

# Study explains 'cocktail party effect' in hearing impairment

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Plenty of people struggle to make sense of a multitude of converging voices in a crowded room. Commonly known as the "cocktail party effect," people with hearing loss find it's especially difficult to understand speech in a noisy environment.

New research suggests that, for some listeners, this may have less to do with actually discerning sounds. Instead, it may be a processing problem in which two ears blend [different sounds](#) together—a condition known as binaural pitch fusion.

The research, co-authored by scientists at Oregon Health & Science University and VA Portland Health Care System, was published today in the *Journal of the Association for Research in Otolaryngology*.

The study's lead author attributes these difficulties to abnormally broad binaural pitch fusion in people with hearing impairment. The new study suggests that for people with hearing impairment, fusing of different sounds from both ears leads to sound blending together in a way that is often unintelligible.

"This differs from what people with normal hearing experience in what is known as the "[cocktail party effect](#)," said Lina Reiss, Ph.D., Associate Professor of Otolaryngology/Head and Neck Surgery in the OHSU School of Medicine. "People with normal hearing can separate and understand the multiple voices, but they just get confused about which voice is saying what."

Reiss, who has hearing impairment herself and is part of the Oregon Hearing Research Center at OHSU, previously co-authored [research](#) in 2018 that first demonstrated broad binaural pitch fusion in hearing impairment. Together with another [study](#) showing blending of the fused pitches, the research suggested the possibility that similar fusion and blending could occur with sounds in speech.

The new study put the theory to the test.

Researchers with OHSU and the VA's National Center for Rehabilitative Auditory Research recruited 11 people with normal hearing and 10 with hearing loss. Participants were fitted with headphones in a double-walled, sound-attenuated booth in OHSU's Hatfield Research Center.

Two [vowel sounds](#) were played simultaneously through the headphones, with a different [vowel](#) sound played to each ear, and with voice [pitch](#) varying between male and female voices. Participants were then asked to respond on a touchscreen to identify the specific vowel sounds.

Using [statistical analysis](#), researchers definitively revealed that people with hearing loss experienced abnormal fusion of speech across both ears, even for different [voice](#) pitches.

When different vowel sounds were fused, participants heard an entirely new vowel sound. For example, the vowel "ah" (as in "hot") spoken by a female talker would fuse with the vowel "ee" (as in "heed") spoken by a male talker, and be heard as

"eh" (as in "head").

"Abnormal binaural fusion may provide a new explanation for the difficulties that hearing-impaired listeners have with understanding speech in multi-talker environments," the authors concluded.

Reiss called it a breakthrough, suggesting the possibility of new therapies to improve the perception of speech among the millions of people worldwide with [hearing](#) impairment.

"This suggests more targeted rehabilitation strategies to improve [speech](#) perception in noise," she said.

**More information:** Lina A.J Reiss et al, An Alternative Explanation for Difficulties with Speech in Background Talkers: Abnormal Fusion of Vowels Across Fundamental Frequency and Ears, *Journal of the Association for Research in Otolaryngology* (2021). [DOI: 10.1007/s10162-021-00790-7](https://doi.org/10.1007/s10162-021-00790-7)

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