Pathfound: Revealing the neural basis of semantic memory and its breakdown in semantic dementia and stroke aphasia

https://neurodegenerationresearch.eu/survey/title-of-pipathfound-revealing-the-neural-basis-of-semantic-memory-and-its-breakdown-in-semantic-dementia-and-stroke-aphasia/

Title of project or programme

Title of PI	Pathfound: Revealing the neural basis of semantic memory and its breakdown in semantic dementia and stroke aphasia

Principal Investigators of project/programme grant

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- United Kingdom

Source of funding information

Medical Research Council

Total sum awarded (Euro)

912913.94

Start date of award

01-11-2006

Total duration of award in months

60

The project/programme is most relevant to

- Alzheimer’s disease and other dementias

Keywords

Research abstract in English

Semantic memory represents our knowledge of the meanings of words, objects, people, etc. as well

as our general knowledge about the world. This knowledge is central to everything we do (including speaking, reading, recognising and using objects). The two linked, primary goals of our research programme follow from this centrality of semantic memory; they are to improve our understanding of (a) the nature of semantic impairment in various neurological disorders (i.e., clinical research) and (b) the neural basis of semantic memory (basic science). When semantic memory breaks down, patients are left with significant deficits that affect their employment, acts of daily living, social lives and private pursuits. The current literatures – based on neuropsychological studies of patients, functional neuroimaging (with PET or fMRI) and computational modelling – provide inconsistent answers to these two research questions. We will, therefore, use a deliberate conjunction of five methods to resolve these inconsistencies, thereby securing a foundation on which to interpret patients? deficits. They will also give critical insights about the patients? clinical management and better interventions by speech therapists.Our considerable track record on the topic of semantic memory is already based on a combination of detailed neuropsychological studies of patients, functional neuroimaging of normal and dysfunctional semantic processes, and computational modelling. These models provide a formal method by which neuroimaging and behavioural data can be combined: the architecture of the models (combinations of simple mathematical processing units and connections) can be made to reflect normal or impaired neuroanatomy in a way that simulates the behavioural data from healthy participants and patients. To this methodological mixture we will add: (1) improvements to standard fMRI methods to allow functional neuroimaging of the anterior temporal lobes; (2) recently developed methods for MR multi-fibre tractography (both (1) and (2) from our MRC Pathfinder grant); and (3) transcranial magnetic stimulation studies designed to extend and mimic patient performance in normal participants. We will also extend our europsychological studies to encompass additional patient populations. The five methodologies will be used together in order to answer four key questions: (1) What is the organisation/structure of representations within the anterior temporal lobe (the damage associated with semantic dementia)?; (2) What is the role of frontoparietal areas in semantic cognition/control?; (3) What are the individual contributions of temporoparietal and prefrontal regions (the damage producing comprehension impairments in CVA)?; (4) How does the full neural network give rise to semantic cognition?

Lay Summary
In which category does this research fall?

- Clinical research