Unravelling episodic memory structure in a lifelike continuous experience using Hidden Markov Models

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Perception and memory have been widely studied in the context of discrete pictures or words. However, in real-life, we are faced with a continuous stream of perceptual input that arrive on a wide range of timescales. Previous studies have shown that our brain can segment this continuous stream into events that not only reveal a hierarchy from coarse to fine time-scales, but also integrate them differently throughout the cortex, with processing timescales increasing from tens of milliseconds in early sensory regions up to hundreds of seconds in higher-order regions. However, the neural mechanisms that support such event segmentation process during online encoding of a naturalistic and continuous experience remain unknown. To address this issue, we tested whether the formation of meaningful event models could be expressed by specific patterns of electrophysiological activity recorded from healthy humans elicited during the online encoding of a 50 minutes movie. A Hidden Markov Model based algorithm was used to identify latent variables in the EEG and relate them to participant?s later memory recall of the encoded events.

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