

On the tip of your tongue: Researchers reveal our motor system activates when we hear speech

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A palate used in the experiment

(PhysOrg.com) -- Researchers from Royal Holloway, University of London have discovered our motor system activates automatically when we hear speech. These findings could, in the future, play a central role in helping to unravel various language difficulties seen in adults and children.

The study, 'Activation of Articulatory Information in Speech Perception', is featured in the [Proceedings of the National Academy of Sciences](#) of the United States of America this week, and suggests that our motor systems are recruited whenever we hear speech, irrespective

of whether we are trying to ignore the speech that we are hearing.

Professor Kathleen Rastle, from the Department of Psychology at Royal Holloway, University of London, explains that the study was carried out by fitting participants with a custom-made acrylic palate that measured contact between the tongue and the roof of the mouth 100 times per second whilst they were speaking, which formed a detailed picture of the tongue's position during speech. The participants were asked to read aloud printed targets such as 'koob' whilst also listening to spoken distractors such as 'toob'.

“Our key question was whether there would be evidence that participants had constructed programs for the movements involved in speaking from the spoken distractor [syllables](#). We hypothesized that if motor systems are recruited when we listen to speech, then the way that target syllables were produced would be influenced by the characteristics of the spoken distractors”, she said.

Results showed that the articulation of target syllables was distorted toward the articulatory requirements of the spoken distractors. For example, in the production of the 'K' sound in 'koob', participants' tongues were slightly further forward when they were trying to ignore the spoken distractor 'toob' than otherwise.

Professor Rastle says the results suggest that participants had activated articulatory programs of the spoken distractors even though doing so caused them to produce distorted speech.

“These findings provide the first evidence that when we hear speech, we activate the movements involved in speaking in an automatic and involuntary manner. Research must now focus on precisely how the motor system impacts on [speech perception](#) and on why the motor system is recruited when we listen to speech,” she said.

The researchers say that this study helps to understand the relationship between hearing and producing speech and could help explain things such as why our accents can unintentionally change when we visit or relocate to a foreign country and start sounding like those around us when we make no attempt to alter our mode of speaking.

“This phenomenon is likely to occur precisely because of the exquisite relationship between perceptual and motor systems revealed in our research”, Professor Rastle says.

“Nonetheless, there are limits to this tight coupling as evidenced by the fact that most of us cannot faithfully reproduce the foreign accents that we are able to hear. Future research will help to reveal the reasons behind these abilities and limitations.”

Provided by Royal Holloway, University of London

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