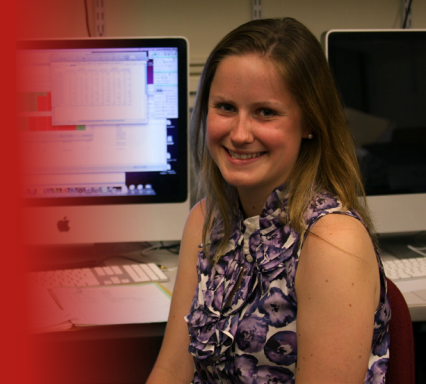# Assessing Alzheimer's Through Speech By Aditi Naik '13

Is there a way to diagnosis Alzheimer's disease before the symptoms start? That is the question Jordan Whitlock, a senior working with Professor Barbara Lust's research group, is trying to answer. If an earlier diagnosis were possible, then doctors could target this incurable disease in its beginning stages, prior to the onset of severe mental decline and brain damage. The goal of Whitlock's research is to show if language deterioration can be an indicator of the early stages of Alzheimer's. She says that the "loftiest ideal of this study is to learn about the progression of Alzheimer's without any genetic testing."

Professor Lust's group uses several language testing methods while conducting this study. Whitlock focuses on a technique called Elicited Imitation, where she creates sentences that slightly vary in the specific part of speech she wishes to examine. Then, she will read these sentences aloud to a subject, who will repeat it back after a few moments. Subconsciously, the subject must reconstruct the sentence in their mind before answering. Here's an example of this technique taken from Whitlock's research where she tests the relative clause:

Original Sentence: The perfectionist noticed the thing which the supervisor forgot.
Subject's Response: The perfectionist noticed the-the problem that the supervisor forgot.

The way the subject phrases the sentence back allows Whitlock to determine what part of language the subject understands and what they are beginning to forget.

This study is a collaborative effort between researchers at the Massachusetts Institute of Technology (MIT), the Massachusetts General Hospital (MGH) in Boston, and Cornell University. Whitlock relies heavily on video chats through Skype to keep communication open regarding the research done between these three groups. The researchers must record the testing dialogues, transcribe them, categorize the response mistakes, and then work through the statistical analysis of the data. The

data from this sort of study could have a great deal of room for variation. Therefore, Whitlock and her colleagues use the ACE-R test, which assesses memory, basic knowledge, and motor skills, to gather preliminary information about each subject.

The control group for this study is a number of young adults from MIT in their mid-twenties. Scientists believe that people generally have their best memory skills around that age. Then, there are two elderly test groups with individuals in their mid-sixties to mid-eighties: one was recruited from the Ithaca area and self-reported to have no cognitive problems, and the other was from MGH and diagnosed with early Alzheimer's, or with Mild Cognitive Impairment (MCI), which has been linked as a pre-Alzheimer's stage.

This study is still in its preliminary stages, but Whitlock has found that there seems to be a general decline in the language ability of elderly speakers, and that "this decline is more pronounced for those with MCI." As this semester continues, Whitlock will attempt to determine whether this trend has statistical significance. Additionally, she will look more closely into the nature of the differences between the speech patterns of the healthy subjects compared to the speech of those with MCI.

Whitlock has worked on this project since last spring and thinks it is "neat to get something so quantitative out of something so qualitative." She first became involved after taking a course taught by Professor Lust, called Language Development Lab, regarding using cybertools for research collaboration across institutions. Along with her research, she helps at the Cornell Language Acquisition Lab, where she works with multilingual children aged two to five. She also manages the sprint lightweight football team and is President of Change for a Change, an organization which raises money for suicide awareness. After graduating this coming spring with a major in Linguistics and a minor in Cognitive Sciences, she plans to continue her study of linguistics at graduate school, with a focus on speech pathology.

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