Temporal decoding of selective recollection with psychophysiology

ABSTRACT:

Background
Our brains store memories of a vast number of past experiences. To draw effectively on these experiences we need to influence what we remember. This selective recollection requires strategic control that acts before memories are retrieved.

Aims
We used EEG to investigate how and when people recover desired information. Measuring time-resolved neural responses during recollection allowed us to quantify pre-retrieval selection and its modulation by internal goals and external cues.

Method
In a first study we examined univariate event-related potentials (ERPs) in two preregistered experiments (Ns = 28). We then applied multivariate decoding analysis to investigate the selective reinstatement of goal-relevant neural patterns during recollection.
Objects were studied as pictures or auditory names. One source was designated as targets in each memory test, and cue overlap varied by probing memory with visual names (Experiment 1) or line drawings (Experiment 2).

Results
The left parietal ERP indexing recollection was selective when test cues overlapped more with the targeted source. In contrast, reinstatement of neural patterns from the study phase was selective regardless of cue overlap. Decoding of EEG data prior to retrieval cues also revealed preliminary evidence (Experiment 1) of goal representations hypothesized to initiate selective recollection.

Conclusions
The data show that selection can act before recollection if there is sufficient overlap between retrieval cues and targeted memory traces. The ERP and decoding results point to selection at both early and late stages of the retrieval cascade. Internal goals may modulate initial reinstatement of remembered information, while external cues modify later processing.

Keywords

Decoding; EEG; ERP, Recollection

Researcher's Contacts:

Alexa Morcom
School of Psychology
Pevensey I
University of Sussex
Falmer, BN1 9QH
United Kingdom