

Neuroscience of the reading process



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There is no doubt that our brains are flexible, i.e. can be moulded according to humankind's socio-cultural activities, and much has been written on this. Various tools already allow these processes to be analysed, from the simple study of patient conduct, to the actual images obtained through magnetic resonance imaging, the sophistication of the measurements of changes in electrical activity during electroencephalography, or the insertion of intracranial electrodes.

However, it is no less certain that, lately, the concept of cerebral flexibility has been harmed by the coverage of a series of false proposals, one of which, for example, is the infinite capacity of the brain. On the basis of conversations held between the journalist Gareth Cook and neuroscientist Stanislas Dehaene (*Mind & Brain*, 47) about his latest research in this field, it may be concluded that there are some restrictions that limit the brain's capacity. From a structural anthropological focus, this means that beneath the apparent cultural diversity there lie some common basic structures.

For example, the neurologist Mark Changizi proved that all writing systems share certain basic forms; those associated with natural forms and for which recognition is possible thanks to our cerebral configuration are the evidence of natural abilities, the pre-configured structures of which adapt or "recycle" in accordance with cultural necessities, evolving during the learning process with the least possible changes to the cerebral circuits, and implying that learning one skill supposes "unlearning" another.

Therefore, for example, optimising reading requires reading in parallel and at a high speed, which means minimizing our "specular vision", in contrast to dyslexics who have this capacity to detect more advanced symmetries, reading sequentially, but who at the same time have difficulties in visually recognizing the shape of letters, spatial organisation and a disorganisation in the phonological system (slow to or incapable of visually correlating the letter with its sound).

The visual area for word forms is located in the lower part of the brain's left hemisphere. This is a specific zone for written characters that belongs to a large area in unvarying visual recognition; this is, as for human faces and objects such as scenes. There is also an area for the recognition of small visual natural forms, which is also present in primates, which would deal with shapes found in nature, such as, for example, those resulting from the configuration of tree branches and which can link to letter forms, like the letter "Y", which is easily identified by primates.



The human brain is naturally formed to decipher one letter from another. It is in this way that we read, and as soon as we reach a certain fluency in this, we read in parallel and not sequentially. We rapidly break down the letters of each word in parallel, creating the illusion that we are reading the whole word, something that is unreal since our visual recognition system for letters does not detect the overall outline of words, but rather does so grapheme by grapheme. Consequently, according to Dehaene, our brain would adjust better to an educational reading method that is analytical rather than holistic (learning by words and phrases).

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