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Mapping the path from symbol visualization to comprehension in the brain

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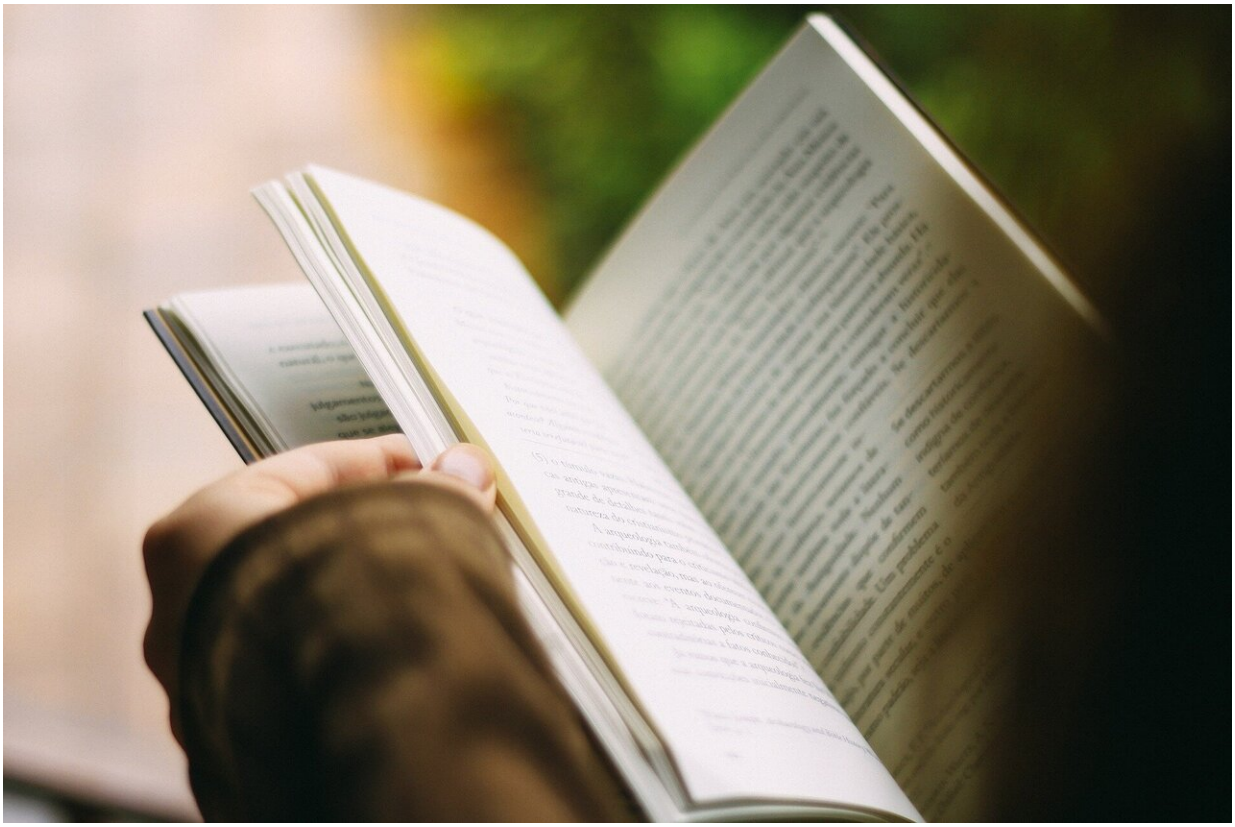

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A trio of researchers from Aston University, the University of Cambridge and Royal Holloway University of London has mapped the neural process that occurs during conversion of symbols that are read to

understanding what they mean. In their paper published in *Proceedings of the National Academy of Sciences*, Jo Taylor, Matthew Davis and Kathleen Rastle describe fMRI studies they carried out with volunteers and what they learned from them.

Processing occurs in the brain when converting given symbols to meaningful information. The first time a reader encounters an acronym on Twitter, for example, they learn it, and from then on, the conversion happens naturally. In this new effort, the researchers sought to learn more about what actually happens in the brain when that conversion occurs.

To better understand the conversion process, the researchers asked 24 English-speaking volunteers to learn to read and recognize words in an unfamiliar symbolic language. Each of the words were assigned meanings that correlated with words (nouns) they knew in English. Next, each of the volunteers was asked to submit to fMRI scans as they read the words that they had learned in their training classes.

The researchers observed as the brains of the subjects processed the newly learned words. They found that the physical representation of the words—the symbols that were used to form them—was first handled by a rear part of the ventral occipitotemporal cortex. But then, as the brain sought to understand the meaning of the words, the activity moved to a more forward part of the same brain region. They claim the scans show the transition as it takes place—from symbol recognition to the deeper meaning behind the symbols. The researchers also found that words that sounded the same or had similar meanings activated the same brain regions in nearly the same ways.

More information: J. S. H. Taylor et al. Mapping visual symbols onto spoken language along the ventral visual stream, *Proceedings of the National Academy of Sciences* (2019). DOI: 10.1073/pnas.1818575116