity as a cognitive process. New York: Harper & Row, 1969.

Stuart, I. R. Perceptual style and reading ability: Implications for an instructional approach. Perceptual and Motor Skills, 1967, 24, 135-138.

Thorndike, E. L. Reading as reasoning: A study of mistakes in paragraph reading. Journal of Educational Research, 1917, 8, 323-332.

Wallach, M. A. & Kogan, N. Modes of thinking in young children New York: Holt, Rinehart & Winston, 1965.

Wineman, J. H. Cognitive style and reading ability. California Journal of Educational Research, 1971, 22 (2), 74-79.

Witkin, H. A. Some implications of research on cognitive syle for problems in education. Archivio di Psicologia, Neurologia e Psichiatria, 1965, 26 (1), 28-55.

Witkin, H. A., Birnbaum, J., Lomonaco, S., Lehr, S., & Herman, J. L. Cognitive patterning in congenitally totally blind children. Child Development, 1968, 39, 767-786.

Witkin, H. A., Faterson, H. F., Goodenough, D. R., & Birnbaum, J. Cognitive patterning in mildly retarded boys. Child Development, 1966, 37, 301-316.

Wolitzky, D. L., Hofer, R., & Shapiro, R. Cognitive controls and mental retardation. Journal of Abnormal Psychology, 1972, 79, 296-302.

Zamm, M. Reading disabilities: A theory of cognitive integration. Journal of Learning Disabilities, 1973, 6, 95-101.

Zucker, J. S. & Stricker, G. Impulsivity-reflectivity in preschool Headstart and middle class children. Journal of Learning Disabilities, 1968, 1, 578-583.

TABLE 1

AGES, READING COMPREHENSION SCORES, AND
I.Q.'S FOR GOOD READERS

Scores	All Ss	Males	Females
N	72	37	35
Age (years & months)			
Range	11.4-13.2	11.4-12.7	11.5-13.2
Mean	12.0	12.0	12.0
Standard Deviation	.37	.37	.37
Reading Comprehension			
Range	6.8-9.8	6.8-9.7	6.9-9.8
Mean	8.8	8.10	8.6
Stanfard Deviation	1.14	1.12	1.16
I.Q.'s			
Range	93-143	96-143	93-137
Mean	116	116	116
Standard Deviation	11.40	11.75	11.17

TABLE 2

AGES, READING COMPREHENSION SCORES, AND I.Q.'S FOR AVERAGE READERS

Scores	All Ss	Males	Females
N	74	38	36
Age (years & months)			
Range	11.4-13.6	11.5-13.6	11.4-13.2
Mean	12.0	12.1	12.0
Standard Deviation	.52	.53	.50
Reading Comprehension			
Range	4.8-6.7	4.8-6.7	4.8-6.7
Mean	5.8	5.7	5.8
Standard Deviation	.75	.78	.72
I.Q.'S			
Range	82-115	82-115	84-113
Mean	99	98	100
Standard Deviation	7.83	8.17	7.32

TABLE 3

AGES, READING COMPREHENSION SCORES, AND I.Q.'S FOR POOR READERS

Scores	All S's	Males	Females
N	57	31	26
Age (years & months)			
Range	11.7-14.2	11.7-14.2	11.6-13.6
Mean	12.7	12.10	12.5
Standard Deviation	.75	.78	.61
Reading Comprehension			
Range	2.0-4.6	2.0-4.6	2.2-4.5
Mean	3.8	3.6	3.9
Standard Deviation	.89	.94	.82
I.Q.'S			
Range	71-120	72-120	72-102
Mean	87	88	86
Standard Deviation	9.15	10.88	6.56

TABLE 4

EQUIVALENCE RANGE MEASURES FOR GOOD READERS

Measures	All Ss	Males	Females
N	72	37	35
Total Number of Groups			
Range	4-20	4-20	7-18
Mean	12.08	11.72	12.45
Standard Deviation	3.21	3.58	2.77
Number of Words Ungrouped			
Range	0-22	0-22	0-11
Mean	3.44	4.72	2.08
Standard Deviation	4.95	6.16	2.81
Mean Number of Words per Group			
Range	2-12	2-12	2-6
Mean	4.19	4.31	4.05
Standard Deviation	1.55	1.91	1.06

TABLE 5

EQUIVALENCE RANGE MEASURES FOR AVERAGE READERS

Measures	All Ss	Males	Females
N	74	38	36
Total Number of Groups			
Range	4-19	4-18	4-19
Mean	11.37	11.26	11.50
Standard Deviation	3.36	3.42	3.34
Number of Words Ungrouped			
Range	0-27	0-27	0-14
Mean	3.83	5.23	2.36
Standard Deviation	5.06	6.07	3.18
Mean Number of Words per Group			
Range	2-12	2-12	2-11
Mean	4.54	4.48	4.61
Standard Deviation	1.96	2.06	1.88

TABLE 6

EQUIVALENCE RANGE MEASURES FOR POOR READERS

Measures	All Ss	Males	Females
N	57	31	26
Total Number of Groups			
Range	4-20	4-20	8-16
Mean	10.64	10.03	11.38
Standard Deviation	3.10	3.57	2.28
Number of Words Ungrouped			
Range	0-18	0-17	0-18
Mean	4.19	3.19	5.38
Standard Deviation	5.10	4.86	5.20
Mean Number of Words per Group			
Range	2-12	2-12	2-6
Mean	4.81	5.44	4.06
Standard Deviation	2.11	2.60	8.83

TABLE 7

FREQUENCIES OF UNGROUPED WORDS RECURRING TEN OR MORE TIMES

Word Number	Good			Average			Poor		
	Freq	M	SD	Freq	M	SD	Freq	M	SD
2*	13	.18	.38	13	.17	.38	14	.24	.43
3				18	.24	.43			
12	13	.18	.38	14	.18	.39			
13							11	.19	.39
29	12	.16	.37						
31	10	.13	.34	14	.18	.39			
33*	21	.29	.45	31	.41	.49	12	.21	.41
36				11	.14	.11	11	.19	.39
48*	24	.33	.47	22	.29	.46	11	.19	.39
49*	14	.19	.39	18	.24	.43	15	.26	.44
50	12	.16	.37				11	.19	.37

Note: Four words, designated 2*, 33*, 48*, and 49*, appeared most frequently ungrouped by all readers.

TABLE 8

CORRELATIONS BETWEEN READING COMPREHENSION, I.Q.'S, AND EQUIVALENCE RANGE MEASURES

Group	All Ss			Males			Females		
	N	df	r	N	df	r	N	df	r
Reading Comprehension: Total Number of Groups									
Good	72	70	.12	37	35	.19	35	33	.07
Average	74	72	-.06	38	36	-.19	36	34	.09
Poor	57	55	.12	31	29	-.11	26	24	.54**
Reading Comprehension: Number of Words Ungrouped									
Good	72	70	-.06	37	35	-.08	35	33	-.18
Average	74	72	-.08	38	36	-.06	36	34	-.07
Poor	57	55	-.02	31	29	-.16	26	24	.09
Reading Comprehension: Mean Number of Words per Group									
Good	72	70	-.02	37	35	-.01	35	33	-.06
Average	74	72	.05	38	36	.16	36	34	-.10
Poor	57	55	-.03	31	29	.18	26	24	-.59**
Reading Comprehension: I.Q.									
Good	72	70	.63**	37	35	.51**	35	33	.79**
Average	74	72	.31**	38	36	.38**	36	34	.19
Poor	57	55	.23	31	29	.12	26	24	.55**

TABLE 8 (continued)

I.Q.: Total Number of Groups

Good	72	70	.19	37	35	.08	35	33	.34*
Average	74	72	-.10	38	36	-.23	36	34	.03
Poor	57	55	.03	31	29	-.05	26	24	.40*

I.Q.: Number of Words Ungrouped

Good	72	70	-.24*	37	35	-.28	35	33	-.19
Average	74	72	-.16	38	36	-.08	36	34	-.21
Poor	57	55	-.31*	31	29	-.44**	26	24	-.06

I.Q.: Mean Number of Words Per Group

Good	72	70	-.03	37	35	.11	35	33	-.31
Average	74	72	.13	38	36	.27	36	34	-.07
Poor	57	55	.13	31	29	.18	26	24	-.34

*p < .05.
**p < .01.

TABLE 9

ONE-WAY ANALYSIS OF VARIANCE: GOOD [AND] AVERAGE READERS

Tests	F - Ratios		
	All Ss	Males	Females
Reading Comprehension	43.83**	25.27**	18.82**
I.Q.	110.21**	58.51**	51.39**
Equivalence Range:			
Total N of Groups	1.67	.33	1.72
N Words Ungrouped	.22	.13	.15
Mean N Words per Group	1.48	.13	2.35

Note: All Ss, df = 145,1; Males, df = 74,1; Females, df = 70,1.

*p < .05.

**p < .01.

TABLE 10

ONE-WAY ANALYSIS OF VARIANCE: GOOD [AND] POOR READERS

Tests	F - Ratios		
	All Ss	Males	Females
Reading Comprehension	89.92**	51.39**	38.89**
I.Q.	245.76**	100.57**	155.41**
Equivalence Range			
Total N of Groups	6.52**	3.79*	2.58
N Words Ungrouped	.71	1.27	10.12**
Mean N Words per Group	3.71*	4.23*	.00

Note: All Ss, df = 128,1; Males, df = 67,1; Females df = 60,1.

*p < .05.

**p < .01.

TABLE 11

ONE-WAY ANALYSIS OF VARIANCE: AVERAGE [AND] POOR READERS

Tests	*F* - Ratios All Ss	Males	Females
Reading Comprehension	22.91**	11.31**	11.53**
I.Q.	66.78**	18.65**	65.57**
Equivalence Range:			
Total N of Groups	1.62	2.12	.02
N Words Ungrouped	.16	2.30	8.02**
Mean N Words per Group	.54	2.93	1.96

Note: All Ss, *df* = 130,1; Males, *df* = 68,1; Females, *df* = 61,1.

*$p \leq .05$.
**$p \leq .01$.

TABLE 12

STRESS VALUES FOR EUCLIDEAN REPRESENTATIONS:
GOOD, AVERAGE, POOR READERS

Dimensions	Good	Average	Poor
6	.213	.230	.224
5	.205	.269	.266
4	.295	.283	.312
3	.353	.414	.389
2	.463	.474	.482

TABLE 13

VARIMAX ROTATION ANALYSIS FOR GOOD READERS

Word	Correlation	Class Denominator
	Dimension 1 A	
ROWBOAT	.9654	Recreation--outdoor
CANOE	.9534	" "
SLED	.8982	" "
BASEBALL	.5800	" "
GOLF CLUB	.5646	" "
	Dimension 1 B	
PICTURE	-.7175	Recreation--indoor
BOOK	-.7079	" "
LETTER	-.5951	" "
	Dimension 2 A	
FORK	1.1037	Domestic--food preparation
CUP	1.0858	" " "
POT	1.0851	" " "
SPOON	1.0701	" " "
GLASS	.9154	" " "
STOVE	.8993	" " "
REFRIGERATOR	.7609	" " "
	Dimension 2 B	
PURSE	-1.0010	Domestic--wearing apparel
LIPSTICK	-.9804	" " "
COIN	-.9306	" " "
WALLET	-.9159	" " "

TABLE 13 (continued)

Dimension 2 B (continued)		
COMB	-.8831	Domestic--wearing apparel
HAT	-.8659	" " "
JACKET	-.8514	" " "
SHOE	-.8059	" " "
CIGARETTE	-.6233	" " "
Dimension 3 A		
TV SET	.8963	Media/Message-oriented
RADIO	.8631	" " "
TELEPHONE	.6459	" " "
Dimension 3 B		
SCREWDRIVER	-.9837	Tool/Job-oriented
HAMMER	-.9791	" " "
RAKE	-.9827	" " "
SCISSORS	-.7070	" " "
Dimension 4 A		
RUG	.7276	Living area-house
KEY	.7240	" " "
DOOR	.6843	" " "
WATCH	.6697	" " "
CHAIR	.6684	" " "

TABLE 13 (continued)

Dimension 4 B		
FLOWER	-.9833	Play area--garden
TREE	-.9772	" " "
TIRE	-.6435	" " "
ARROW	-.6415	" " "
PISTOL	-.5936	" " "
Dimension 5 A		
THREAD	.7892	Tasks--manual
HANGER	.6443	" "
PENCIL	.6198	" "
RULER	.6095	" "
Dimension 5 B		
CANDLE	-1.0828	Setting--time,lighting
LAMP	-1.0266	" " "
LAMP POST	- .9941	" " "
FLASHLIGHT	- .9271	" " "
CLOCK	- .6324	" " "

TABLE 14

VARIMAX ROTATION ANALYSIS FOR AVERAGE READERS

Word	Correlation	Class Denominator
	Dimension 1 A	
CANOE	1.1028	Recreation--outdoor
ROWBOAT	1.0940	" "
TIRE	.7075	" "
SLED	.6211	" "
	Dimension 1 B	
JACKET	-.8528	Domestic--wearing apparel
SHOE	-.8365	" " "
WATCH	-.7944	" " "
HANGER	-.7334	" " "
HAT	-.6912	" " "
	Dimension 2 A	
LAMP POST	.9870	Setting--media, lighting
LAMP	.9810	" " "
CANDLE	.9285	" " "
FLASHFIGHT	.8572	" " "
TELEPHONE	.5495	" " "
	Dimension 2 B	
PURSE	-.7262	Personal portables
COMB	-.6651	" "
LIPSTICK	-.6521	" "
COIN	-.5472	" "

TABLE 14 (continued)

Dimension 3 A		
WALLET	.8661	Not apparent
CIGARETTE	.7904	" "
THREAD	.6294	" "
Dimension 3 B		
SPOON	-.9528	Domestic--food preparation
CUP	-.9395	" " "
FORK	-.9389	" " "
POT	-.9038	" " "
REFRIGERATOR	-.8556	" " "
STOVE	-.8517	" " "
GLASS	-.8466	" " "
CLOCK	-.4964	
Dimension 4 A		
PISTOL	.8651	Play area--garden
ARROW	.8450	" " "
HAMMER	.7450	" " "
GOLF CLUB	.7241	" " "
SCREWDRIVER	.7092	" " "
BASEBALL	.6722	" " "
Dimension 4 B		
PICTURE	-.7714	Not apparent
CHAIR	-.6207	" "
Dimension 5 A		
RADIO	.8727	Media/Message--oriented
TV SET	.8143	" " "

TABLE 14 (continued)

Dimension 5 B		
SCISSORS	-1.0110	Tasks--manual
PENCIL	- .9920	" "
RULER	- .8190	" "
LETTER	- .8022	" "
BOOK	- .7426	" "
RAKE	- .5442	" "
Dimension 6 A		
RUG	.5820	Living area--house
DOOR	.5102	" " "
KEY	.4183	" " "
Dimension 6 B		
TREE	-1.0239	Landscape
FLOWER	- .9623	"

TABLE 15

VARIMAX ROTATION ANALYSIS FOR POOR READERS

Word	Correlation	Class Denominator
	Dimension 1 A	
CIGARETTE	.6916	Not apparent
COIN	.6532	" "
TIRE	.5858	" "
	Dimension 1 B	
CUP	-1.0527	Domestic--food preparation
FORK	-1.0344	" " "
SPOON	-1.0102	" " "
GLASS	- .9326	" " "
POT	- .9217	" " "
REFRIGERATOR	- .8978	" " "
STOVE	- .8637	" " "
CHAIR	- .5931	" " "
	Dimension 2 A	
SCREWDRIVER	1.0816	Tool/Job--oriented
HAMMER	1.0304	" " "
SCISSORS	.9681	" " "
RAKE	.8996	" " "
ARROW	.7911	" " "
	Dimension 2 B	
PURSE	- .8273	Not apparent
WALLET	- .8253	" "
COMB	- .5357	" "

TABLE 15 (continued)

Dimension 3 A		
BOOK	1.0182	Recreation--indoor
LETTER	1.0150	" "
PENCIL	.8343	" "
PICTURE	.8043	" "
RULER	.6006	" "
DOOR	.4858	" "
Dimension 3 B		
BASEBALL	- .9193	Recreation--outdoor
SLED	- .8917	" "
ROWBOAT	- .8848	" "
GOLF CLUB	- .8644	" "
CANOE	- .8134	" "
Dimension 4 A		
(None)		
Dimension 4 B		
TV SET	- .8880	Media/Message--oriented
RADIO	- .8613	" " "
WATCH	- .8417	" " "
TELEPHONE	- .7696	" " "
CLOCK	- .7385	" " "
Dimension 5 A		
JACKET	.9994	Domestic--wearing apparel
HAT	.9391	" " "
SHOE	.8297	" " "
LIPSTICK	.5988	" " "

TABLE 15 (continued)

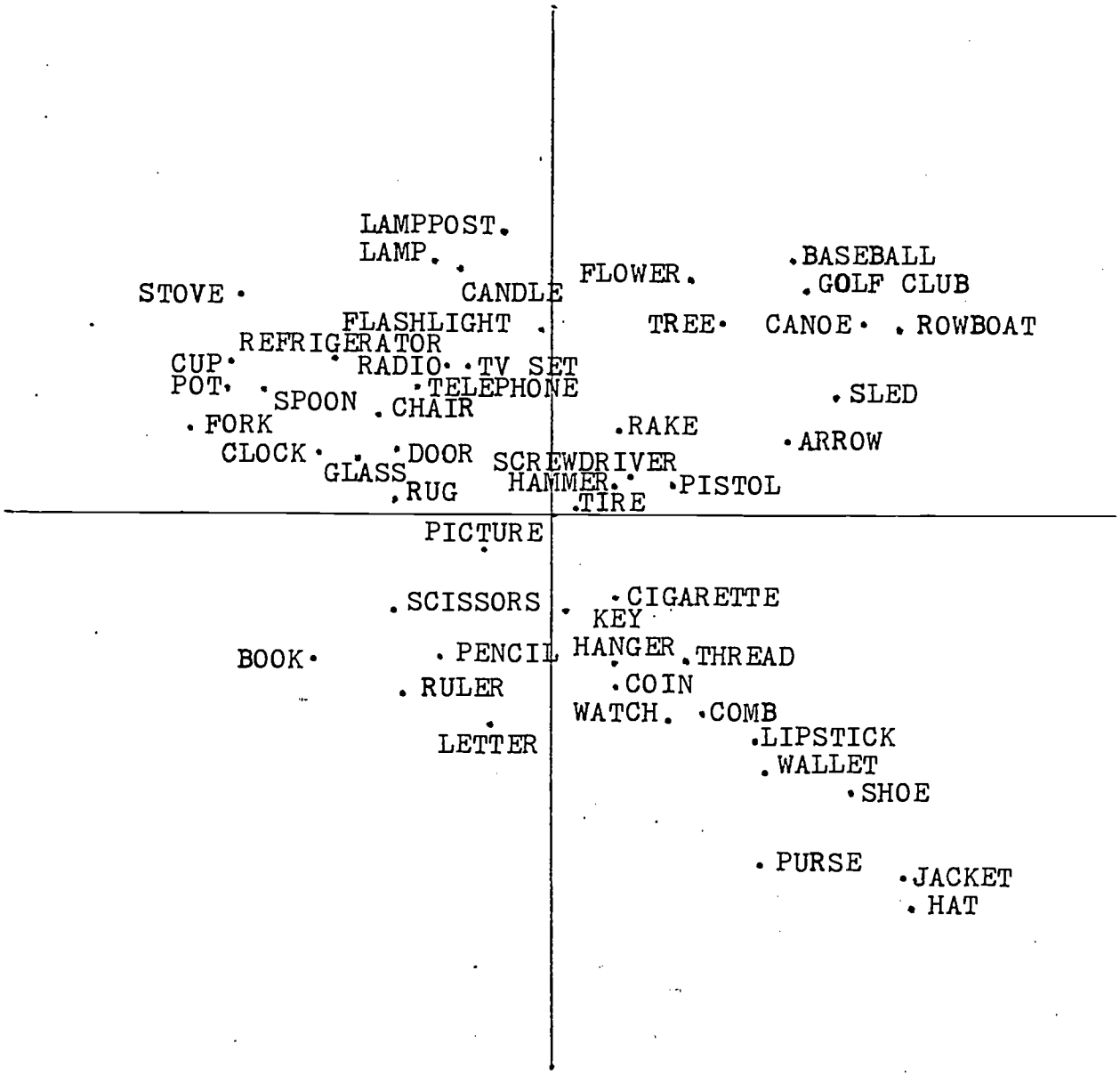
Dimension 5 B		
FLASHLIGHT	-1.0067	Setting--lighting
CANDLE	- .9899	" "
LAMP POST	- .9744	" "
LAMP	- .9682	" "
Dimension 6 A		
THREAD	.6545	Living area--house
KEY	.6175	" " "
RUG	.5422	" " "
HANGER	.5420	" " "
Dimension 6 B		
TREE	-1.0516	Landscape
FLOWER	- .9409	"
PISTOL	- .7329	"

Figure Captions

Figure 1. Plot of two-dimensional configuration (multidimensional scaling map) of words and locations of words-for-objects, for good readers.

Figure 2. Plot of two-dimensional configuration (multidimensional scaling map) of words and locations of words-for-objects, for average readers.

Figure 3. Plot of two-dimensional configuration (multidimensional scaling map) of words and locations of words-for-objects, for poor readers.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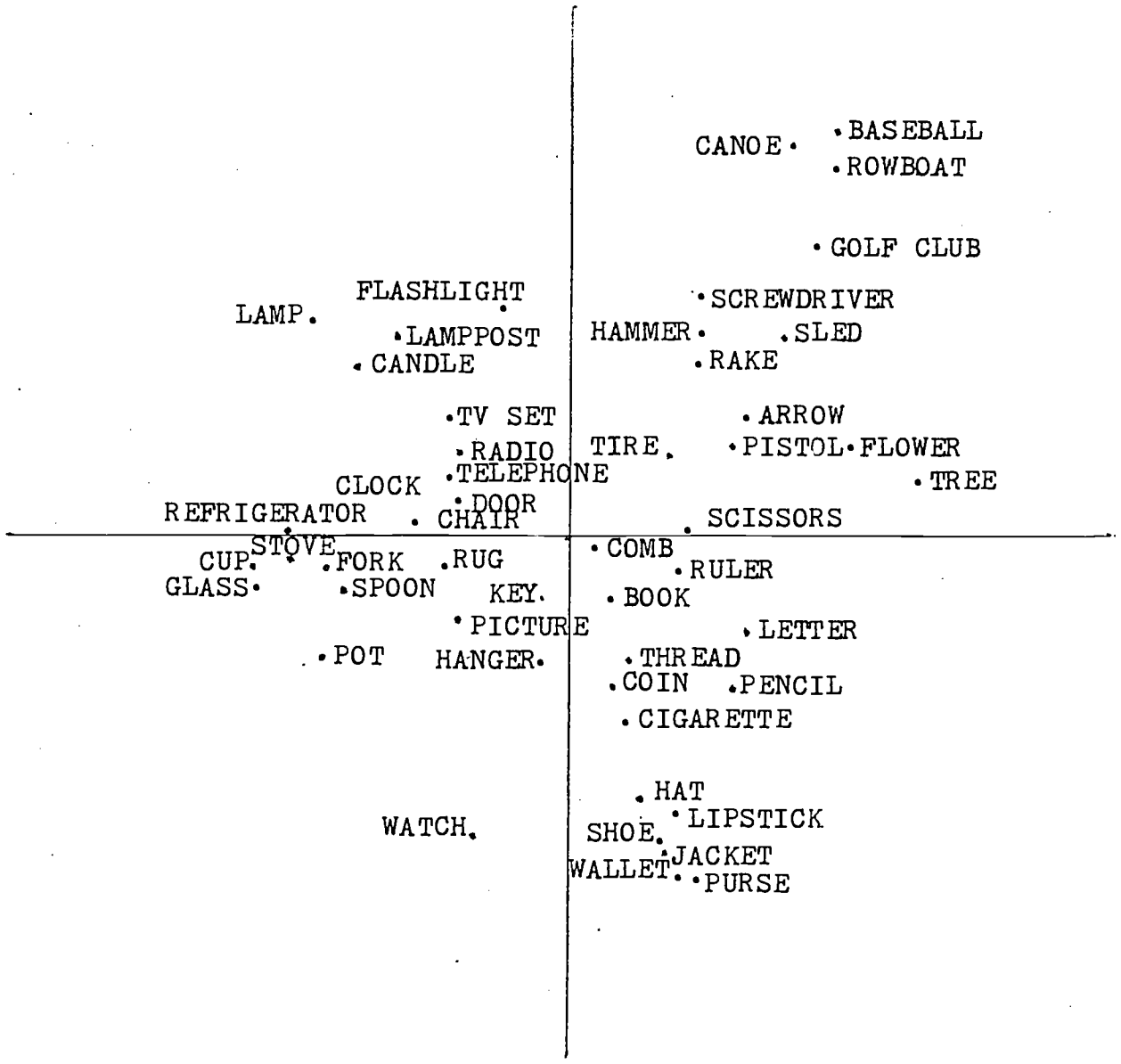
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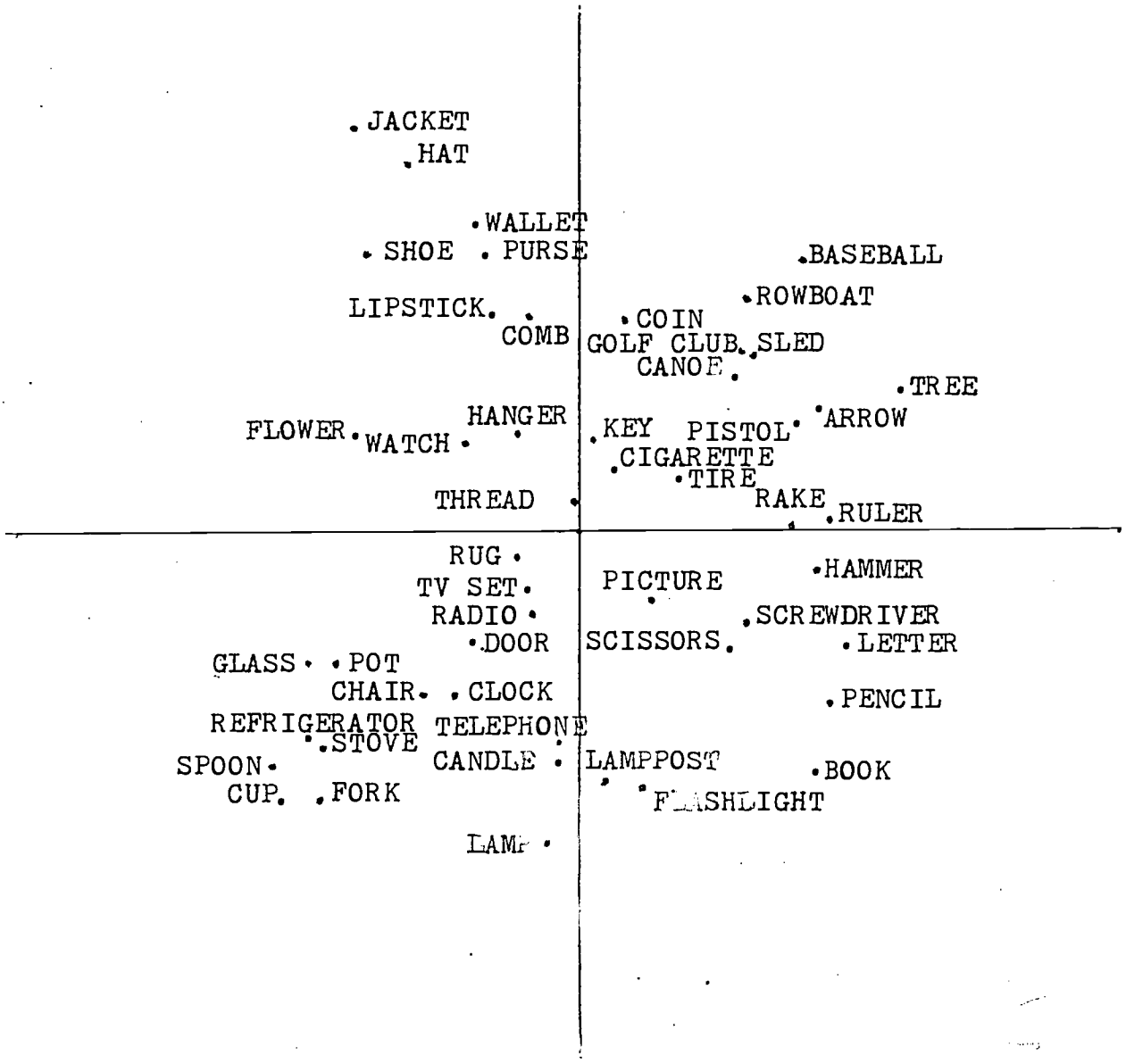
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