Study suggests face masks do not muddle speech perception

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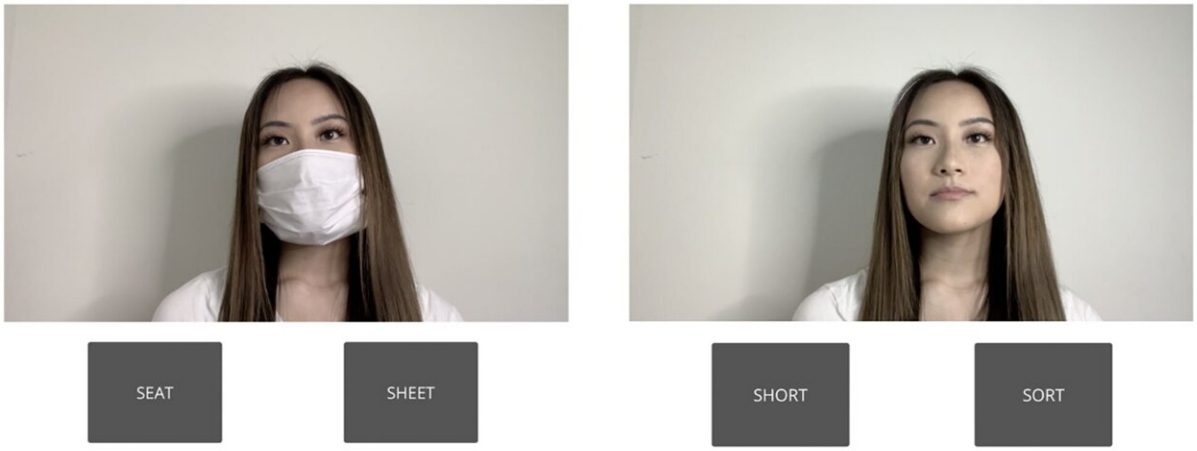

Credit: Carnegie Mellon University

A Department of Modern Languages course sparked an opportunity for four Carnegie Mellon University students to publish and present research at the 2021 Richard Macksey National Undergraduate Humanities Research Symposium at Johns Hopkins University.

The team enrolled in Seth Wiener's summer 2020 "Language in the Time of COVID-19" class and investigated whether or not face masks

affect speech perception between native and non-native English speakers.

"I wanted to pick a topic that I thought was interesting and could make use of my practical knowledge," said Ananya Vasudev, a senior majoring in statistics and machine learning. "I thought it would just be a summer project. I didn't know we could flesh it out enough to present at a conference and publish it."

Sophia Hill, a junior statistics and machine learning major, and Anyah Stempien-Smith and Lindsay Zhang, both junior psychology majors, joined Vasudev on the project team.

"I began the course to help my students learn about the field of psycholinguistics," said Wiener, an assistant professor of second language acquisition and Chinese studies at CMU's Dietrich College of Humanities and Social Sciences. "The goal was to help them gain experience designing a research study, to work as a team to collect and analyze data, and to potentially present and publish the findings."

The quartet did just that. They picked up one of the many research questions posed during the course that was not only timely but also fit into their respective fields of interest.

"There were rumors that face masks were deterring speech perception," said Vasudev. "So we wanted to see if this was correct."

The team devised a series of four videos to examine how face masks affect speech perception between native and non-native English speakers. The videos consist of a presenter who speaks a series of words involving prominent visual lip-rounding clues, like "b" and "p" words or "f" or "h" words. The presenter is either masked or unmasked and is accompanied by audio that was recorded masked or unmasked. The 85

participants (39 non-native speakers and 46 native speakers) chose which word they heard from a pair of words below the speaker.

"We found that facial covering did not have a significant impact on how native and non-native speakers perceive English speech," said Vasudev.

The team found that visual information, or the shape the mouth makes when forming words, may be helpful—but not necessary—to understand speech.

"We were surprised [by this finding] because past work stated that articulatory lips and mouth are important for speech perception, especially for non-native speakers," said Zhang, who was also first author on the study. "This is in conflict so it would be interesting to look at it in the future."

In a broader sense, the researchers did find that non-native English speakers were less accurate and slower in their correct word identification compared to their native speaker counterparts.

Vasudev, Hill, Stempien and Zhang presented their results at the virtual conference in April 2021. The students joined a group of research teams in the digital humanities and listened to presentations at the intersection of STEM and linguistics.

What started as a summer course assignment expanded into a viable research project that influenced their future career goals.

"This was my first time conducting research, and I enjoyed the process," said Zhang. "This past summer, I was involved with research at UPMC to find a link between memory formation and the experience of pain. My background from this project inspired me to get involved with other research projects."

After graduation, Zhang is hoping to pursue dental school. Vasudev aims to find a job that will allow her to apply the skills in data science and analytics she developed in her classes and this project. Hill is interested in pursuing a career in data science followed by time in graduate school. Stempien-Smith plans to pursue her passion for linguistics in graduate studies.

"It's amazing. I'm so proud of them," said Wiener. "Their presentation and publication are a testament to how remarkable CMU students are."

More information: The Role of Face Masks in Native and Non-Native Speech Perception.
mackseyjournal.scholasticahq.com/article/27862

Provided by Carnegie Mellon University