Proust and the Squid: The story and science of the reading brain

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Henrietta Dombey explores Maryanne Wolf's application of neuroscience.

Why is it that nearly all children learn to talk with ease, but for most learning to read only comes with teaching and much conscious effort? A few decades ago, Frank Smith seduced many educators into thinking that if only they went about it the right way, they could make learning to read as easy for children as learning to talk. But it didn?t seem to work for most. Cognitive neuroscientist Maryanne Wolf, a renowned expert on the reading brain, shows convincingly in her latest book, **Proust and the Squid**, that the structures of our brains have something to do with the difficulties of learning to read. **Henrietta Dombey** explains Wolf?s thinking.

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Reading is not ?natural? in the same way that spoken language is. Through this meticulous account, of paths of development of written language ? in various branches of the human race as well as in the learning child ? we begin to understand why mastery of the written word takes time and does not come easily to all.

It?s now universally agreed that children learn to talk through being engaged in meaningful communication. This puts them in a position to unconsciously infer the underlying grammatical rules that their brains seem predisposed to learn. The more language they are exposed to, the richer that language is, and the more they are listened to ? for their meanings rather than the niceties of grammar and pronunciation ? the faster and more powerfully children learn to talk.

When it comes to making sense of and through written language, part of the problem is that there is not the same pressing communicative need. Even if there were, even if an important area of children?s experience could be communicated only through written language, this book suggests that there would still be difficulties.

Meanwhile the vast majority of writing on the teaching of reading has treated the brain as a black box, as something not amenable to study ? a box into which information is put and out of which other information emerges. But we now have the technology to see what different parts of the brain are doing as we go about reading. What is revealed throws light on a number of important issues in literacy learning. As this lucidly written book demonstrates, we ignore the structures and processes of our brains at our peril.

The structures and processes of the brain

Wolf writes about (and presents lucid diagrams of) brain structures that in past millennia enabled us to gather visual information speedily from our physical environment, interpret it and make decisions about action in a way that preserved our genes. She shows us that these same structures are now pressed into service for a very different purpose, and have to be elaborately connected with the various structures dealing with concepts and oral language, if we are to read and write. They need to be recycled, educated into their new roles.

Different writing systems make different demands on the brain?s structures. For fluent alphabet readers, most activity takes place in the posterior of the left hemisphere. However, reading Chinese, with its system of several thousand ideograms, makes use of many areas across both hemispheres. Wolf tells us of a Chinese stroke patient who lost the ability to read Chinese, but could still read English.

Learning to read in any language depends on the brain?s ability to connect and integrate various sorts of information ? visual, auditory, linguistic and conceptual. Learning effectively depends, in part, on the maturation of these areas and the connections between them. So it isn?t just that it?s hard to interest three-year-olds in the business of reading: their brains are simply not yet mature enough to do it. While the sensory and motor regions are sufficiently developed before children turn five, this is not true of the regions of the brain, such as the angular gyrus, that are responsible for rapid integration of auditory, visual and verbal information. The problem is with the axons, which connect the neurons. They are insufficiently myelinated: that is the communicative pathways lack the myelin coating that is necessary for rapid communication. And it may be that this process takes place more slowly in boys than in girls.

So we should not be expecting children under five to make rapid progress in learning to read. Wolf observes ??the many efforts to teach a child to read before four or five years of age are biologically precipitate and potentially counter-productive for many children.? (p.96) However, she is at pains to stress that myelination does not happen at the same rate in all children: some may very well be ready to learn to read at four. But clearly we should not build an education system on the assumption that all four- and five-year-olds are ready to learn to read. In support she cites work by Goswami, who found across three different languages that European children asked to begin to learn to read at five did less well than those who started at seven (Goswami, 2002)*****.

A hugely complex network

Learning to read does not just make use of brain structures that originally served other purposes: it also changes them. The brain is not a simple container for storing information and ideas, or a pre-wired system with fixed structures and functions. Instead we learn that it is a hugely complex network that changes its structure according to how it is used. ?Reading in any language rearranges the length and breadth of the brain.? (p.64) For example, before they learn to recognise a letter automatically, children have to make some of the neurons in the visual cortex specialists in detecting the features of each letter. For fluent and meaningful reading, the neurons in this network have to be connected with neurons in other networks in many parts of the brain, through fully myelinated axons. To recognise common letter patterns or words, assemblies of cells have to learn to operate as working units.

As skill in reading develops, as children learn to draw on their background knowledge to make sense of what they read, the areas of the right hemisphere that are involved in the process become as expansive and as broadly distributed as the left hemisphere language areas.

Dyslexia and other reading disabilities

But as we all know, reading comes to some with particular difficulty. As mother of a dyslexic son and descendant of an apparently dyslexic ancestor, Wolf has much to say about dyslexia. With considerable supporting evidence, she argues that the brains of dyslexics are rather different from the brains of those of us who read with more ease. She reports in detail how the brains of dyslexic students make more use of structures in the right hemisphere, developing cumbersome pathways to connect visual and verbal regions in a hemisphere that does not operate with temporal precision.

But the pathways are not identical. Wolf concludes that there is no one form of dyslexia, but a continuum of reading disabilities reflecting the many components of reading and features of the languages and orthographies involved. We need to look not for the primary cause of dyslexia, but for its sub-types. While some deficits are subtle, involving only fluency and comprehension and appear later in school, most appear early on, as children struggle to learn to decode and spell. Tests of phonemic awareness (individual speech sounds) and the naming speed for letter recognition are the best predictors for these more common problems. Children who find both difficult should not just be left to go at their own speed: they are in need of intensive intervention.

This intervention should not be narrowly focused on phonics: ?Intervention for children with dyslexia should address the development of each of reading?s contributory components ? from orthography and phonology to vocabulary and morphology ? their connections, their fluency and their integration in comprehension.? (p.194)

With a roll-call of some of the most illustrious minds the world has known, Wolf reminds us that many dyslexics have astonishing talents in fields where visual representation and the interpretation of patterns play an important part. Whether these talents are there from the start, or result from their reading problems, they are indisputable ? in radiology, engineering, computer design, business, architecture, art and acting. She reminds us that just because they have problems in reading and writing, we must not patronise dyslexics.

So this book has plenty to say. And it says it in a way that is both closely argued (with full but unintrusive notes at the end of the book) and pleasingly written. It shows abundantly that unlike many writers on this topic, Wolf understands how to read literature, how to engage in the complex process of making meanings true to the text that resonate with your experience. Even if the squid gets little mention in the text, she is justified in invoking Proust in her title.

***** Goswami, U. (2002). Phonology, reading development and dyslexia: A cross-linguistic perspective. **Annals of Dyslexia, 52**, 1-23.

Proust and the Squid: The story and science of the reading brain by Maryanne Wolf with illustrations by Catherine Stoodley is published by Icon Books (978 1 840468 67 0) at £12.99 hbk.

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