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ARE PERCEPTUAL SKILLS NECESSARY FOR SUCCESS IN READING? WHICH ONES?

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Numerous reading and reading readiness programs have been made available to teachers over the years, constructed on the assumption that certain auditory and visual perceptual skills are prerequisites to successful achievement in academics, particularly reading. Many educators have suggested that children who have been labeled learning or reading disabled demonstrate deficits at the perceptual level. In fact, many of those who have been instrumental in the field of learning disabilities have suggested that all learning disabled children have perceptual processing problems and that these perceptual problems are at the root of their learning disabilities (Barsch 1965; Cruickshank, 1977; Frostig, 1970; Getman, 1965; Kephart, 1960; Wepman, 1974).

Two important questions, however, must be raised and answered before the reading specialist can design an educational program for each child for whom she/he is responsible. Are perceptual skills necessary for success in reading? If so, to which perceptual skills is reading success most strongly related? Recently many educators have begun to seriously question previously held assumptions that particular auditory and visual perceptual skills are prerequisites for mastering reading and that deficiencies in these skills may actually cause reading failure (e.g., Bateman, 1964, perceptual and perceptual-motor integration, spatial orientation, body image, and coordination; Bonsail & Dornbush, 1969, visual discrimination; Dornbush & Basow, 1970, auditory and visual short-term memory; Hammill & Larsen, 1974, auditory discrimination, sound blending, auditory memory and auditory-visual integration; Hare, 1977, auditory discrimination, spatial relations, visual memory and auditory-visual integration; Sears, 1970, sound blending and visual closure; Hammill, Larsen, Parker, Bagley, & Sanford, Note 1, visual discrimination, visual memory, and auditory-visual integration).

Just what does all this mean to the reading specialist? It is the reading specialist who needs to make sense of all this information and who needs to decide what educational program to provide for each youngster assigned to him/her for instruction. Therefore, it is important that the reading specialist be familiar with the most recent research findings and the educational implications of these findings. What follows is a brief review of these findings and the presentation of the results of a study recently completed by the author which shed light on two very important questions

frequently asked by reading specialists—(1) Are perceptual skills necessary for success in reading? (2) If so, to which perceptual skills is reading success most strongly related?

A review of correlational studies which explored the relationship of auditory and visual perceptual skills to school achievement in general and to reading in particular have caused many educators to question the practical relevance of the reported correlation coefficients between numerous measures perceptual functioning and reading achievement. Hammill & Larsen (1974) reviewed 33 studies which explored the relationship of word recognition and reading comprehension to measures of auditory discrimination, memory, blending, and auditory-visual integration. They found that a large percentage of children who performed well on tests of auditory perception experienced difficulty in learning to read and an equally sizeable percentage who did poorly on these same tests had no problems in reading. They concluded that these auditory perceptual skills, as measured in the studies they reviewed, do not appear to be sufficiently related to reading to be particularly useful for school practices. It should be noted that only seven of these studies controlled for the influence of intelligence in correlating auditory perceptual skills and reading achievement.

Larsen and Hammill (1975) reviewed 60 studies which used correlational procedures to explore the relationship between visual perceptual skills (i.e., visual discrimination, visual memory, spatial relations, and visual-auditory integration) and reading, arithmetic, and spelling. They concluded that there is little support for the widespread belief that visual perceptual skills are essential for academic achievement. Apparently a large percentage of children who did adequately on tests of visual perception experienced difficulty in school and an equally large percentage who did poorly on these same tests exhibited no problems in academic achievement. In only six of these studies did the investigators control for the influence of intelligence.

However, the picture is not all that clear. Others who focused on particular perceptual skills found different results. Richardson, DiBenedetto, and Bradley (1977) reviewed 13 studies which focused specifically on sound blending and its relationship to reading achievement. Sound blending is of particular interest since it has been suggested as a component of the decoding process (Richardson & Bradley, 1974). Richardson et al. concluded that there is a moderate relationship between sound blending and reading achievement. Intelligence was controlled for in only two of the studies reviewed. Rosner & Simon (1971) also studied the relationship between sound blending and reading achievement and found moderate correlation coefficients in primary grade subjects after the effects of intelligence were partialled out.

While the majority of older studies did not adequately account for the variable of intelligence, more recently researchers have recognized the need to partial out or at least consider the effect of confounding variables when studying the relationship between perceptual skills and academic per-

formance. Hammill et al. (Note 1) studied the relationship of various auditory and visual perceptual skills (i.e., auditory and visual discrimination, auditory and visual sequential memory, auditory and visual association, and auditory-visual integration) and work recognition and reading comprehension in first grade subjects. Using the .35 cut off point for practical significance, they found that, when intelligence was controlled for, only two skills (auditory discrimination and auditory sequential memory) reached significance with work recognition and two (auditory discrimination and auditory association) with reading comprehension.

Peck (1977) studied the relationship between auditory discrimination, memory, and sequential memory, and visual discrimination, memory, and spatial orientation and reading achievement (vocabulary and comprehension) in reading disabled youngsters, ages 7 to 9, whose measured intelligence was equal to or greater than 80. She found "small but significant relationships" (p. 2050) between all of the perceptual skills measured except spatial orientation and reading comprehension and between all but auditory memory and auditory sequential memory and reading vocabulary. Significant correlations ranged from .22 to .36, with only one coefficient, that between auditory memory and reading comprehension, falling at or above .35.

The consensus of the correlational research reviewed suggests that many auditory and visual perceptual skills, as measured, are not sufficiently related to reading to be educationally meaningful. The exceptions appear to be auditory, rather than visual, perceptual skills (i.e., sound blending, auditory discrimination, and auditory memory). Yet, research findings are still far from conclusive as to what specific perceptual components are important to the reading process. It should be recognized that whenever a large body of research is summarized, certain important differences among studies are lost. Variables which may be significant, yet lost in summarization, include: characteristics of subjects (i.e., chronological age, intelligence, school placement, achieving vs. nonachieving, and background), size of sample, test instruments utilized for assessing perceptual academic skills, and the cut off point set for significance.

This author investigated the relationship of four perceptual and perceptual-motor skills (i.e., visual perception, visual-perceptual integration, sound blending, and visual closure) to two measures of reading achievement (i.e., word recognition and reading comprehension) in normal and learning disabled children. Their perceptual skills were selected for study because of the contradictory research findings to date. Separate analyses were conducted for the normal and learning disabled groups in order to determine whether the relationship between perceptual skills and reading achievement differed in the two groups.

METHOD

Sample

Subjects selected for participation in this study were 55 children identified as learning disabled according to prevailing guidelines and 54

normal children. Learning disabled subjects were selected according to the following criteria: (1) they evidence an academic deficit sufficient to warrant special educational services, (2) they obtained intelligence quotients in the average or above average range, (3) they do not have physical, sensory, or primary emotional problems, and (4) they are age peers of second graders. Mean chronological age for the learning disabled subjects was 91 months and mean IQ was 99.19. Normal subjects were randomly selected from the same classes and/or schools as the learning disabled subjects according to the following criteria: (1) they had no record of academic or emotional problems, (2) they obtained intelligence quotients in the average or above average range, and (3) they were in second grade. Mean chronological age for the normal subjects was 89 months and mean IQ was 113.64.

Children of second grade age were selected for this study because research findings suggest that perceptual deficits are most noticeable when children are learning to read. After age eight, average readers have developed an adequate level of perceptual skills or have learned to compensate for their perceptual deficits (Peck, 1977).

Procedure

Each subject was tested individually between late October and early December. Four perceptual and two reading tasks were administered to each subject. The order of presentation remained constant for all subjects.

Perceptual Tasks

The following test instruments were used to measure perception. The Motor-Free Visual Perception Test (MFVPT) (Colarusso & Hammill, 1972) was used because it assesses visual perception without involving motor ability. The Developmental Test of Visual-Motor Integration (VMI) (Berry & Buktenica, 1967) was selected for use because it is a measure of the degree to which visual perception and motor behavior are integrated, in contrast to the MFVPT. The Sound Blending and Visual Closure subtests of the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, & Kirk, 1968) were used to measure sound blending and visual closure, respectively.

These perceptual skills were chosen for study because research thus far has yielded contradictory evidence concerning the degree of relationship of these skills to reading. Some researchers (e.g., Busby & Hurd, 1968; Rosen, 1965; Wendell, 1973) have argued that there is a strong relationship between visual perceptual and/or visual-motor integration skills and reading, while others (e.g., Bateman, 1964; Hammill, 1972; Larsen & Hammill, 1975) found little or no evidence of such a relationship. Likewise, some researchers have reported moderate correlations between sound blending and reading (Chall, Roswell, & Blumenthal, 1963; Golden & Steiner, 1969; Hare, 1977; Macione, 1970; Rosner & Simon, 1971), while others found little relationship between reading performance and skill in sound blending (Larsen, Rogers, & Sowell, 1976; Sears, 1970). Similarly, conflicting evidence exists for the relationship between visual closure and

reading. Macione (1970) reported that disabled and nondisabled readers scored significantly differently on the Visual Closure subtest of the ITPA, while Golden and Steiner (1969) and Sears (1970) found that good and poor readers did not perform significantly differently on the same subtest.

Reading Tasks

Reading performance was measured by the Reading Recognition (RR) and Reading Comprehension (RC) subtests of the Peabody Individual Achievement Test (PIAT) (Dunn & Mackwardt, 1970). Separate measures were used for recognition and comprehension in order to determine whether the perceptual skills studied were more strongly related to one of the reading skills than to the other. (E.g., sound blending has been found to be more strongly related to word analysis skills than to oral reading or than to silent reading [Chall et al., 1963; McNinch & Richmond, 1972].)

RESULTS

The data were subjected to second order partial correlational analysis in order to hold intelligence test score and chronological age constant. The results are presented in Table 1. In interpreting correlation coefficients, Guilford (1956) suggests that correlation coefficients ranging from .3 to .8 represent "the level of validity coefficients usually found useful predictive instruments in psychology and educational practice" (p. 378). Garrett (1954), on the other hand, suggests that only coefficients of .4 or above are useful, as lesser values denote negligible or at best slight relationships. For the purposes of this study, .35 was used as the cut off point between coefficients with practical significance and those without.

Examination of Table 1 reveals a striking difference between the normal and learning disabled groups. Six of the eight coefficients reached statistical significance for the normal group, with three, MFVPT and SB with RR and MFVPT with RC, exceeding the .35 cut off point established. Only two of the eight coefficients reached statistical significance for the learning disabled group, with none reaching .35.

DISCUSSION

For the sample studied, the selected perceptual skills were more highly related to reading achievement in the normal subjects than in the learning disabled subjects. However, even in the normal subjects, only three coefficients reached the established significance level. These coefficients represented the relationship between sound blending and reading recognition. None of the coefficients for the learning disabled group reached the established level of significance. Of particular interest is the finding that the correlations between the MFVPT and both measures of reading exceeded the .35 cut off for the normal group but were negligible for the learning disabled group. The degree correlation found for the normal group is consistent with the coefficients between the MFVPT and measures of school performance in normal children reported by Colarusso and Hammill (1972). The negligible coefficients obtained for the learning

TABLE 1

Correlation Coefficients with Intelligence Test Score and
Chronological Age Partialled Out

Measures correlated	group			
	<i>r</i>	Normal <i>p</i>	Learning disabled <i>r</i>	<i>p</i>
MFVPT with RR	.36	.005	.10	NS
VMI with RR	.16	NS	.24	.05
SB with RR	.38	.005	.31	.025
VC with RR	.21	NS	-.02	NS
MFVPT with RC	.37	.005	-.06	NS
VMI with RC	.28	.025	.15	NS
SB with RC	.34	.01	-.04	NS
VC with RC	.34	.01	.12	NS

MFVPT	=	Motor-Free Visual Perception Test
VMI	=	Developmental Test of Visual-Motor Integration
SB	=	Sound Blending (ITPA)
VC	=	Visual Closure (ITPA)
RR	=	Reading Recognition (PIAT)
RC	=	Reading Comprehension (PIAT)
NS	=	Not significant

disabled group raises serious questions in light of past and present assumptions of the relationship between visual perception and reading. The coefficients between visual-motor integration and both measures of reading did not reach the established significance level for either group, again raising questions in light of assumptions frequently found in the literature.

Also of interest is the finding that the correlations between sound blending and reading recognition exceeded the established significance level for the normal group only. This finding is consistent with previous findings (Chall et al., 1963; Golden and Steiner, 1969; Hare, 1977; Macione, 1970; Richardson et al., 1977, & Rosner and Simons, 1971) that sound blending is significantly related to reading and is of importance in light of the suggestion that sound blending is a component part of the decoding process. These findings also support the view that sound blending is more highly related to word analysis skills and oral reading than to silent reading. That the relationship between sound blending and reading

recognition did not reach the established significance level for the learning disabled group is surprising in light of previous research. The fact that the relationship between sound blending and reading comprehension was negligible for the learning disabled group is somewhat puzzling, although research has shown sound blending to be less highly related to silent reading than to word analysis skills or oral reading.

None of the correlations between visual closure and reading performance for either group reached the established level of significance, again questioning the assumptions frequently found in the literature regarding the relationship between those variables.

This author's findings do not support the view that deficits in the perceptual skills investigated are highly related to reading performance in learning disabled children. These findings, of course, are limited to the perceptual skills studied in this investigation and to subjects of similar chronological age. No inferences should be made to subjects of different ages or to other perceptual skills. Perhaps certain perceptual skills are more strongly related to the academic difficulties learning disabled children frequently experience. However, when the results of this study are analyzed in conjunction with previous research, one is left with a growing body of evidence which suggests that numerous perceptual skills, as measured, are not necessarily requisite for success in reading. Perhaps a minimal level of perceptual processing is necessary but that subjects in these studies have all exceeded that minimal level. Also to be considered, of course, are the skills measured in these studies and the assessment instruments used to measure these skills. The accuracy of the results cannot exceed the accuracy of the instruments used to measure performance in the first place. Difficulties related to many learning or reading disabled children's poor reading performance might also be in totally different areas such as teacher expectancy, social interaction patterns within the classroom, and language skills. The possibility that the learning or reading disabled subjects in the present study have already learned to compensate for their perceptual deficits cannot be totally dismissed, however, the mean chronological age for learning disabled group was only 91 months.

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