DOCUMENT RESUME

ED 034 651 RE 002 298

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TITLE Reading Retardation: I. Psychiatric and Sociologic Aspects.
PUB DATE Feb 66
NOTE 23p.
JOURNAL CIT Pediatrics; v37 n2 Feb 1966

EDRS PRICE EDRS Price MF-$0.25 HC-$1.25
DESCRIPTORS Cognitive Development, Curriculum Development, *Disadvantaged Schools, Health Programs, *Illiteracy, Intelligence, Low Motivation, Physical Health, *Psychological Needs, *Reading Failure, Sensory Deprivation, Teaching Quality, Urban Schools

ABSTRACT

Noting the need for action to alleviate the illitaracy which handicaps half of the world's population and 11 percent of America's, it was emphasized (1) that the problem is particularly intense in urban schools where failure rates and nonreaders run from two-thirds to 50 times higher than in other schools; (2) that the percentage of retarded readers among Negroes is twice that of the national average; and (3) that retarded readers are twice as prevalent among boys as among girls. Defects in teaching were related to attendance problems, the inequality of schools, poor methods, and large classes as well as to poor teaching. It was noted that environmental factors often deprive children from exposure to cognitive stimulations such as complex speech patterns and vocabulary and from motivating encouragement and rewards in the school, the home, and the community. Psychophysiological factors listed as detrimental included poor health, sensory defects, intellectual defects, brain injuries, and special reading disabilities. It was concluded that pediatricians can show their concern by promoting maternal and child health programs, health and education programs for the preschool child, and revised school curricula and classroom conditions. Tables and a bibliography are included. (BT)

READING REDARDATION: I. PSYCHIATRIC AND SOCIOLOGIC ASPECTS*

LEON EISENBERG, M.D.

The modern species of the genus Homo has been christened variously: sapiens, the wise; faber, the tool-maker; loquens, the speaker; but man's most extraordinary accomplishment warrants the epithet: Homo scribens et legens, man the writer and reader. Contemporary man, wherever he has been found and whatever his state of culture, has possessed a spoken language; every language thus far encountered has been complex and sophisticated. The origins of the faculty of speech are lost in antiquity. It can be deduced confidently that Cro-Magnon man, who lived from 25,000 to 10,00 years ago, possessed language; his fabrication of tools, his ceremonial burials, and, most of all, his cave paintings, all bespeak the necessary level of conceptualization. It seems not unreasonable to suppose that Neanderthal man, the maker of stone tools and of fire, knowledgeable enough to cook his food, a man with a cranial capacity in no wise inferior to our own and with endocranial makings indicative of frontal and parietal lobe differentiation, may have possessed the gift of tongues as long as 50,000 years ago.[1] The invention of writing, on the other hand, dates no earlier than the fourth millenium before Christ.

Consider the exponential rate of development of society in the 5,000 years since written language as against the limited progress in the 50,000 years of spoken language that preceded it. True, technological advances other than literacy have been catalysts of this revolutionary transformation but few are the advances that have not been mediated by written symbols. The magnificence of this accomplishment transcends the creature comforts it has enabled man to attain. The ability to read makes available to the least of men direct commerce with the great minds of all times. It opens vistas of sensitivity and understanding that liberate men from the parochialism of individual experience. Reading of our brothers half a globe away cannot but quicken the pulse of our common humanity. Writing confers immortality; the fame of Ozymandias may crumble with the decay of his colossal monument, but time does not dim the poet's luster.

*Pediatrica, Vol. 37, No. 2, February 1966

Yet today fully half the world's adults are wholly illiterate and not one-third are "functionally" literate by the criterion of a fourth grade reading level.[2] By that standard in 1956, 11% of U.S. citizens could not read, the proportions varying by states from 3.9 to 28.7%.[3] This is a measure of our failure and their failure, for to them are denied the riches of literature and the necessities of life. Employability is increasingly contingent upon literacy; those who fail to learn to read today will be the disadvantaged of tomorrow, impoverished in body and in soul. Clearly, then, just as the pediatrician concerns himself with the correction of physical defect, the prophylaxis of infection, and the adequacy of nutrition, all to ensure the healthy physical development of the children under his care, he must be concerned with physiological characteristics of the individual child, the preschool intellectual environment of the family, and the psychological nutrients provided by the educational system, all precursors to the attainment of skill in reading. Few issues bear more directly upon the future of his patients.

METHODS

What is the magnitude of the problem? How many children are defective readers and where are they to be found? What personal and familial characteristics are associated with reading difficulty? If the answers to these questions are to be interpretable, we must first consider methods of measurement of reading competence.

Surveys of reading performance are based upon group tests of reading such as the Iowa, Stanford, California, Gates, and others. Typically, the test is standardized by scoring the results of its administration to a sample of children drawn from selected and presumably representative communities throughout the United States. Practical considerations determine that the test must be relatively brief in order to avoid fatiguing the child and in order to recommend itself to school administrators for periodic system-wide surveys. Scoring must be simple; hence stems the reliance on multiple choice answers which permit maching scoring. In general, the tests that are given to upper classmen assume reading competence at the elementary level, again in keeping with the necessity for brevity; consequently, a child may receive a minimum non-zero score simply by appearing for the test and signing his

name to it. To this basement grade score may then be added additional credit for successful guessing at answers; most standard tests do not penalize for errors (the Gates is an exception). As a result, clinical reading specialists usually report functional reading levels based upon individual examination that are one or more grades lower than those derived from the group tests.

The skills measured by the elementary reading tests are different from those demanded for successful completion of the intermediate and advanced batteries. At the lower levels, little more is required from the child than the ability to decode the visual symbols into recognizable words. At intermediate and advanced levels, comprehension is called much more directly into play; in consequence, performance will vary with vocabulary, level of reasoning, and general intellectual facility. One would expect, therefore, that the child with limited exposure to intellectual stimulation would be progressively more penalized at ascending grade levels. One final caveat is in order. The great variability in individual response at primary grade levels, together with the limited discrimination of the test instrument at the lower end of the scale, restricts the confidence to be placed in group testing methods in the first grades of school. I would commend to every pediatrician that he familiarize himself with the tests used in his community by reading through the test forms with some care.

EPIDEMIOLOGY

With these general considerations in mind and the further restriction that comparisons between systems employing different tests must be made with caution,[4] let us look at the facts and figures that we can summon. In Figure 1, I have plotted the 1964 reading performance on the Stanford Test of the entire sixth-grade population of a large urban center here named "Metropolis." (It should be noted that children in special classes for mental retardation are <u>not</u> included). Though the figures in this graph are precise and based upon actual figures from a single city, I shall not name the city, as naming would invite invidious comparisons. The findings serve to condemn not it but urban America. Twenty-eight percent of the sixth-grade children are reading two or more grades below expected grade level, the conventional .

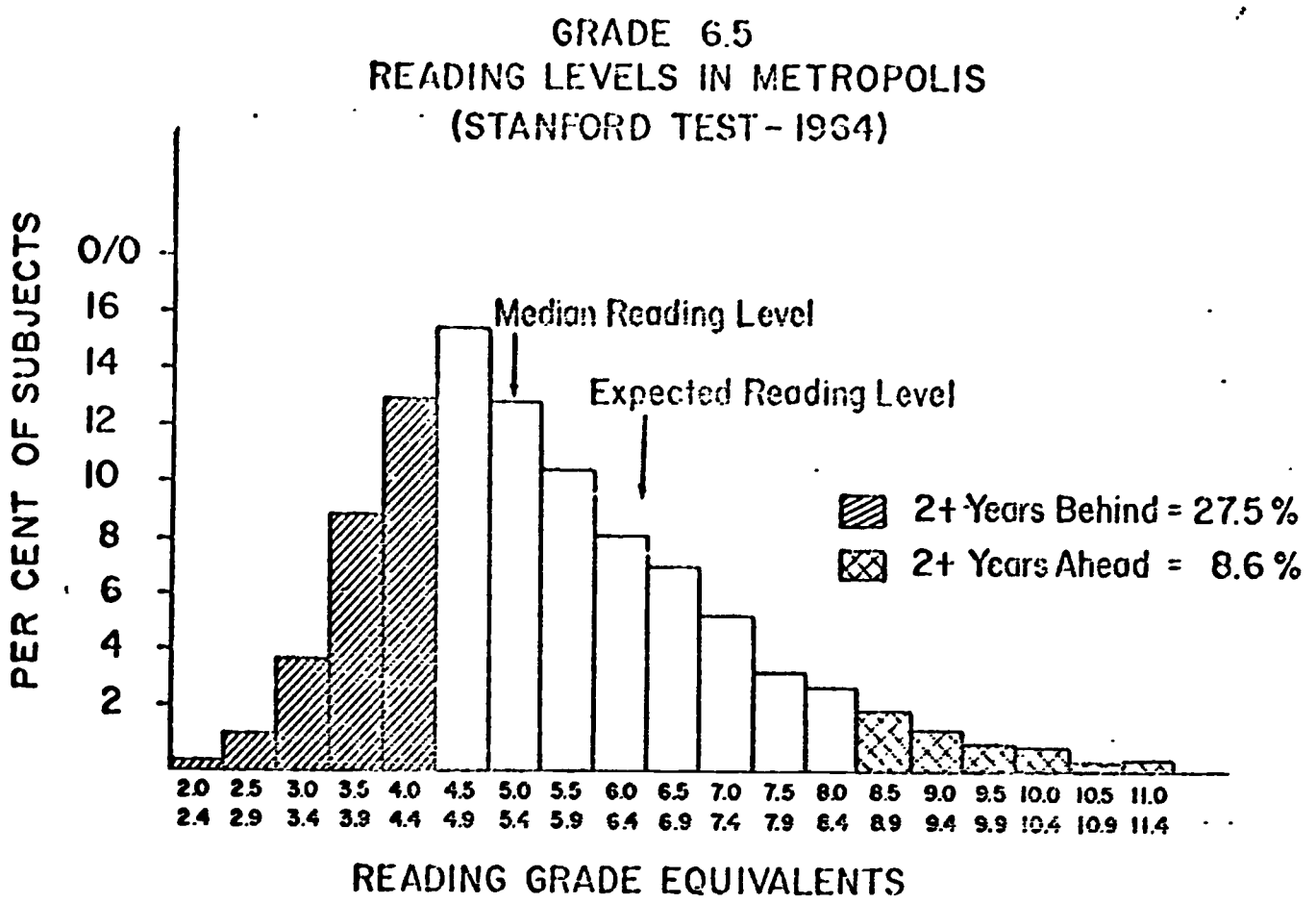

FIG. 1. Reading levels for all sixth-grade children (except those in special classes for the retarded) in a large city in the Eastern United States. The data are based on 12,000 children. On the abscissa are plotted reading scores by half-year intervals, on the ordinate the percentage of the total sample scoring in each range.

definition of severe reading retardation! With a median reading level of 5.2, the distribution is shifted significantly to the left; by definition of test construction, the median should lie at 6.5, the grade and month at which the test was administered.

Group intelligence tests administered to these children at the same time revealed a median I.Q. between 94 and 95. This may appeal to school personnel as a rationalization for the reading scores on the grounds that, had the children had the expected I.Q. median of 100, the theoretically constructed reading curve would be shifted well toward a more normal distribution. Before we buy this reassurance that all is well with the educational establishment, let us remember that the group I.Q. test requires reading for its comprehension; success with it no less than with the reading test is a function of the educational experience of the child. It would be more accurate to state that *both* group I.Q. and reading levels are depressed in contemporary American urban school populations, given the circumstances of education and of life for the children who reside in the gray areas of our cities.

The epidemiologic significance of these data can be heightened by comparing them with those from other population groups. Figure 2 plots the reading scores for "Metropolis," for "Suburbia" (a county immediately outside Metropolis), and for children attending independent (that is, private) schools in Metropolis. So enormous are the differences that one could almost believe three different biological populations are represented here; yet what we know would indicate that the children of Metropolis have a potential not different from that of Suburbia* and, I would add, not substan-

* To the extent that the slum dwellers of Metropolis suffer a heavier burden of C.N.S. injury stemming from social-class-related complications of pregnancy, parturition, and early life (see later sections of this paper), we encounter a true biological difference; but one that is *far less in magnitude* than that evident in the reading figures and

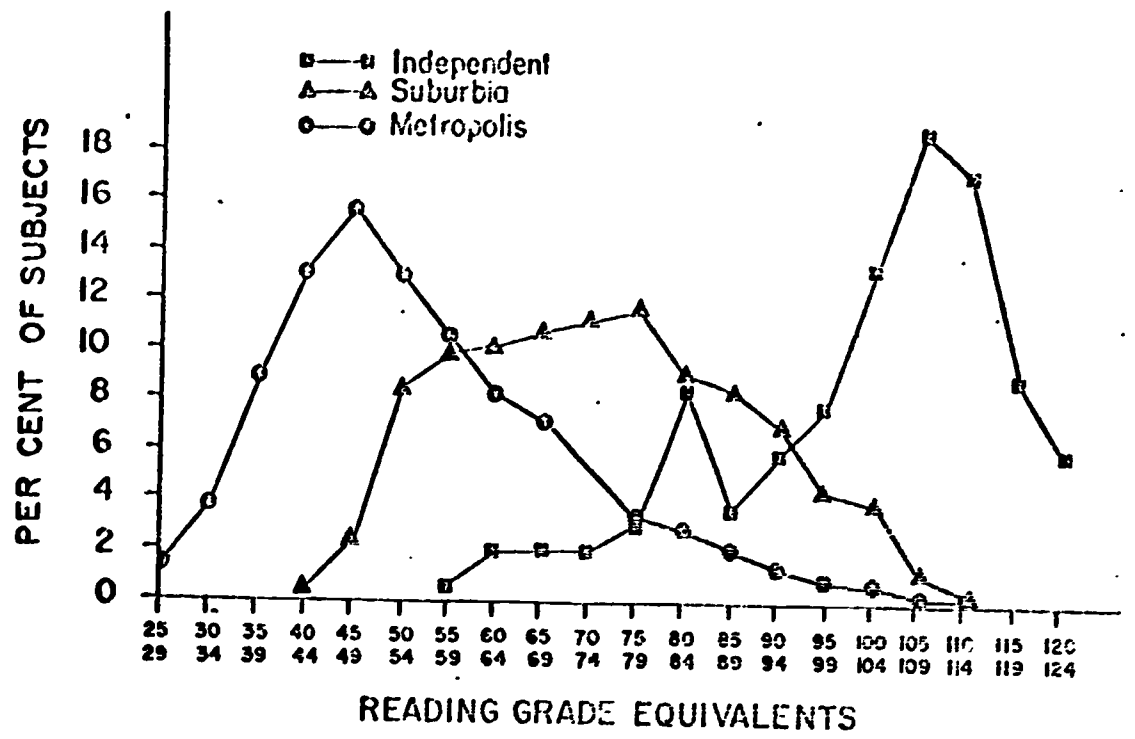

FIG. 2. Reading levels in 1964 for sixth-grade children in Metropolis, Suburbia, and Independent. Plot is is as in Figure 1. Number of subjects in each sample: 12,000 for Metropolis, 8,000 for Suburbia, and 200 for Independent. Expected mean based on national sample is 6.5 (i.e., 5 months into the sixth grade).

tially different from that of the independent schools.† If this be so, or even approximately so, then we have here in the difference between what the children of Metropolis do do and what they could do, a scathing indictment of the indifference of our cities to the education of their children.

Table I sets forth key reading parameters for the school populations of "Metropolis," "Suburbia," the independent schools, and "Clinicounty," a bedroom county (for exurbanite white collar workers) that includes pockets of rural, largely Negro, poverty. If we focus our attention on the percentage of children more than one year retarded in reading, Metropolis has failure rates two-thirds higher than Clinicounty, three times higher than Suburbia, and more than fifty times higher than the independent schools. Similar discrepancies obtain at the other end of the reading spectrum. Success rates, as measured by the percentages of children more than two years advanced in reading, are nine times higher in the independent schools than in Metropolis or Clinicounty and 2.4 times higher than in Suburbia.

Let us now turn to other demographic characteristics as a basis for comparative analysis of population groups. Rates by sex (for Clinicounty) reveal that the number of retarded readers among boys (19.5%) is more than twice as high as that for girls (9.0%), a finding consistent with other surveys of reading performance[5,6] and a point to which we shall return.

We have thus far examined rates by area of residence and by sex. What of rates by

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one that is *preventable* by the vigorous application of health and welfare measures. It has been argued that assortative migration and assortative mating have engendered substantial hereditary differences between these populations. This remains to the present an *hypothesis* whose validation would require that differences in educational performance persist even after equality of life experience has been afforded the less privileged group. The repeated demonstration of I.Q. gains after special programs of educational enrichment for slum children makes equally tenable the view that the greatest part (if not all) of the class-related variance in school performance is attributable to differences in experience. At the least, this viewpoint has the heuristic advantage that it suggests, at one and the same time, a possible remedy for the educational deficiency and a test of validity for both hypotheses.

† Independent schools routinely employ entrance tests; to the extent that these tests screen out slow-learning and handicapped children, the admitted group will be superior to the general population of children.

race? This question is not readily answerable for many urban school systems; for, although the schools may not be fully integrated, the records are, much, one suspects, to the relief of administrators when irate citizen groups raise questions about the adequacy of education for Negro children. The data from Clinicounty, however, did permit computation of rates by race. Whereas 12% of the white children were two or more years retarded in reading, a failure rate alarming enough in itself, the corresponding figure for Negro children was 36%, three times as great! (Within each ethnic group, the male rate remains significantly higher than the female rate, 16.8% to 7.1% for whites and 42% to 26% for Negroes.) These figures become somewhat more explicable when we add the information that only 7% of the white families in Clinicounty as against 62% of the Negro families fall into social class V, the very bottom of the economic heap.

SOURCE OF RETARDATION IN READING

Epidemiologic surveys employing a crude measure like group reading levels suffer from the inherent limitation that they treat by a common statistic cases that vary widely in the nature of the underlying pathology. We would not expect to learn much useful about the epidemology of infections if we studied the distribution of fever in a population without regard to its source. Yet

TABLE I

SIXTH-GRADE READING LEVELS BY SCHOOL SYSTEM

	System	Test	Percentage Retarded		Percentage Advanced
			2 yr	1 yr	2 yr
I	Metropolis	Stan.	28	57	9
	Clinicounty	Cali.	15	35	8
	Suburbia	Iowa	3*	19	34
	Independent	Stan.	0	1	82

* Because of the Iowa Scoring System, this figure is almost certainly an underestimate, by half or more, of the actual prevalence of children two or more years retarded in reading in Suburbia.

TABLE II

PROVISIONAL CLASSIFICATION: THE SCOURCES OF READING RETARDATION

A. Sociopsychological factors

1. Quantitative and qualitative defects in teaching
2. Deficiencies in cognitive stimulation
3. Deficiencies in motivation
   a) Associated with social pathology
   b) Associated with psychopathology ("emotional")

B. Psychophysiological factors

1. General debility
2. Sensory defects
3. Intellectual defects
4. Brain injury
5. Specific (idiopathic) reading disability

this has been the common practice in respect to reading. It is not therefore surprising that competent investigators have been led to contrary conclusions about the role of handedness, heredity, perceptual handicap, and the like, when each has examined a heterogeneous sample of cases defined only by its reading performance.

PROVISIONAL CLASSIFICATION OF SOURCES OF READING RETARDATION

To order our further inquiry, it is convenient to divide the sources of retarded reading into two major groups; the sociopsychological and psychophysiological, with full realization that this dichotomy is both arbitrary and inaccurate. Given the differential distribution by social class of the complications of pregnancy and parturition, of the availability of adequate nutrition and medical care, one could equally well classify brain injury under the heading: sociophysiological. However, the axis of classification employed in Table II can provide a useful basis for a preliminary examination of the types of retarded readers.

SOICOPSYCHOLOGICAL FACTORS

DEFECTS IN TEACHING

We would not expect that a child who had not been taught would learn to read. Yet there are children in the United States who are late in beginning school, who attend irregularly, whose shcool year is foreshortened to conform to the farming season, and who therefore experience a significant loss of exposure to teaching. These are the children of sharecroppers and of migratory workers. Similar academic ills befall children of disorganized families who move from one tenement, and hence one school district, to another.

But even those urban or rural children of the poor who attend school more or less as required by law suffer a serious deficit in teaching. The schools they attend are likely to be more overcrowded, are more often staffed by less-qualified teachers, are more beset by problems of discipline to the detriment of teaching time, and employ traditional methods of teaching that, however adequate they may be for the middle-class child, are highly inappropriate for the special educational needs of the disadvantaged. No less devastating is the pessimistic conviction of many teachers and many administrators that such children lack the necessary wherewithal to learn. This belief may be couched in terms of the restricted intellectual stimulation in the child's home or may be more nakedly racist in adherence to beliefs in biological inferiority. Whatever the source of the conviction, it influences the performance of the teacher, the expectations he sets for the child, and the ultimate attainment in the classroom. Without a direct challenge to these conventional beliefs, educational progress will not be possible.

Under the heading of teaching defects, most physicians will expect to hear some discussion of the "look-say" (whole word) method versus phonics. Attacks on the look-say method have their fad; they appeal to traditionalism and suggest a cheap and easy answer to contemporary problems by returning to the ways of the good old days. Such evidence as there is indicates that the average first grader learns equally well by either method but somewhat faster by look-say, whereas the potential dyslexic child may have his disability magnified by exclusive reliance on the whole word method. That the look-say primers have been full of drivel: "Here, Tip! Run, Jane! Look, look, look!"

(Damn, damn, damn!) is not inherent tin the whole word method but must be attributed to the vacuous authors of these non-books. Pending the accumulation of definitive evidence based upon controlled studies,* we can only conclude that the excellence of the teacher and a class size small enough for individualization of instruction are far more important than the choice of method. An either-or formulation is in any event absurd; a competent teacher should know the several ways of teaching reading in order to capitalize on the ability profil of the particular child. Nostalgia for the McGuffey reader and a "no nonsense" approach to education will not solve the reading problem.

DEFICIENCIES IN COGNITIVE STIMULATION

Although the formal education of the child by definition begins when he enters school, there has in fact been a quite extraordinary transformation in his mental function during the first six years of life at home. From a largely vegetative, only intermittently conscious newborn with a limited repertoire of reflexes, he has become a self-conscious, speaking, reasoning, and imaginative being. This developmental explosion accompanies a tripling of brain weight and an uncountable proliferation of dendrites and synapses, but is in no sense a mere unfolding of a process predetermined from within. How fast it happens and how far it goes are, within limits, a direct function of the amount and variety of patterned stimulation supplied by the environment.[7]

We know that if a child does not hear language, he will not speak. We tend to overlook the corollary proposition that if he is exposed to a less-differentiated language experience, he will speak and understand less well. The slum child has, on the average, had less training in listening to sustained and grammatically complex speech, had less exposure to the extensive vocabulary of our language, and had less reinforcement for his own verbal efforts. He exhibits defects in auditory attention and perception, performs less well on vocabulary tests (especially when challenged by abstract words), and is less responsive to verbal instructions in the classroom.[8,9]

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* There is some early evidence that the Initial Teaching Alphabet, employing 43 symbols, may be a superior method for teaching reading in the early elementary grades. The augmented alphabet allows a one-to-one correspondence between sound and symbol.

Many inner city children have never been more than a few blocks from their home; the museums, symphony halls, even the zoos and amusement parks of their communities are foreign territory to them. Books, magazines, even newspapers are infrequent companions; they are not often read to. Exercises with paper and pencil, puzzles, and sedentary games with formal rules are uncommon. They have been short changed of experiences that, for other children, serve to build concepts and set the ground for learning to learn.[10] Yet their lives have, in no sense, been blank. Scrounging in the streets, dodging cars for a game of stick ball, avoiding cops, defending themselves from youthful and adult predators alike, they have had to learn the complex arts of survival in the slums. In so doing, they acquire behavior traits that <u>interfere actively</u> with the acquisition of the patterns required for success in the classroom. To note that these children are different is not to convict them of being defective. The figures from Metropolis make appallingly clear that failure to learn <u>as they have been taught</u>. This, however, is a failure of the teaching, not the children.[11]

DEFICIENCIES IN MOTIVATION

Intelligence tests have been the best available single predictors of academic success, but the highest correlations obtained between I.Q. and grade averages have been on the order of 0.5 and 0.6. Statistically, then, "intelligence" (or whatever I.Q. tests measure) accounts at best for one-quarter to one-third of the variance in academic performance. This is hardly surprising; we all recognize it when we choose students, house officers, and colleagues by estimating their motivation in addition to their talent. Motivation, like intelligence, is shaped by the environment; in this shaping both social class values and idiosyncratic life experiences play a role.

When parents fail to reinforce a child for good school performance or to chastise him for academic misbehavior; when they convey a belief that school success bears little relationship to ultimate occupational attainment; when they share with the child a view of school authorities as repressive agents employed by a society hostile to their values, they provide little support for the development of achievement motivation. The beliefs on which these behaviors are predicted are not myths; they are constructed from the social reality of the slum dweller. These beliefs may lead--indeed, they do lead--to the self-perpetuation of defeat and alienation but that does not make them untrue. The Negro high-school graduate is more often unemployed and,

when employed, earns less than the white graduate. Unemployment rates for young workers, white and Negro, are disproportionately high; unchecked, the crisis will grow worse as population trends lead to an increase inthis age group.[12] The examples of success that sustained previous generations of immigrants from abroad have been replaced by examples of failure in homes and on street corners that discourage all but the hardiest of today's domestic immigrants from farm and mine. For this, the solution will not lie in the schools but in the creation of job opportunities with equal access to all.

However, teacher attitude may serve to consolidate a conviction of the hopelessness of it all. Educators are satisfied with less from the lower-class child because they expect less; their expectations form part of the social field that molds the child and determines, in part, what he does. He arrives at school ill prepared; his initial poor performance leads to "streaming" in low-ability sections; the limited teaching further retards his learning; he completes his "education" less able than others; ironically, the terminal product is used to justify the system.[13] But is it not apparent that the operation of the system has guaranteed fulfilment of the prophecy? Schiffman[14] in a study of 84 elementary school children referred for placement in classes for "slow learners" because of academic failure, found that 78% had Wechsler performance quotients in the average or better range; yet only 7% of their teachers identified them as other than dull and only 14% of their parents recognized their potential. Need it surprise us that 86% of the children rated <u>themselves</u> as dull or defective? With such a self-image, affirmed at school and at home , what shall it profit a child to try?

With or without social disadvantage, though all too commonly associated with it, individual psychopathology is a frequent concomitant of retardation in reading. On the one hand, school difficulties are among the major presenting complaints at every psychiatric clinic for children; on the other, physicians who have studied retarded readers have uniformly noted a high association with emotional disturbance.[15-18] The correlation with antecedent family pathology[18] indicates that, in a substantial number of cases, the psychiatric disorder is the source of the reading problem. No single pattern of psychopathology is characteristic; among the more common patterns are: anxiety states that preclude attention to academic tasks; preoccupation with fantasy such that the child is psychologically absent from class; passive-aggressive

syndromes in which resistance to parental coercion is subtly executed by a hapless failure to learn; low self-esteem based upon identification with an inadequate parent; schizophrenic thought pathology in which letters and words become invested with idiosyncratic meanings. Reading failure is a final common pathway for the expression of a multiplicity of antecedent disruptions in learning.

At the same time, it must be recognized that the reading difficulty is in itself a potent source of emotional distress. Embarrassed by fumbling recitations before his peers, cajoled, implored, or bullied by his parents and his teachers to do what he cannot, the retarded reader is at first disturbed and finally despondent about himself. His ineptness in reading penalizes him in all subjects and leads to his misidentification as a dullard. With class exercises conducted in what for him is a foreign language, he turns to other diversions, only to be chastised for disruptive behavior. However begun, the psychiatric disturbance and the reading disability are mutually reinforcing in the absence of effective intervention. For such children, psychiatric treatment may be necessary before response to remedial techniques can be expected.[19]

PSYCHOPHYSIOLOGICAL SOURCES

The psycho. physiological sources of reading retardation can be divided into five major categories: general debility, sensory defects, intellectual defects, brain injury, and idiopathic or specific reading disability. Overlap and multiple conjunction of causes are common.

GENERAL DEBILITY

Discussions of reading retardation do not list general debility among its causes but this is a serious oversight. The child who is chronically malnourished and the one who is chronically ill can hardly be expected to perform adequately in school. I mention them here only to stress the importance of a thorough pediatric examination as the first step in the evaluation of any child with a learning failure.

SENSORY DEFECTS

Defects in seeing and hearing impede information transmission over the primary channels whose integration is required for reading. Visual defect leads to reading handicap only when acuity is reduced by half or more.[20] With respect to hearing, however, there is increasing evidence that children with normal pure tone auditory thresholds may nonetheless suffer from perceptual handicaps in discriminating speech sounds[21] and from defective intersensory integration, as in the task of converting auditory to visual signals,[22] both disorders being associated with poor reading. These deficits may stem from central nervous system pathology or from faulty auditory experience. In either case, corrective training to minimize this source of difficulty would appear logical though the effectiveness of such training remains to be established.

INTELLECTUAL DEFECTS

Intellectual defect can be expected to limit reading achievement as a function of its severity. The assessment of this factor requires individual clinical examination by a competent psychologist and cannot be based upon group testing. The prognosis will, of course, vary with the nature of the underlying disorder as well as the degree of mental deficiency. However, even moderately retarded children can learn to read enough to transact the ordinary business of life, if teaching methods take into account the learning characteristics of the defective child.

BRAIN INJURY

Children with chronic brain syndromes are at high risk for learning disabilities, though there is no simple one-to-one relationship between amount or locus of damage and ultimate academic achievement.[23] Whether the category: "brain injury" or its various extensions, "minimal cerebral dysfunction," "diffuse brain damage," etc., are useful concepts has been challenged,[24] but the clinician should be alerted to the search for learning problems and to the importance of special teaching techniques for children with borderline as well as overt neurological findings. Occasional children with brain tissue damage sufficient to result in mental deficiency of moderate degree are nonetheless able, in the elementary grades, to attain above average fluency in oral reading, although their comprehension of what they have read is

minimal. Such instances are instructive in several respects. They serve to remind us of the variability of the clinical patterns observed in brain - injured children; they indicate the complex nature of the reading process, in which word recognition and sentence comprehension are separable skills; they emphasize the importance of a thorough reading analysis in complement to a comprehensive pediatric assessment in the work up of each case of reading retardation.

SPECIFIC READING DISABILITY

We turn now to the important residual category of specific reading disability also known as congenital word blindness,[25] primary reading retardation,[26] and developmental dyslexia.[27] The adjective "specific" calls attention both to the circumscribed nature of the disability and to our ignorance of its cause. Operationally, specific reading disability may be defined as the failure to learn to read with normal proficiency despite conventional instruction, a culturally adequate home, proper motivation, intact senses, normal intelligence, and freedom from gross neurologic defect. Hinshelwood's statement,[28] is not less relevant today than when it was written in 1902: "It is a matter of the highest importance to recognize the cause and the true nature of this difficulty in learning to read which is experienced by these children, otherwise they may be harshly treated as imbeciles or incorrigibles, and either neglected or punished for a defect for which they are in no wise responsible."

There are no reliable data on which to base a secure estimate of the prevalence of specific reading disability; such surveys as exist record only the extent of retardation in reading on group tests without differentiation as to cause. Clinical reports indicate a much higher rate of occurrence among boys, the male/female ratio generally exceeding 4 to 1.[27] This disproportion is similar to, but higher than, the surplus of boys among retarded readers from all causes, among children designated as academically backward,[5] and among children referred to psychiatric clinics.[29] Some have sought to explain these figures on the grounds of greater cultural pressure upon boys for academic success; this may account for some differential in rates of identification in so far as standards for boys may be more exacting. But it is noteworthy that boys are in general slower to acquire verbal facility and are more prone to exhibit behaviors in the early school grades that teachers label "immature."

It would seem more parsimonious to relate these disproportions to the greater biological vulnerability of the male to a wide variety of ills; from the moment of conception onwards, there is a highly significant differential in morbidity and mortality between the sexes, such that an original surplus of males is converted to its opposite by the time adulthood is attained.[30,31]

Many authorities have called to attention, as though they were diagnostic of specific reading disability, such phenomena as: reversals (was for saw, gril for girl), mirror writing, confusion of certain letters (b,d,p,q,g), omitted or added words, perseverations, skipped or repeated lines, and the like. These very same errors occur as the normal child learns to read; what distinguishes the dyslexic is the frequency and persistence of these errors well beyond the time at which they have become uncommon in the normal.

The failure of many investigators to adhere to defined criteria for the diagnosis and to recognize the importance of the age variable accounts for some of the contradictory findings reported in the literature. It does seem that sinistrality and, more especially, delayed or inconsistent laterality occur more often among dyslexics (though many are typical dextrals), but it is quite another matter to suggest that "incomplete cerebral dominance" accounts for the reading problem. The determination of laterality is not so simple a matter as once thought[32] nor is "brainedness" so readily to be inferred from handedness.[33] The apparent association between delayed establishment of laterality and the reading defect seems more probably related to a common underlying developmental antecedent than as cause and effect. The confusion about the proportion of dyslexics with perceptual deficits takes on some order when it is realized that perceptual handicaps are more often found in younger than in older dyslexics.[34] This change with age may reflect the developmental course of perception.[35] The older child may no longer exhibit the handicap which may have been prominent at a critical stage in the learning process and have contributed to the failure to learn to read.

Etiologic studies have also led to apparently contradictory conclusions. Kawi and Pasamanick[36] have presented evidence of a much greater frequency of pregnancy complications and premature births in the obstctrical histories of retarded readers than those of control cases. The differences are well beyond chance expectancy. However, the index cases were selected from school records

because of retarded reading and screened only for an I.Q. above 81. It seems probable that cases with a variety of reading disorders were included, the proportion of specific dyslexia being unknown. On the other hand, many clinicians have been impressed with the regularity with which a history of reading difficulty is obtained from the parents and collateral relatives of children with specific reading disability. In the most comprehensive study of its kind, Hallgren[37] concluded that the data from a genetic survey of 276 cases support a dominant mode of inheritance.

We are left with the unanswered question of the nature of the defect, even if we accept the proposition that it is biological. Critchley supposes it to be due to "specific cerebral immaturity", but adds that he doubts the existence of "a structural lesion recognizable by present day techniques."[38] Geschwind[39] has advanced the notion that there is "delayed maturation of the angular gyrus region, probably bilaterally." From the evolutionary standpoint, this region is not recognizable in the macaque and is only imperfectly developed in the higher apes. The human inferior parietal lobule (including the angular and supramarginal gyri) matures very late cytoarchitectonically, often not until late childhood.[40] Geschwind argues that, since lesions of the angular gyrus in the adult result in word blindness, delay in its development might account for specific reading disability in childhood. Against this thesis is the opinion of other neurologists that pure word blindness is neither so "pure" nor so consistently associated with specific lesions as classical doctrine alleges. Autopsy material being unavailable, the argument rests upon its plausibility and the way the clinical evidence is evaluated.

Problems of diagnosis, treatment, and outcome are the topics of Dr. Klapper's paper and for that reason will not be further considered here.

THE DEVELOPMENT OF READING SKILL: A PEDIATRIC ACTION PROGRAM

The evidence marshaled in this paper has, I trust, persuaded you of the integral relationship between reading and intellectual development, of the appalling extent of retardation in reading among American school children, of the multiple sources of interference to the acquisition of literacy, and of the relevance of the foregoing to the pediatrician's role in the maintenance of health and the correction of disability. Permit me, in my concluding remarks,

to outline the areas in which the informed pediatrician, as professional and citizen, has the opportunity and the responsibility to provide leadership for social action to promote the healthy development of children. Those areas, as I see them, are (a) maternal and child health programs, (b) health and education programs for the preschool child, and (c) revised curricula and classroom conditions throughout the years of public schooling.

MATERNAL AND CHILD HEALTH PROGRAMS

At the level of primary prevention, there is a clear need for comprehensive maternal and child health programs to diminish the complications of pregnancy, parturition, and the neonatal period that lead to insult to the central nervous system of the infant.[41] Malnutrition, poor hygiene, and inadequate medical care are among the casual factors subject to control if we but have the determination to apply present knowledge and resources.[42-44] Current federal legislation provides us with a splendid opportunity for progress but money and initiative from Washington alone will not suffice to guarantee quality of services. Pediatricians in every community will have to participate in the planning and the execution of new and imaginative programs. More is needed than the customary 3-minute-per-child schedule of traditional health department well-baby clinics, more than the mere advertisement to the community of their existence. Medical interest will have to extend beyond vaccinations and cursory physical examinations to sensitive concern with cognitive as well as physical development; notices of clinic hours must be augmented by an active recruitment of the families not now making use of these services. The index patient may be the pregnant woman or the infant but the physician's curiosity must extend from them to the welfare of all members of the family unit. Special programs will be necessary for mothers at highest risk: the unmarried, the very young and the old, the Negro, the mother with prior history of obstetrical difficulty. It should not be tolerated that the pregnant high-school student is merely dismissed from school; health care and provision for supplementary education are essential. In these tasks, medical specialists and generalists, nurses, social workers, health educators, nutritionists, and others will have to function as a team if the disadvantaged family is to be rehabilitated. The call for pediatric leadership is not an appeal to establish hegemony but rather a reminder of the proudest tradition in pediatrics: its concern with prevention.

PRESCHOOL PROGRAMS

The emphasis on preschool enrichment via Project Headstart, directed by an eminent Fellow of this Academy, Dr. Julius Richmond, opens the vista of large scale efforts to foster early cognitive development. Pilot studies indicate that inner city children exposed to nursery enrichment programs function more effectively than their peers when they enter first grade. For the first time, funds are available to extend this opportunity to several hundred thousand children. Funds, though necessary, are not sufficient to ensure quality. Thought and effort will have to be devoted to curricula to promote intellectual growth rather than baby-sitting services. The shortage of professional personnel requires that imaginative use be made of talent whereever it exists in the community without getting hung up on formal criteria created to preserve the educational power structure and without opening the doors to politically controlled job handouts. If the children are to be served with greatest effect, there must be parallel parent education programs couched in terms that make sense to urban slum-dwellers. They love their children no less than we; what they need to understand is how they can help their children to achieve the goals they long for but see as unattainable. The preschool program will serve as a catchment area for pediatric identification of medical defects and the mobilization of corrective measures. If these are to be more than the mere compilation of records, vigorous pediatric procedures for follow-up together with the sstablishment of medical responsibility will be required.

IMPROVED SCHOOL PROGRAMS

If preschool enrichment is not augmented by substantial revision of traditional school services, there is little reason to anticipate significant long-run benefit. None of us would expect a good diet at the age of 3 to protect against malnutrition at 6. The brain requires alimentation both biological and psychological at each stage of the life cycle; early nourishment is necessary but not sufficient to guarantee its development. The precedent-shattering federal aid-to-education bill recognizes for the first time a national responsibility to improve the quality of education; the funds made available are but a token of what will be required ultimately. If we allow them to be used to supplant state funds or merely to be spread thinly throughout the system, no palpable changes will result. The best teachers must be attracted

to slum area schools; class size must be reduced to private school levels: 15 to 20 pupils per class; curricula must be modified. School programs will have to be extended to include after school tutoring and recreational activities. What I am emphasizing is capital investment in human renewal, the very principle that has paid off so handsomely in our industrial enterprise. These proposals will not be welcomed by those school boards and those professional educators threatened by any change in the status quo. The pediatrician can play a significant role as citizen in mobilizing community support for the intent of this legislation.

I would urge upon you one final task. Most school systems introduce remedial reading instruction at the third grade or later (if they have it at all). The justification is one of economy. Of those children not reading at the end of first grade, perhaps half manage to pass muster by the end of the second grade, a few more of the remainder learn to read by standard instruction by the end of the third grade. These children are the "late bloomers," youngsters who, for unknown reasons, acquire late, but do acquire, the capacity to profit from conventional teaching. By wating till the third grade, the school system has spared itself the cost of extra teaching for children who were going to make it on their own. This "economy" however, must be balanced against the cost to those children who by the third grade, are deeply imprisoned in faulty learning habits, have become convinced of their ineptness, and now respond poorly to any but the most expert individual clinical instruction. Surely, this country can afford to do better by its children. It is essential that we identify the child who is not beginning to read by the second semester of the first grade, institute a careful diagnostic study, and provide the appropriate remedial education. If this means that we will be giving extra help to a child not in need of it for each child who requires it, then I urge that we do so. The surplus child will not be harmed and may be benefited; the dyslexic child will be reached at a time when the chance of success is greatest. We would not hear of delaying therapy for rheumatic fever because not every patient incurs a valvulitis; we would not consider deferring laparotomy for a suspected appendicitis because diagnosis is imprecise and not every case perforates; how then can we tolerate a view that is equivalent to saying: Let us make certain the child cannot read and is really in trouble before we give him extra help? An effective program for early identification and treatment might even produce long-run savings if we take into account the

cost of prolonged treatment and ultimate losses in the economic productivity of the handicapped readers. But my argument places no weight on such matters. Where the healthy development of children is concerned, financial considerations are simply irrelevant.

If this call to political action on behalf of children seems out of keeping with your conception of a physician's role, let me recall to you the words of Dr. Benjamin Rush, signer of the Declaration of Independence and the first American psychiatrist. In his final lecture to medical students,[45] he placed prominent among the duties of a physician: "a regard to the interests of your country. The education of a physician gives him a peculiar insight into the principles of many useful arts, and the practice of physic favors his opportunities of doing good, by diffusing knowledge of all kinds. . . . In modern times and in free governments, they [physicians] should disdain an ignoble silence upon public subjects. The history of the American Revolution has rescued physic from its former slavish rank in society. For the honor of our profession it should be recorded, that some of the most intelligent and useful characters, both in the cabinet and the field, during the late war, have been physicians."

Let it be said of us that we were among the most intelligent and useful characters, both in the cabinet and the field, in the late war against poverty by helping to create a healthy and a literate population.

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