Preface

This book is about the science and practice of learning disorders, which are prevalent and impairing conditions that for too long were neglected by mainstream psychology and medicine. For much of the 20th century, learning disorders were relegated to the margins of science, characterized by various myths, and treated with controversial alternative therapies.

Some of these myths are still prevalent today, such as the myth that dyslexia is a visual disorder that causes a person to see things backward. Or there is the myth that vaccines cause autism (this myth has even reached the White House!). Not too long ago, it was even popular to claim that some learning disorders *themselves* were myths. For instance, it was argued that attention-deficit/hyperactivity disorder (ADHD) did not exist as a disorder, that it was just a medicalization of normal childhood exuberance. Or when one of us (BFP) first entered the field, it was seriously proposed that learning disabilities did not exist, that instead they were a middle-class myth to protect the self-esteem of parents whose children were not meeting high educational expectations. Or if they agreed that learning disabilities did exist, clinical psychologists proposed Freudian explanations of learning disabilities based on unconscious conflicts. For instance, they hypothesized that mathematical problems with addition were caused by oral issues, problems with subtraction were caused by castration anxiety, problems with multiplication were caused by sexual conflicts, and so on. It is our hope that all readers of this book agree that learning disorders *do* exist and can see how ludicrous these Freudian explanations of math problems are, but it may take a little more understanding of science to understand why the other myths are wrong.

The fact that we have been able to refute all these myths about learning disorders demonstrates how science works. Various hypotheses about how and why things happen in the world can be rigorously examined to determine whether they are true, and science progresses by rejecting wrong ideas about how the world

works. The dustbin of scientific history is filled with curious ideas such as the earth is flat, the sun revolves around the earth, the stars are mounted on crystalline spheres (hence, "the music of the spheres" that some of us sang about in church), the mind is in the heart, invisible ether is needed to transmit light, and combustion occurs when objects give up their phlogiston. It is our hope that all readers of this book recognize that these ideas are wrong, and can even explain why most of them are wrong.

The ultimate goal of scientific research on learning disorders, like all biomedical research, is to improve public health by improving early detection, intervention, and ultimately prevention. This is a "virtuous cycle" between science and practice: Practice leads to scientific questions, and scientific research improves practice, which in turn leads to new scientific questions. This book illustrates this virtuous cycle in the domain of learning disorders.

To achieve this goal, the book is divided into two major parts. Part I, "Scientific Foundations," is concerned with both scientific methods used to understand learning disorders and key issues for practice. It has chapters dedicated to specific methods (i.e., genetics, neuroimaging, neuropsychology) that will be useful for individuals interested in these methods. Part II, "Reviews of Disorders," is concerned with what these scientific methods have taught us about six learning disorders and how to diagnose, treat, and possibly prevent them: speech and language disorders (Chapter 9), dyslexia (Chapter 10), mathematics disorder (Chapter 11), ADHD (Chapter 12), autism spectrum disorder (Chapter 13), and intellectual disability (Chapter 14). Each chapter reviews the history, definition, and prevalence of each disorder, as well as current knowledge of their underlying developmental neuropsychology, brain mechanisms, and etiology. Each disorder-specific chapter contains a section on diagnosis and treatment that reviews current assessment and treatment recommendations, and their scientific basis. To illustrate the principles reflected in these sections, we provide case presentations that include data tables that describe assessment results and a description of the differential diagnostic process. Last, each disorder-specific chapter contains a summary table of the entire chapter.

The main target audience for this book is psychologists who assess children, including clinical psychologists, clinical neuropsychologists, school psychologists, and counseling psychologists. However, this book is also relevant for educators, pediatricians, neurologists, speech–language pathologists, occupational and physical therapists, and researchers in developmental psychology, educational psychology, and cognitive neuroscience. We also hope that parents of children with learning disorders as well as adolescents and adults with learning disorders will find the content useful.

Lay readers may want to start with the Preface, Chapter 1, and the summary tables for each disorder in Chapters 9–14. Clinicians will find the diagnosis and treatment sections in Chapters 9–14 most relevant for their applied work. Readers who are interested in the science of learning disorders will want to familiarize themselves with scientific methods with which they are less familiar in Part I before proceeding to the scientific sections of each disorder-specific chapter in Part II.

All readers will benefit from the summary tables that accompany each disorder-specific chapter.

In the nearly 30 years since the first edition of this book was written, there has been enormous scientific progress in our understanding of learning disorders. The biggest scientific advances have been in the fields of genetics and brain mechanisms, where much more powerful methods have displaced old findings and have made it clearer how much remains to be understood. More than ever before, there is a new appreciation that both the genome and the developing brain are complex systems whose functioning needs to be understood in network terms. In terms of practice, diagnostic definitions of learning disorders have evolved, their extensive comorbidity is better understood, and we have much better data questioning the validity of some learning disorders (e.g., Asperger syndrome, the hyperactive–impulsive subtype of ADHD, and disorders of written expression).

There have also been major advances in the science and practice of learning disorders in the decade since the second edition of this book was published; thus, this third edition is considerably different from its predecessor. We have extensively revised and updated all of the main chapters of the previous volume. For example, genetic and neuroimaging technologies have advanced considerably in the past decade, and these advancements are reflected in the chapters on etiology (Chapter 2) and brain mechanisms (Chapter 3). For each of the disorder-specific chapters in Part II, the genetics, brain mechanisms, and developmental neuropsychology of each disorder have advanced to such an extent that each chapter was nearly fully rewritten. The case presentations that accompany each chapter in Part II were also revised to be consistent with DSM-5 and current assessment techniques. In addition to these extensive revisions, we have added four entirely new chapters on comorbidity (Chapter 5), on differential diagnosis of specific learning disorders using DSM-5 (Chapter 6), on evidence-based practice in assessment (Chapter 7), and on achievement gaps (Chapter 8). We believe that readers who are familiar with the second edition will find that this third edition is not merely an incremental update, but nearly a completely new book.

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