Abstract of thesis entitled

"An fMRI Study of Conceptual Combination in Chinese"

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A substantial body of neuroimaging studies on semantic processing has focused on single word level. But in everyday language, words are very often combined to express a new concept in a productive manner. The present study utilized functional magnetic resonance imaging (fMRI) to examine the neural mechanisms for combining noun concepts (i.e. N+N conceptual combination) in the human brain. Furthermore, this research was also aimed to investigate the neural processing of those noun-noun combinations denoting motion. During the fMRI experiment, concept fusion task was employed in which subjects were instructed to judge whether the sequentially presented nouns could be combined into a single coherent concept; whereas a font type judgment used as the control baseline. In the concept fusion task, there were two types of trials, namely *dynamic N+N combinations* and *static N+N combinations*. The former one contained noun constituents denoting motion while the latter one did not. The neuroimaging results evidenced that performing N+N conceptual combination activated a predominantly left-lateralized network, encompassing the inferior and superior frontal gyri, inferior temporal gyrus, anterior cingulate and some cortical nuclei. The right inferior frontal cortex showed only minimal activation which was much weaker than its left homologue. Most of these neural responses were most likely implicated in semantic control integral to conceptual combination. Importantly, the left-lateralized prefrontal activation has suggested that it is the left, but not the right prefrontal region playing a predominant role in N+N conceptual combination. On the

other hand, dynamic N+N combination specifically recruited a distributed neural network, including the right middle occipital cortex and cuneus, left cerebellum, right-lateralized yet bilateral posterior cingulate, right posterior temporal and left superior temporal cortices, and the right caudate nucleus. We suggested that these regions mediated motion processing and implicit processing of motion-related spatial attributes, which might be elicited by the noun constituents denoting or implying motion. These results showed that neural regions related to motion processing can be activated by the words denoting or implying motion even in the absence of physical moving stimuli.