

A Network of Nouns and Their Features :A Neurocomputational Study

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Abstract : Neuroimaging studies indicate that a large fronto-parieto-temporal network support nouns and their features, with some areas store semantic knowledge (visual, auditory, olfactory, gustatory,...), other areas store lexical representation and other areas are implicated in general semantic processing. However, it is not well understood how this fronto-parieto-temporal network can be modulated by different semantic tasks and different semantic relations between nouns. In this study, we combine a behavioral semantic network, functional MRI studies involving object's related nouns and brain network studies to explain how different semantic tasks and different semantic relations between nouns can modulate the activity within the brain network of nouns and their features. We first describe how nouns and their features form a large scale brain network. For this end, we examine the connectivities between areas recruited during the processing of nouns to know which configurations of interaction areas are possible. We can thus identify if, for example, brain areas that store semantic knowledge communicate via functional/structural links with areas that store lexical representations. Second, we examine how this network is modulated by different semantic tasks involving nouns and finally, we examine how category specific activation may result from the semantic relations among nouns. The results indicate that brain network of nouns and their features is highly modulated and flexible by different semantic tasks and semantic relations. At the end, this study can be used as a guide to help neuroscientists to interpret the pattern of fMRI activations detected in the semantic processing of nouns. Specifically; this study can help to interpret the category specific activations observed extensively in a large number of neuroimaging studies and clinical studies.

Keywords : nouns, features, network, category specificity

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