

Neurology of childhood learning disorders

second edition

Richard J. Schain, M.D.

NEUROLOGY OF CHILDHOOD LEARNING DISORDERS

SECOND EDITION

Richard J. Schain, M.D.

Professor and Head, Division of Pediatric Neurology
University of California School of Medicine
Los Angeles, California



The Williams & Wilkins Co. / Baltimore

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428 E. Preston Street
Baltimore, Md. 21202, U.S.A.

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Made in the United States of America

Library of Congress Cataloging in Publication Data

Schain, Richard J
Neurology of childhood learning disorders.

Bibliography:
Includes index.

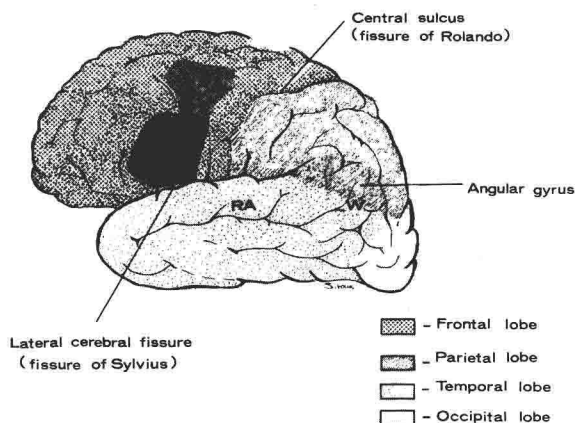
1. Brain-damaged children. 2. Learning disabilities. I. Title. [DNLM: 1. Brain damage, Chronic—In infancy and childhood. 2. Learning disorders. WS340 S296n]

RJ496.B7S3 1977 618.9'28'5884 76-30690

ISBN 0-683-07566-7

Composed and printed at the
Waverly Press, Inc.
Mt. Royal and Guilford Aves.
Baltimore, Md. 21202, U.S.A.

**NEUROLOGY OF
CHILDHOOD LEARNING
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LATERAL VIEW OF LEFT CEREBRAL HEMISPHERE

Some views of the localization of language functions in the brain and disturbances resulting from lesions in these areas. This type of schematization, derived from analysis of the effect of acquired brain lesions upon language functions, should not be taken too literally. Brain (1965) has referred to the assignment of psychological functions to specific brain areas as the "naïve psycho-anatomical" view of the neurology of language. A, writing skills (agraphia); EA, speech production (expressive aphasia); RA, speech understanding (receptive aphasia); W, comprehension of written language (alexia).

Brain, L. (1965) *Speech Disorders. Aphasia, Apraxia and Agnosia*. Washington, Butterworths, p. 83.

Again, To Joan

Foreword To First Edition

In the years since Strauss, Werner and their colleagues brought the syndrome of the brain damaged child sharply to our attention, many books and articles on the syndrome have appeared. Volumes by educators, psychologists, pediatricians and psychiatrists all have appeared and have made contributions to our more detailed understanding of the child whose developmental course has been affected by central nervous system abnormalities but, surprisingly, of the books written not one to my knowledge has been by a neurologist.

The absence of a systematic statement on the brain damaged child (under whatever name) by a pediatric neurologist has been distressing for at least two reasons. In the first place, the central core of many of the theoretical arguments and practical disagreements in the management of the child variously labelled as brain damaged, minimally cerebral dysfunctional, perceptually handicapped or with learning disorders is the degree to which such children, in fact, have damage to the brain. In the final analysis, the answer to this question must come from the pediatric neurologist and neuropathologist. Second, children with learning disorders are, in increasing number, being brought to the attention of the pediatricians and pediatric neurologists for differential diagnosis and for recommendations for treatment, management and placement. Both parents and teachers expect the physician to help them in discriminating among dysfunctions deriving from faulty neurological organization as distinct from reactive disturbances due to poor rearing and experience or faulty educational or social settings. What has been lacking has been a systematic exposition of the problems that attach to such differentiation, of the technology which may usefully be em-

ployed, and of the types of recommendation together with their consequences that may emerge when an appropriate approach to differential diagnosis has been taken.

Dr. Schain, in his book, has confronted these issues directly and, as a broadly experienced pediatric neurologist, has shared with us the problems that he encounters, as well as his wisdom in seeking to solve them. This book, therefore, is an invaluable introduction to the pediatric neurologist's approach to a complex functional disturbance—learning disorder. It acquaints us with the strategies of this specialty, with its potentials for contribution and with its present limitations and opportunities for inquiry. Others will share my pleasure in reading it.

Herbert G. Birch, M.D., Ph.D.
*Albert Einstein College
of Medicine*

Preface to Second Edition

The problem of children with learning disabilities can only be regarded as having increased in magnitude since the appearance of the first edition of this book. In some ways, uncertainties in the fields of education, psychology and medicine seem to have grown greater as simplistic attitudes of the past have proven inadequate in dealing with the approximately 10% of children who fail to adapt to the educational systems of our time. The importance of the physician having a clear sense of the significance of neurological factors in learning problems and of his own role in management is more pressing than ever. The purpose of this book as an exposition of the role of the neurological consultant has been clearly stated in the Foreword for the first edition written by Dr. Herbert Birch shortly before his untimely death in 1972. His message is characteristically succinct and incisive and cannot be improved upon.

A separate chapter on medications in learning disorders (Chapter 14) has been added to this edition that reflects the significance to physicians of the question of drug administration. A section on speech disorders has been added to Chapter 11. The discussions on hyperactivity and minimal brain dysfunction have received major revisions. Most of the other chapters have been revised to include significant new areas of information. As was the previous edition, this is a text for the clinician interested in learning disorders and does not contain comprehensive accounts of neurology or of functions of the brain.

Consistency is no virtue in an area as fluid as that of learning disorders in children. In particular, my views on medications for hyperactive children have evolved over the years so that opinions expressed in this edition are different from those previously given. It is still my intention, however, to present balanced judg-

ments and I am hopeful that this new edition succeeds in attaining that goal.

I wish to express my appreciation to a number of persons who helped in the preparation of this new edition. My thanks are due to Dr. Leon Oettinger, Jr. for his careful critique of the original edition and for his many suggestions, especially those dealing with the practical aspects of management of hyperactive children. I also wish to thank Melanie Pollack and Susan Wong who carefully worked out the final details of manuscript preparation. Finally, I am grateful to Suzanne Kerr who provided assistance at many stages of the writing of this book.

R.J.S.

Preface to First Edition

Children with learning disorders are being brought to physicians with increasing frequency for assistance in the identification of factors contributing to poor performance in the classroom. Both parents and teachers expect the physician to be able to help them to unravel the difficult issues of distinguishing between neurological handicaps, behavioral disturbances and faulty educational approaches as causes for school learning problems. These distinctions are often difficult as all three of these factors are commonly found to have contributed to an educational problem. The physician who accepts the role of neurological consultant should regard a learning disorder as a symptom the etiology of which is his responsibility to elaborate to the fullest possible extent.

The neurological consultant has several roles in evaluating a child with a learning disorder. He is expected to be an expert authority on theories relating neurological dysfunction to learning problems in children. It is one of his major responsibilities to detect the presence of neurological diseases or disturbances that may be present in children with learning disorders. Finally, he is expected to point the way to appropriate treatment programs that will permit a child to achieve his full potential at school as well as at home.

This book deals with the issues faced by the neurological consultant evaluating children with learning problems. Several chapters are devoted to the relationship between learning disorders and "brain damage," minimal or otherwise. Subsequent chapters review neurological diseases that are commonly found in children with learning disorders. The question of why children with certain neurological disturbances manifest learning dis-

orders has been considered in some detail. An effort has been made to review areas of importance to the physician in the management of children with learning disorders as well as to cover salient diagnostic issues. Some of the positions taken in this book may be disputed by some readers. However, I have attempted clearly to separate the presentation of concepts and data from personal viewpoints.

This is not a textbook of pediatric neurology. Comprehensive discussions of diagnosis and treatment of many of the neurological disorders mentioned can be found in texts on clinical neurology or pediatric neurology. *Neurology in Pediatrics* by Bray (1969) and *The Neurological Evaluation of Children* by Paine and Oppe (1966) are valuable references in pediatric neurology. Those interested in classical neurological evaluations may turn to *Brain's Diseases of the Nervous System*, by Brain and Walton (1969) or *The Neurological Examination*, by De Jong (1967). A particularly valuable guide to the neurological examination is *Van Allen's Pictorial Manual of Neurologic Tests* (1969) which illustrates many of the standard procedures of the neurological examination.

I gratefully acknowledge the assistance of Mrs. Siroun Ariyan Tahtakran in the preparations of the frontispiece and Figures 2.6 to 2.8. Finally, my appreciation is expressed to my secretary, Mrs. Maureen Murray, who translated the initial drafts of this book into a readable manuscript.

References

- Brain, L. and Walton, J. N. (1969) *Diseases of the Nervous System*. London, Oxford.
Bray, P. F. (1969) *Neurology in Pediatrics*. Chicgo, Year Book Publishers.
De Jong, R. N. (1967) *The Neurological Examination of Children*. 3rd Ed., New York, Hoeber.
Paine, R. S. and Oppe, T. (1966) *Neurological Evaluation of Children*. London, Heinemann.
Van Allen, M. W. (1969) *Pictorial Manual of Neurological Tests*. Chicago, Year Book Publishers.

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Introduction to Learning Disorders

From a clinical point of view, the term "learning disorder" means that there is good evidence that a child's learning performance at school is not commensurate with his intellectual abilities. A more rigorous definition will invariably exclude some children currently brought to clinics with this label, especially during early grade school years. A convenient objective method for assessing learning performance is the measurement of reading skills utilizing some standard test of reading ability. This approach toward detecting learning disorders will not recognize children who are failing to enter into the learning process during the first years of classroom instruction but it does provide a means of estimating prevalence of this disorder. A reading score two or more grades below expected grade level is generally regarded as evidence that a child manifests a significant degree of reading retardation. Review of various studies of reading disorders in the United States have resulted in an estimate that 15% of school age children are affected by learning disorders (La Veck, 1970); other estimates have ranged from 5 to 30% (De Hirsch *et al.*, 1966). In addition, it is clear that these children are not uniformly distributed throughout the country but that the prevalence is greatly determined by social and economic factors.

To put into perspective the role of neurological factors in the genesis of learning disorders, it is necessary to review the

various approaches that have been taken in an effort to understand the reasons for children's poor performance in classroom situations. It is always true to some extent that one's own professional background and interests determine approaches to clinical problems. This is perhaps nowhere more evident than in the area of learning disorders where attitudes from different disciplines often seem to have evolved almost completely independent of one another. Several approaches toward the sources of learning disorders in children have evolved and will be briefly outlined below.

Brain Damage or Dysfunction

The concept that learning disorders stem from neurological disturbances rests upon the evidence that many children with learning problems also manifest signs of brain dysfunction. In general, the types of neurological disturbances that are believed to be present in children with learning disorders can be divided into three categories:

1. Genetically determined delayed maturation or impaired performance of selective neurological systems concerned with perceptual functions and acquisition of language.
2. Acquired minimal damage of areas of the brain which is not extensive enough to result in gross neurological deficits but is sufficient to produce language, perceptual and motor disturbances.
3. Overt brain damage resulting in frank neurological deficits.

The first of these categories can be recognized as referring to specific developmental dyslexia (Chapter 7). The second category of acquired minimal brain damage is often suspected but proof is difficult (Chapters 4 and 6). A multitude of terms have been coined to refer to these two groups although little has been gained by this proliferation of medical taxonomy (Schain, 1968). There is a tendency at the present time to avoid attempting to distinguish between these first two categories but rather to include them under

an all inclusive expression such as minimal brain dysfunction.

The last category refers to children with clearly defined neurological syndromes who also manifest learning disorders according to the definition given at the beginning of this chapter, namely, school performance not commensurate with intellectual abilities. Children with seizure disorders, cerebral palsy syndromes and sensory disorders may perform at school on a level below their potential capabilities. Multiple factors are responsible for learning problems in children with chronic neurological handicaps. These problems tend to be neglected by both physicians and educators who often lose interest in learning performance once a specific neurological syndrome is identified.

Specific Learning Disabilities

The concept of specific learning disability has been developed by psychologists and educators more interested in educational management than in neurological diagnosis. This deemphasis of diagnostics in children with learning problems is understandable in view of the lack of prognostic or prescriptive significance of "abstruse diagnostic formulations of little relevance to the classroom teacher" (Cruickshank, 1961; Gallagher, 1966). The emphasis is placed upon development of educational methods for teaching children who are "educationally handicapped" rather than for identifying subtle cerebral dysfunctions. A concise review of educational developments in the area of learning disabilities can be found in the monograph by McCarthy and McCarthy (1969).

Virtually all definitions of learning disabilities exclude children whose learning problems are primarily due to neurological handicaps, emotional disturbance or socioeconomic disadvantage. A federal definition that has considerable implications for federal funding practices states the definition of learning disabilities in detail:

"The term 'children with specific learning disabilities' means those children who have a disorder in one or more of the basic

psychological processes involved in understanding or using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. This term does not include children who have learning problems which are primarily the result of visual, hearing or motor handicaps, or mental retardation, or emotional disturbance or of environmental disadvantage." (From Public Law 91-230, Section 602-15, April 13, 1970.)

Perhaps a more restrictive definition is that of the Council for Exceptional Children, Division for Children with Learning Disabilities (Haring and Bateman, 1969).

"A child with learning disabilities is one with adequate mental ability, sensory processes and emotional stability who has specific deficits in perceptual, integrative or expressive processes which severely impair learning efficiency. This includes children who have central nervous system dysfunction which is expressed *primarily* in impaired learning efficiency."

A brief definition is that by Kirk (1967).

"A learning disability refers to a specific retardation or disorder in one or more of the processes of speech, language, perception, behavior, reading, spelling, writing or arithmetic."

Task Force II of a National Collaborative Study (Bateman Schiefelbusch, 1969) avoids definitions but states that:

diagnostician (of learning disabilities) frequently attempts to establish that the child shows:

1. a discrepancy between measures of intellectual, cognitive or academic potential and current level of performance
2. dysfunction in the learning processes
3. absence of other primary factors such as mental retardation; cultural, sensory and/or educational inadequacy or serious emotional disturbance."

It is important to recognize that the definitions of learning disability quoted above tend to imply the presence of some