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Neural Phase Synchrony on Understanding Meanings of Symbols

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Abstract: The establishment of symbolic communication system, i.e., making a shared meaning system from meaningless signals, is studied in experimental semiotics (Galantucci, 2005). Local neural activities within a brain region during a symbolic communication task (Konno et al., 2013), where two participants try to establish a symbolic communication system from scratch, has been studied (Li et al, 2015). It is, however, not certain how information bindings between different brain regions is involved in a cognitive process associated with the establishment process. We analyzed EEG phase synchronization, as a measure of functional connectivity, of participants engaged in the symbolic communication task. We found the recruitment of fronto-occipital synchronization at 40 Hz frequency (gamma band), when a symbolic message was displayed, became fast when establishing a symbolic communication system. This finding suggests that frontal-occipital information binding by phase synchronization becomes efficiently used in the course of mutual understanding of symbolic messages.