

Scientists discover new computerized linguistic approach to detect Alzheimer's disease

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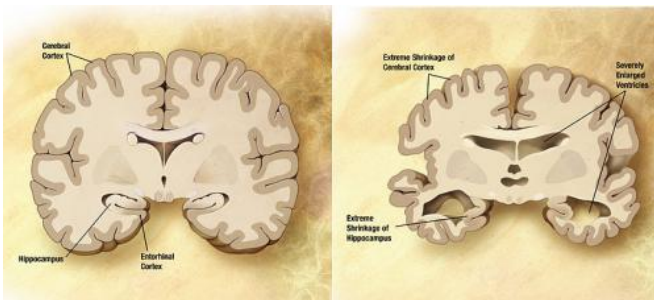


Diagram of the brain of a person with Alzheimer's Disease. Credit: Wikipedia/public domain.

Researchers have discovered how to diagnose Alzheimer's disease with more than 82 per cent accuracy by evaluating the interplay between four linguistic factors; and developing automated technology to detect these impairments.

The study, led by Dr. Frank Rudzicz, Scientist, Toronto Rehabilitation Institute (TR), UHN, is published in the December issue of the *Journal of Alzheimer's Disease*. The method and automated application of the assessment is proven to be more accurate than the current initial assessment tool used by health-care professionals. It can also provide an objective diagnostic rating for dementia.

Based on the analysis, it was determined that four collective dimensions of speech are indicative of dementia: semantic impairment, such as using overly simple words; acoustic impairment, such as speaking more slowly; syntactic impairment, such as using less complex grammar; and information impairment, such as not clearly identifying the main aspects of a picture.

"Previous to our study, language factors were

connected to Alzheimer's disease, but often only related to delayed memory or a person's ability to follow instructions," says Dr. Rudzicz, who is also Assistant Professor, Department of Computer Science, University of Toronto, and a Network Investigator with the AGE-WELL Network of Centres of Excellence. "This study characterizes the diversity of language impairments experienced by people with Alzheimer's disease, and our automated detection algorithm takes this into account."

Dr. Rudzicz further adds, "the driving force that makes this analysis so accurate is the large number of measurements, behind the scenes, that are precisely and automatically detected from speech using our software. An advantage of this technology is that it is repeatable—it's not susceptible to the sort of perceptual differences or biases that can occur between humans."

In this study, the researchers examined speech samples (including audio files) from a database of patients diagnosed with possible or probable Alzheimer's disease and additional samples from [97 control subjects](#).

"Every caregiver knows that people with dementia have good days and bad days—we can tell this by talking to them, because speech is a rich source of information on the brain's cognitive function," says Dr. Jed Meltzer, neurorehabilitation scientist, Rotman Research Institute at Baycrest Health Sciences, and co-author of the study. "These methods offer a way to assess speech quantitatively and objectively, so we can use them to test interventions such as novel drugs and brain stimulation."

"The demand on the health-care system to support Alzheimer's disease will continue to grow rapidly,"

says Dr. Rudzicz. "Our automated approach will provide an opportunity to give people easier, more cost-effective and accurate access to initial dementia screening."

The researchers will now begin testing the automated screening technology with current patients and control subjects to validate the approach. Dr. Rudzicz is also partnering with the University of Toronto and industry to commercialize the technology through a start-up company called WinterLight Labs.

Provided by University Health Network

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