

Dyslexia, Learning, and the Brain

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Ways of Reading the Book

The book covers a wide range of topics and disciplines, and at quite a high level, probably graduate level in science metatheory, cognitive psychology, neuroscience, and developmental psychology.

Learning to read involves a number of stages, with each stage forming the basis for, and an impediment to, transition to the next stage in that one has to unlearn some skills to acquire others. Our journey toward the origins of dyslexia appears to follow a similar tortuous route. After two brief scene-setting chapters, we start with a relatively strong hypothesis—that the key problem for learning is in terms of skill automaticity—and over the course of our research on automaticity we come to the conclusion that, although fruitful and parsimonious, automaticity deficit is not the full explanation, in that there are problems in further areas of skill acquisition. We then advocate an equally strong hypothesis at the brain level, that the difficulties may be considered as examples of abnormal cerebellar function. Subsequent work has strongly supported the hypothesis, but has also indicated that several other brain structures and systems are inevitably involved. We end up by proposing an inclusive and underspecified hypothesis, that there are problems within the general “procedural learning” brain circuitry—circuitry that includes the cerebellum, the language areas of the frontal cortex, and parietal regions. This hypothesis has the major strength that it allows other developmental difficulties to be described within the same framework, and, we hope, leads to fruitful new issues for theorists and practitioners to address.

Every reader will therefore find some aspects of the exposition challenging, and every reader will find some of the issues described confusing. Unfortunately, confusion and challenge are unavoidable in this confused and challenging enterprise of bridging the immense gap between school attainment and brain structures. We have attempted to address these difficulties in three ways.

First, for those readers able to invest the time to read from beginning to end, we have provided a strong historical narrative structure, explaining the different phases of the research, and why we moved from one phase to the next. We believe that this helps ground the issues involved by explaining our reasons for undertaking each phase.

Nonetheless, for the reader who only wishes to dip into the book, there is an element of repetition and potential confusion, as we gradually build an unfolding picture, in which we learned from our early work both its strengths and weaknesses.

Second, at the end of each chapter we have provided a reasonably lengthy summary, providing both an *aide memoire* and a substitute for full reading. We have also provided, in addition to the subject and author indexes, a glossary of standard terms that we have taken for granted but are, in truth, specialist to the various contributory disciplines.

Third, some chapters are more important than others. The reader who wishes to cut to the chase may find it sufficient to read the summary chapters—chapters 2, 7, 8, and 9. This will bypass the 15 years of research and the background information on dyslexia, learning, reading, and the brain the intervening chapters document. A strategy of reading in this order, and then dipping into the earlier chapters, may well be a useful compromise for those with a strong need for closure.