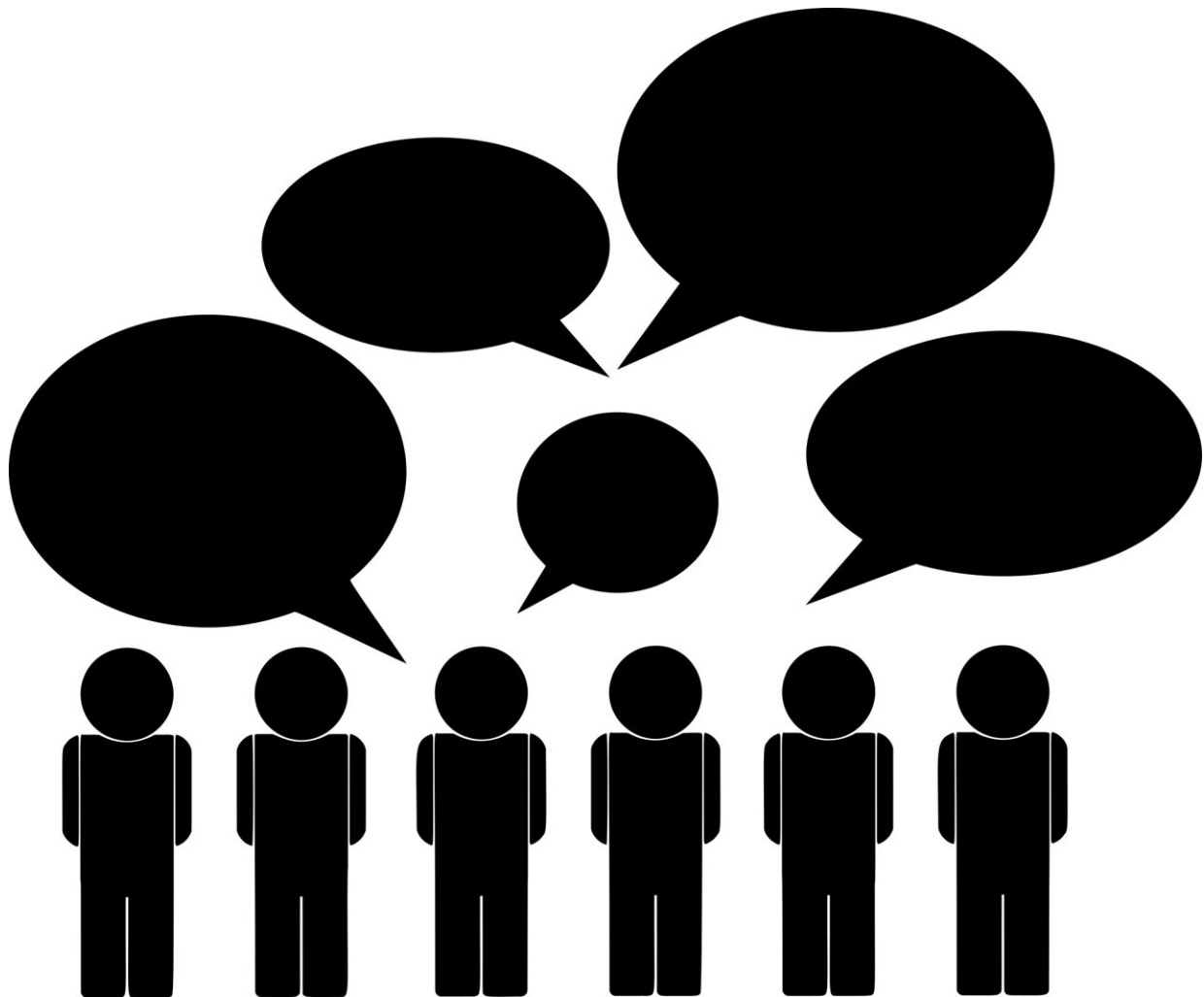


# Vowel intelligibility testing may help monitor progression for people with ALS

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Approximately 31,000 people are living with amyotrophic lateral sclerosis (ALS) in the United States, with an average of 5,000 new cases every year, according to the Centers for Disease Control and Prevention.

ALS, commonly referred to as Lou Gehrig's disease, is a progressive neurodegenerative disease that affects the [nerve cells](#) that make muscles work. As these nerve cells stop working, the brain loses its ability to control movement and trigger specific muscles—including the muscles needed for speaking.

In a new [publication](#) in the *Journal of Speech, Language, and Hearing Research*, researchers in the Penn State Colleges of Health and Human Development and Medicine determined that vowel intelligibility testing could be a good clinical tool and could provide useful information when assessing dysarthria in people with ALS.

According to paper co-author Jimin Lee, associate professor of communication sciences and disorders at Penn State, characterizing [speech](#) function deficits can help clinicians design effective intervention plans for this population.

According to the researchers, up to 95% of people with ALS experience dysarthria—a motor speech disorder characterized by muscle weakness. Dysarthria can cause slurred speech, slowed speech, abnormal pitch and rhythm, changes in voice quality and limited tongue, lip or jaw movement. This reduced speech function is related to poor quality of life in individuals with ALS.

For individuals with dysarthria, clinicians often need to measure intelligibility—how well people are understood by others when they speak. Sentence intelligibility testing—how well sentences are understood by listeners—is one of the most common ways this is tested.

"People with mild dysarthria typically do not experience significant intelligibility loss in sentence production. This is partly because sentences include contextual information that can help listeners recover the intended message by using hints from understandable parts of the sentences.

"As a result, their speech deficits often go undetected," Lee said. "When we removed the contextual information from sentences using vowel intelligibility testing, their speech deficits were more detectable."

In this study, Elizabeth Krajewski, doctoral candidate in the Penn State Department of Communication Sciences and Disorders (CSD), worked with CSD faculty members Lee and Anne Olmstead, and Zachary Simmons, professor of neurology and director of the Penn State Health ALS Clinic and Research Center.

Together, they recruited 23 people with ALS. Participants were asked to produce sentences and [vowel sounds](#). These data were compared to speech from a cohort of speakers who were age- and sex-matched with members of the original sample. Intelligibility scores were obtained from 152 people who listened to and identified the speech samples.

"Sentence intelligibility testing has been found to be accurate in assessing the middle range of dysarthria severity but was showing ceiling and floor effects in individuals with mild or severe dysarthria," Krajewski said. "By examining vowel intelligibility, however, we were able to gain information about the speech function of patients on either end of the severity spectrum."

For individuals on the milder end of the spectrum, sentence intelligibility was higher than vowel intelligibility. For people on the more severe end of the spectrum, however, vowel intelligibility was higher than sentence intelligibility. In addition, the researchers found that vowel intelligibility

testing had high sensitivity and specificity for detecting dysarthria severity.

"I was surprised by the sensitivity and specificity of vowel intelligibility testing," Lee said. "The pattern was completely flipped between speakers with mild dysarthria and speakers with severe dysarthria, and the consistency of this pattern in the number of speakers we had was surprising."

The research team said they are not suggesting the use of vowel intelligibility testing in place of sentence intelligibility testing, but in addition to it. They suggested it may serve as an efficient and feasible tool for assessing dysarthria in [clinical settings](#), however, more research is needed before vowel intelligibility testing could move forward as a clinical tool.

"This study was a good first step in showing the value of vowel intelligibility testing," Lee said. "The test could allow clinicians to hear and see how patients are producing their vowels and what errors they are making. This can be valuable information when providing [clinical care](#) for these individuals."

Lee and Krajewski plan to continue this work in several projects examining this same population of individuals with dysarthria induced by ALS. The researchers are currently monitoring how individuals' speech production and vowel intelligibility change as the disease progresses. Actively monitoring people's symptoms and managing their care in relation to disease progression are among the most important aspects of health care for people with ALS, according to Lee.

Lee emphasized that this research would not have been possible without the participants with ALS and their caregivers who traveled to the Penn State Health ALS Clinic and Research Center for the study to contribute

to scientific understanding of ALS.

"I was inspired by their willingness to do this work, and I learned a lot from them in the sessions we had," Lee said. "I could not have done this without the contributions from our participants and support from the Penn State Health ALS Clinic and Research Center, the Department of Communication Sciences and Disorders and the Social Science Research Institute."

**More information:** Elizabeth Krajewski et al, Comparison of Vowel and Sentence Intelligibility in People With Dysarthria Secondary to Amyotrophic Lateral Sclerosis, *Journal of Speech, Language, and Hearing Research* (2024). [DOI: 10.1044/2024\\_JSLHR-23-00497](https://doi.org/10.1044/2024_JSLHR-23-00497)

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