Title: Assessing autobiographical memory in patients with disorders of consciousness

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Abstract: 2.13

Assessing cognitive function in patients with disorders of consciousness (DOC) is a challenging task. Past research has shown that some DOC patients have residual brain activity, respond to sensory stimulation, can pay attention and follow commands. However, little is known about other dimensions of their conscious experience. For example, it is unclear whether they can form novel autobiographical memories.

In this study, 12 healthy participants and one DOC patient were recruited and asked to sit in a wheelchair while a researcher wheeled them around a local mall. Importantly, a small wearable camera was mounted on each participant, in order to capture autobiographical videos from this visit. One week later, the participants were scanned while they viewed a series of videos from different categories. Some of the videos were autobiographical (taken from their own experiences at the mall a week prior to scanning), other videos were of other people’s experiences at the same location, and some videos were recordings of other people’s experiences in a different location altogether. Participants were asked to simply view the videos and no overt behavioural response was required. A cross-validate, machine learning model was trained on the fMRI data from all participants. The model was able to successfully classify the video categories above chance in all participants, including that of one DOC patient, implying that there was a shared mechanism differentiating autobiographical videos from non-autobiographical ones. The model feature weights revealed that regions in the fronto-prietal network, medial temporal lobe and ventral visual stream were critical in differentiating between autobiographical memories and non-autobiographical ones. This study uses a novel paradigm that allows researchers to investigate autobiographical memory in patients with brain injuries that are unable to respond to experimental stimuli overtly and was successfully applied in one DOC patient.