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Comment on “Detecting Awareness in the Vegetative State”

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Abstract

In a report of a single patient in a persistent vegetative state, Owen *et al*(1) claim that the presence of task-specific brain activation in response to verbal command implies both covert conscious awareness and a capacity for intention. We argue that neither can be securely inferred from the evidence presented.

Owen and colleagues' recent article on detecting awareness in the persistent vegetative state (PVS) (1) draws far-reaching conclusions about the neural basis of consciousness on the basis of data that – while being of great interest – do not support them.

The authors studied the brain activity in response to auditory cues of a patient satisfying established criteria for a persistent vegetative state. The cues were verbal instructions to imagine performing one of three tasks: playing tennis, exploring a house, or simply relaxing. In comparison to the “relaxed” condition, functional magnetic resonance imaging showed instruction-dependent brain activation similar to that observed in awake normal participants obeying the same instructions. From the similarity of brain activation the authors inferred an identity of cognitive states: essentially that the patient was consciously imagining playing tennis and exploring a house in much the same way the control participants were.

This inference makes the unjustified assumption that the association between a behaviour and a pattern of brain activation implies the converse. It does not. The authors correctly state that the *absence* of brain activation on functional imaging is not proof that the associated behaviour is not taking place. However, it is also the case that the *presence* of brain activation is not sufficient evidence for the associated behaviour – here supposedly consciously mediated behaviour – *unless* one has also shown that the same activation cannot occur without it.

Indeed, as the authors concede, there is an extensive literature demonstrating involuntary and elaborate activation of task-specific brain areas in response to passive exposure to stimuli associated with a specific action, with or without conscious awareness. This objection cannot be dismissed by appeal to the complexity of activation, or – given the haemodynamics of the BOLD (blood oxygen level dependent) response – the duration of the functional signal. The key conditions: playing tennis and exploring one's home were not even matched to the baseline condition for the semantic associations of the individual

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words*. All the activation reported in this patient may therefore have been wholly automatic and unconscious.

The authors also assert that the task-specific brain activity indicated the patient's "decision to cooperate" thereby demonstrating a clear "intention". But one cannot speak of *decision* where there is no evidence of *choice*(2). Had there been no functional brain response the authors would not have concluded that the patient had not cooperated, but merely that she had been unaware. The hypothesis of whether or not this patient can *choose* – to cooperate or anything else for that matter – has not even been tested.

The question this study has sought to address has a significance far beyond the limits of the neuroscience community, with an impact on individual lives that is hard to calculate. While we appreciate that PVS presents formidable challenges of interpretation, it is imperative that radical inferences drawn from such data are carefully considered before publication.

References

1. Owen AM, et al. Science. Sep 8.2006 313:1402. [PubMed: 16959998]
2. Nachev P, Rees G, Parton A, Kennard C, Husain M. Curr Biol. Jan 26.2005 15:122. [PubMed: 15668167]

*For example they could have instructed the subjects "Imagine playing tennis" vs "Do not imagine playing tennis", rather than vs "Relax".