

Dynamic Inter-brain Synchrony in Real-life Creative Problem Solving in Teams: an fNIRS-based Hyperscanning Study

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Abstract

The ability to solve problems creatively is a pivotal characteristic of human brain, yet its underlying neural mechanism remains largely unknown. Previous hyperscanning studies mainly analyzed the entire time series of brain signals to reveal an overall pattern of inter-brain synchrony (IBS) during social interaction. However, we argue that this approach might not be able to capture the dynamic properties of inter-brain interaction. In this study, we proposed a novel approach based on sliding windows and k-mean clustering to identify the dynamic modulation of IBS patterns during an interactively creative problem-solving task. Results showed that inter-personal communication could be characterized as a series of dynamic and modular IBS states along the task. Besides, the transition of dynamic IBS states was highly correlated with the dyad's creativity ability. In sum, the proposed approach holds great promise for advancing our current understanding of the dynamic neurocognitive processes underlying social interaction.