

Title: The effect of inter-hemispheric connectivity when resolving ambiguities in reading.

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Abstract

A computational model of certain aspects of the cortex related to reading is developed. The connectivity arrangements between modeled areas of orthography, phonology and semantics are according to the psychophysical theories of Eviatar and Peleg, in particular with distinctions between the connectivity in the right and left hemisphere. The two hemispheres are connected and interact both in training and testing in a reasonably "natural" way. Experiments show that this integrated model reacts in a comparable way to human psychophysical experiments performed by Eviatar and Peleg on ambiguous homographs designed to tease out the differences in the two hemispheres. Our work further shows the importance of the transfer of information via the corpus collosum between them and suggests further human experiments.

This work presents the computational advantage of having two networks that can exchange information: LH fully connected (Orthography, Phonology and Semantics) and RH lack of connection between Orthography and Phonology. Our work focuses on the different possible connections between networks representing the two hemispheres and how these differences affect the results of processing homophones. The simulation examines the activation of meanings of ambiguous words with polarized meanings (where one meaning is much more frequent (dominant) in the language) and has shown that transfer of information from a 'right hemisphere (RH)' network to a 'left hemisphere (LH)' network, when context biasing to the nondominant meaning is presented after the initial presentation of the word, is the most efficient mechanism for recovery from erroneous activation of the dominant meaning. Results indicates properties about the nature of the connection such as that data transfer is more beneficial when done from RH to LH (in this specific task) and that connection between the hemispheres via the CC is "weakly coupled" as compared to the inner hemisphere connections. These results have suggested human experiments which are now being conducted..

