

A neurocognitive theory of attentional modulation of semantic spread of activation

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The standard explanation of semantic priming involving automatic facilitatory processes and controlled facilitatory and inhibitory processes and their differential time-course has been challenged by findings of context effects at short stimulus onset asynchrony (e.g., Bodner & Masson, 2003; Smith, Besner & Miyoshi, 1994). In particular, the debate focuses on whether a single controlled-processing framework can account for semantic priming or whether an automatic processing component needs to be postulated. Although there are strong arguments in favour of automatic semantic processing (Neely & Kahan, 2001), the finding that attention modulates semantic priming in healthy participants, in the elderly and in neuropsychological patients (e.g., Davelaar, 2004; Giffard, et. al., 2001; Moritz, et. al., 2001) begs a closer look at cognitive theories of semantic priming.

In this presentation, a neurocognitive framework will be proposed in which a number of findings (including the prime-retention effect and hyper-priming) can be accounted for without recourse to additional task-specific or population-specific processes. The framework assumes a posteriorly localised semantic memory system that contains inhibitory as well as excitatory connections between related concepts. This memory system is interconnected with a frontal cortical system that supports focused attention of the presented prime words. It will be shown, through computer simulations, that the facilitatory and inhibitory processes that are inferred from behavioural data are different outcomes of the neural dynamics between the two systems. The results suggest that the strict dichotomy between automatic and controlled processing is blurred, if not absent, at the neural level of description. Future directions for empirical and computational research in cognitive neuroscience will be considered.

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