

Dyslexia in Fifth-Grade Girls: Personality and Perceptual Factors

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Personality and perceptual factors in dyslexia were studied in 60 dyslexic readers and 60 nondyslexic readers. There were no significant differences between dyslexic and nondyslexic readers or between boys and girls on the Minnesota Self-Esteem Scale or the Luft Locus of Control Scale. In contrast to nondyslexic children, children with dyslexia displayed significantly fewer perceptual shifts on the Necker Cube, significantly more distractibility by extraneous cues on the Stroop Color-Word procedure, and more difficulty identifying words from minimal cues on the Seventh Carbon procedure. There were no sex differences on the perceptual measures.

Dyslexia is a common learning disability that has a profound effect on an estimated 7 million children in the United States (Blither, 1994). Many children grow to adulthood with it and cannot overcome it regardless of what they do. Some continue to further their education despite this obvious disadvantage. As many as 3% of college students are dyslexic (Lauber, 1992). Dyslexia has been linked to personality factors and to perceptual deficits (Shasta & Kovich, 1992). Some of these are of particular interest in the present investigation.

Personality

Self-esteem

Krantz and Trilby (1991) asserted that dyslexic children often have one or more overpowering parents whom they can never please enough. Their lowered self-esteem leads them to believe that they will not be able to learn or to keep up with other children. This becomes a self-fulfilling prophecy when they get to the point where the mastery of reading becomes essential for further progress. This peaks in the fifth grade (Ekkles, 1975) and appears to be a

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NOTE: This is a fictional article to be used only for purposes of research education.

problem particularly for young girls. Narwhal (1992) speculated that boys have more diversified avenues for establishing a positive self-image than do girls.

Locus of Control

According to Mason and Mitchell (1989), dyslexic individuals typically have an external locus of control. Their domineering parent(s) make them feel that they are powerless to determine their own destiny, including the mastery of the mystery of the meaning of printed symbols.

Perceptual Factors

Shifting Mental Set

Mastery of reading requires an assortment of perceptual skills. One of them is the ability to shift mental set when encountering letters and letter combinations in one word that are pronounced differently when seen in other words. For example, *most-lost* and *rough-dough* are combinations that look alike but sound different. *Fluff-tough*, *graph-laugh*, and *ghost-toast* are examples of pairs that look different but sound alike. To add to the confusion, the letters *b* and *d* and words like *look* and *took* not only resemble each other, but sound similar as well. The fluent reader has to shift set rapidly to be able to make out the meaning of visually per-

ceived words that are not familiar to the ear (*couch* read as *cutch* in order to be consistent with the way the word *touch* is pronounced) or to accommodate words that are familiar but which do not fit the context of the sentence (*couch* read as *coach*).

Extraneous Cues

Another perceptual factor that is important for reading is the ability to shut out extraneous cues so as to keep attention focused exclusively on the specific task at hand. Delft (1986) has shown how easy it is to be influenced, misled, or distracted by irrelevancies. Distracters can take many forms. Some, such as competing auditory or visual stimuli, are external but can have an effect, as demonstrated by Perls and Nicholas (1989). Others, of especial interest here, are intrinsic to the words being read. An example of this is the visual conflict created when one is asked to read the word *red* printed in green ink (the Stroop effect).

Minimal Cues

Another perceptual skill that is necessary for rapid, fluent reading, according to Hofheimer and Schmidt (1993), is the ability to perceive a meaningful whole from minimal cues. Good readers can take in at a glance a combination of letters that make up a word, or a combination of words that comprise a sentence, without having to pore over each letter and decipher the sound for which it stands. Good readers make rapid saccadic eye movements as they pass back and forth over the text (Benjamin, 1906), but they do not have to examine each letter combination and word as poor readers are obliged to do. Good readers are able to "get" a word with minimal cues. As Gruno (1992) has shown, good readers can make out words that baffle dyslexic individuals when the words are presented tachistoscopically.

To summarize, the present study aims to demonstrate that two personality measures, self-esteem and locus of control, are associated with dyslexia in fifth-grade girls, as are three different perceptual skills. It is hypothesized that nondyslexic readers do significantly better than dyslexic readers on all five of the measures that have been selected to tap these vari-

ables and that the differences are exaggerated in girls.

Method

Participants

Participants in this study were 30 girls and 30 boys with dyslexia and 30 girls and 30 boys who were not dyslexic. All were in the fifth grade. Dyslexic students were identified as having reading problems by their teachers and had been referred to the remedial reading program in the school. The judgment of the classroom teacher was confirmed by reading specialists who conducted individual assessments. All participants were classified as having moderate to severe dyslexia. The students came from six elementary schools in an urban school system, and the research was carried out over a 3-year period. The study was conducted with the approval and cooperation of the school board, the superintendent, the six principals, and the teachers who released children from class for study purposes. The parents of all participants signed an informed consent form, and no child who did not wish to participate was included. Children in the study signed an assent form. All participants were given an attractive box of mixed candies as a reward for participating.

Students were matched in quadruplets for age, grade, nonverbal IQ, and ethnicity. A quadruplet consisted of two girls, one of whom was dyslexic, and two boys, one of whom was dyslexic. The matching procedure assured equivalence on these critical variables. All schools were in comparable neighborhoods, so equivalence of socioeconomic status for the four groups was assumed. Only native-born children for whom English was the first language were included.

A total of 16 children had to be excluded from the study sample because they did not fall into one of the 30 matched quadruplets. The final sample was 48% Caucasian, 24% African American, 21% Latin American, and 7% other.

Procedure

All children had been administered a nonverbal IQ test in the second grade. These scores were used for matching purposes. The follow-

ing measures were administered by the investigators to participants in three individual meetings over a 3-week period.

Minnesota Self-Esteem Scale. This scale is a paper-and-pencil questionnaire that was standardized on a broad sample of preteenagers. It has good convergent validity, with established correlation coefficients of .78 and .74 with the Tennessee Self-Concept Scale and with the Harter Self-Perception Profile for Children, respectively. Correlation with teacher judgments is .61. Its test-retest reliability is reported as .79. Scores are scaled from 0 to 100.

Luft Locus of Control Scale. This questionnaire was devised for children and was standardized on a large sample of elementary-school children. Its correlation with the Rotter Locus of Control Scale is .75. The scale's scores range from 0 to 50, with scores at the lower end representing internal locus of control and scores at the higher end signifying external locus of control.

Necker Cube. The Necker Cube has a long history of use in perceptual research. It is a line drawing of an open-faced cube. Lines that would ordinarily be hidden are drawn in the same way as the ordinarily visible lines. When people fixate their gaze on it, the cube flips in appearance, and the inner lines appear to become the outer borders. It shifts back and forth as one continues to look at it. In this study, the instructions were to look at the cube and to signal every time that it changed form by pressing a button on a beeper device. The researcher counted and recorded the beeps over a 3-min period. This procedure was used to measure the children's ability to shift mental set.

Stroop Color-Word Test (Modified). The Stroop Color-Word Test (Stroop, 1935) consists of a list of color names printed in colors that do not correspond to the words. This conflict interferes with efficient naming of the colors. A number of different versions of this procedure have been used. For this study, lists of five columns, each of 10 words, were printed on standard $8\frac{1}{2} \times 11$ white paper pages. The words *BLACK*, *RED*, and *GREEN* were spread throughout the columns. The distribution was random with the exception that no word was duplicated by the

word that immediately preceded it. The words were printed either in black, red, or green, and in no instance did the print color match the name of the word. Thus, *RED* was printed in green or black, *BLACK* in red or green, and *GREEN* in black or red. In the first viewing, the children were instructed to go down the columns as quickly as possible, ignoring the word and just naming the color. In the second administration, they were instructed to ignore the color and read the words. Score was the number of errors made. In a pretest of this procedure with 50 other children, a test-retest reliability of $r = .76$ was obtained after a 2-week interval. This color-word naming procedure was used to test children's ability to shut out extraneous stimuli.

Seventh Carbon Technique. The Seventh Carbon technique was used to assess the ability of the students' to identify words from minimal cues. Twenty 4-letter words were typed on a manual Remington typewriter. The top sheet was regular bond paper, followed by seven sheets of carbon paper alternating with sheets of onion skin copypaper. The copies become increasingly fuzzy as the copies get farther from the original sheet. The seventh sheet is barely legible to some people, but others are able to make use of the minimal cues available and can identify some or all of the words. If the series is extended, the tenth carbon yields symbols that are so fuzzy that they are not at all identifiable. The procedure has been used for various purposes in a number of research projects (Nicholson, 1985), and it is reported to be of satisfactory reliability.

Results

Personality measures data were analyzed in five 2×2 analyses of variance, one for each variable, and by logistic regression analysis.

Self-Esteem

Contrary to the hypotheses, there was no significant difference between the dyslexic students ($M = 48$) and the nondyslexic students ($M = 52$) on the Minnesota Self-Esteem Scale, $F(1, 116) = 1.21, ns$ (see Table 1). The self-

Table 1
Scores of Dyslexic and Nondyslexic Students on Five Variables

Variable and Sex	Dyslexia		Nondyslexia		Total
	M	SD	M	SD	
Self-esteem					
Girls	47.0	20.3	51.0	10.1	49.0
Boys	49.0	27.6	53.0	11.7	51.0
M	48.0		52.0		
Locus of control					
Girls	34.0	18.6	32.0	9.2	33.0
Boys	38.0	24.3	38.0	8.9	38.0
M	36.0		35.0		
Necker cube					
Girls	10.0	4.1	18.0	3.9	14.0
Boys	8.0	3.7	16.0	3.8	12.0
M	9.0		17.0		
Stroop color-word					
Girls	12.0	3.1	6.0	2.2	9.0
Boys	16.0	3.4	8.0	2.9	12.0
M	14.0		7.0		
7th carbon					
Girls	5.0	2.2	11.0	3.6	8.0
Boys	3.0	2.1	10.0	3.2	7.0
M	4.0		11.0		

Note. All means have been rounded.

esteem of the girls ($M = 49$) did not differ from that of the boys ($M = 51$), $F(1, 116) = 1.32$, *ns*. Means and standard deviations are shown in Table 1. Logistic regression showed that self-esteem did not discriminate between the dyslexic and nondyslexic groups or between the sexes.

Luft Locus of Control

The Luft Locus of Control score for the dyslexic students ($M = 36$) was essentially the same as that of the nondyslexic students ($M = 35$), $F(1, 116) < 1$, *ns*. The means for boys and girls were 38 and 33, respectively, $F(1, 116) = 1.94$, *ns*. Locus of control did not discriminate between dyslexic and nondyslexic students or between the genders (Table 1).

Necker Cube

As predicted, the dyslexic children displayed a significantly smaller ($M = 9$) number of perceptual shifts than did the nondyslexic children ($M = 17$), $F(1, 116) = 4.12$, $p < .05$. There were no gender differences, $F(1, 116) = 1.03$, *ns*, or interactions, $F(1, 116) < 1$, *ns*. As shown in the

logistic regression summary in Table 1, performance on the Necker Cube discriminated significantly between the dyslexic and nondyslexic groups.

Stroop Color-Word

The mean for the dyslexic students ($M = 14$) significantly exceeded that of the nondyslexic students ($M = 7$), $F(1, 116) = 4.11$, $p < .05$, indicating a greater degree of distractibility by extraneous cues by the dyslexic students. There was no significant sex effect, $F(1, 116) < 1$, *ns*, or interaction, $F(1, 116) < 1$, *ns*. The color-word procedure was a significant discriminator between the two reading groups (see Table 1).

Seventh Carbon

In support of the hypothesis, the dyslexic children had more difficulty identifying words from minimal cues ($M = 4$) in contrast to the nondyslexic children ($M = 11$), $F(1, 116) = 4.15$, $p < .05$. As with the other variables, there was no difference between girls and boys, $F(1, 116) < 1$, *ns*, and there was no interaction, $F(1, 116) < 1$, *ns*. Logistic regression confirmed the finding that ability to identify words from minimal cues significantly discriminates between the two reading groups (Table 2).

Discussion

It is apparent from the results of this study that the personality variables of self-esteem and locus of control do not discriminate between any of the groups, whereas the three perceptual measures significantly discriminate between

Table 2
Logistic Regression Summary Table of *p* Values of Discriminators Between Groups

Variable	Dyslexic vs. Nondyslexic	Girls vs. Boys
Self-Esteem	.52	.75
Locus of Control	.49	.73
Necker Cube	.01	.71
Stroop Color-Word	.05	.71
Seventh Carbon	.05	.82

children who have reading difficulty and those who do not. It seems likely that the personality measures did not discriminate because of some weakness in the measuring devices that were used. Although the Minnesota Self-Esteem Scale and the Luft Locus of Control Scale are supposed to be valid with preteenage children, it is possible that the children in this particular research sample were too young and too homogeneous for the scales to show the kind of discriminatory power that was anticipated. The possibility also must be entertained that personality factors do not, in fact, loom as large in reading disabilities as was heretofore believed. Further research with alternative measures on children of different ages is certainly warranted.

In sharp contrast to the failure of personality factors to discriminate, the consistent results on the three perceptual variables places renewed emphasis on the importance of basic perceptual processes to reading skill. The three perceptual processes that were the focus of this study had to do with the abilities to shift mental set, to shut out extraneous visual cues, and to recognize visual stimuli on the basis of minimal visual cues. This does not imply that the perceptual deficiencies of dyslexic children are limited to these three, but we have presented solid evidence that at least those that we studied are involved.

The findings have interesting implications for remedial work. Although it is premature to report any details, we are already striving to develop remedial procedures for improving the ability of children to shift mental set, to devise training methods for enhancing the ability to

shut out extraneous cues, and to discover ways of teaching children how to identify stimuli that have reduced cues. Once these techniques have been fully developed and field tested, they will be subjected to rigorous research appraisal and reported.

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