Computational modeling of semantic decline in Alzheimers disease

https://www.neurodegenerationresearch.eu/survey/computational-modeling-of-semantic-decline-in-alzheimers-disease/

Principal Investigators

AUSTERWEIL, JOSEPH LARRY

Institution

UNIVERSITY OF WISCONSIN-MADISON

Contact information of lead PI
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USA

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Computational modeling of semantic decline in Alzheimers disease

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1

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Research Abstract

Project Summary To interact, communicate, and navigate the world successfully, people must retrieve relevant information from their semantic memory (memory for facts and general

knowledge). Individuals with Alzheimer’s disease have difficulty retrieving such knowledge from early in the course of the disease and progressively gets worse as the disease spreads, a process known as semantic decline. This project examines the mechanisms underlying semantic decline in individuals with Alzheimer’s disease by developing and applying novel computational tools. The extent to which semantic memory is impaired in individuals with Alzheimer’s disease can be probed using behavioral experiments. Individuals with Alzheimer’s as well as those at-risk for the disease display a pattern of behavior on these tasks distinct from healthy individuals. Despite decades of research, explanations of these behavioral impairments focus almost exclusively on cognitive mechanisms that may explain a patient’s current behavior at a given time point, but without an account of the transition from normal, pre-symptomatic behavior to fully impaired behavior. Existing models fail to explain the mechanisms by which semantic memory and memory retrieval processes degrade over time due to Alzheimer’s, limiting our understanding of the development of the disease, as well as hindering our ability for prognosis, early detection measures, and possible interventions. This project will test computational models of how the disease spreads, making specific quantitative predictions about the decline of semantic memory. Additionally, we will develop a novel machine learning method that can be used to map the structure of an individual’s semantic memory, creating opportunities for individualized behavioral interventions to improve semantic memory and improve the quality of life for individuals with Alzheimer’s disease.

Further information available at:

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