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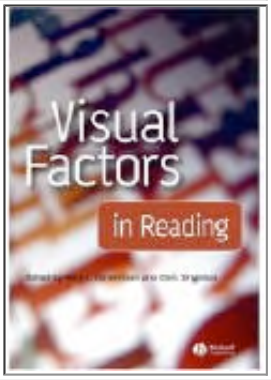
Visual Factors in Reading

Author:	Piers L. Cornelissen & Chris Singleton, Eds. (2007)	
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Scientific views on reading have remained controversial even after a considerable amount of research in several disciplines. Psychological research on word recognition considers this a process of grapheme to phoneme conversion and most theories assume that reading depends heavily on metalinguistic knowledge and therefore is a language based phenomena. This view gives less importance to visual theories of reading. However recent work in the neuroscience and psychophysics of visual processing suggests that many important aspects of visual word recognition are based on visual processing and that seemingly low level factors exert considerable influence on reading speed and accuracy. This view has serious implications for understanding psychological mechanisms of reading as well as processing limitations, stemming from brain abnormalities, found in visual word recognition in dyslexics.

The book under review is a collection of papers that consolidates evidence on various visual factors that influence visual word recognition - apart from metalinguistic factors. High precision eye tracking has led to a tremendous rise in empirical evidence demonstrating that reading depends on finely manipulating several visual factors. The book has ten chapters apart from a preface.

The researchers writing herein indicate a trend altogether different and sometimes complementary to the existing modelling and theorising used to understand word recognition mechanisms and, most importantly, reading failure in dyslexia. For example, issues like effect of print size and letter position on speed and accuracy of visual word recognition is a novel dimension to research in this area. Some of the papers offer experimental evidence of visual processing effects on word recognition, whereas others show focus on dyslexia. A dyslexic's inability to read has several causes, but a majority of papers in this volume point out how variables like word length, print size and visual stress may offer important clues about dyslexia. Occulomotor performance in dyslexics has been poorly integrated in several popular

models of dyslexia and hence papers on dyslexia in this book will offer innovative thinking on this subject.

Reading a word invariably involves fixating letters within it and then acquiring meaning. Several eye tracking studies in different orthographies have found that there is an optimal viewing position. This position depends on word length and is language specific. In their article on optimal viewing position, Brysbaert and Nazir consolidate early empirical work that demonstrates the effect of this privileged position on word recognition. However, the authors note that the optimal viewing effects obtained so far in single-word recognition studies may not explain such phenomena in text processing. Moreover it is possible that this prime position will vary with various psycholinguistic factors of the word, such as frequency of the word, familiarity, lexicality, and context in which that word appears.

Emergence of print awareness in preschool children is the theme of the chapter by Justice et al. Based on a small-sample eye-tracking study the authors argue that print awareness does not develop automatically but needs to be taught explicitly. The chapter informs readers on the link between emerging visual attentional factors and literacy.

Recent developments in psychoacoustic and eye tracking experiments on visual word recognition have revealed important data on hemispheric contributions to reading. Shillcock and McDonald emphasise the importance of hemispheric distribution of labour in reading achievement and its implication for understanding a dyslexic's word-reading deficits. Since it is also known that dyslexics often have abnormal cortical activations, it is but expected that this would result in some form of imbalance between timely division of labour between hemispheres. Lavidor and Bailey in their chapter offer further evidence of hemispheric differences in processing letter strings. In two experiments they show that letter position and number of letters interact in word recognition. Whitney and Cornelissen provide evidence of this letter position constraint in dyslexics through examining SERIOL (Sequential Encoding Regulated by Inputs to Oscillations within Letter units), which offers an integrative model of letter recognition and reading but has shortcomings, for example it does not consider phonological aspects of processing. Though SERIOL offers a very handy and computationally sophisticated account of letter string recognition, considering its special status as a visual object that calls for hemispheric specialisation, it is still not clear how this model would account for contextual effects on word recognition: for example, the effect of the parafoveal words' grammatical or semantic property on the foveal word. Our visual field is highly constrained in terms of the area from which we can acquire information at a time. Maximum information during reading is acquitted from words that are our foveal vision. However, often words that are ahead of the currently fixated word influence fixation time on the current word. This has been termed the effect of the parafovea on the fovea.

Another low level factor that influences word recognition is the shape of a word. Words are visual objects that have contours and as such, all the laws of visual perception apply to them. Beech and Mayall persuasively argue this perspective in their well-written chapter. O'Brien and colleagues explore yet another low level factor: the effect of print size on dyslexia.

Kriss and Evans in their contribution show that the prevalence of Meares-Irlen syndrome (a condition characterised by symptoms of visual stress and visual perceptual distortions) in dyslexia is significantly higher than in control subjects. However, the authors note that so far there are no objective diagnostic tools for this vision disorder. The chapter compares a

dyslexic's visual deficits with matching symptoms of other conditions, perhaps suggesting that dyslexic deficits comprise a range, like the autism spectrum.

In their exclusively theoretical chapter Pammer and Vidyasagar suggest that dyslexia may be traced to an integration problem between visual and linguistic inputs. The authors propose a schematic model largely making use of the magnocellular deficit model of dyslexia (Skottun & Skoyles, 2008).

All but one of the papers in this collection were written by experimental researchers, for an interdisciplinary audience, and hence offer a very solid, detailed blend of data and theory. Most researchers and educators who deal with dyslexia and reading on an everyday basis will find important concepts in this book that do not appear in the textbook discussions they normally access, perhaps because of their own theoretical preference, i.e., is dyslexia a visual or a linguistic problem? Perhaps the most important motive behind this collection is to bring the visual and occulomotor, the so-called low level factors, into scientific discussions of visual word recognition and the psychophysical basis of dyslexia.

Cornelissen and Singleton have compiled a very useful selection of chapters for graduate students working on visual processing in reading, psychologists dealing with literacy issues, and anyone with a scientific interest in reading and its dysfunctions. Their book is - and is going to be - a very important reference work on visual word recognition and the visual basis of dyslexia.

References

Skottun, B. C., & Skoyles, J. R. (2008). Coherent motion, magnocellular sensitivity and the causation of dyslexia. *International Journal of Neuroscience*, *118*(1), 185-190.

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