Showing the Mechanics of Making Music

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Why do some people sound good enough to compete on American Idol while others can't carry a tune? With a lab full of tubes, wires and computers, Nandhu Radhakrishnan uses speech pathology to help others become better actors and singers through the science of sound.

He has spent the past two years developing the Laryngeal Physiology Lab at the University of Missouri-Columbia School of Health Professions to study the complex science behind speech, such as what makes some voices so musical and others so problematic.

The lab works by using a set of non-invasive instruments - a band around a person's neck and another mouthpiece to speak into - to record physically how individuals make themselves heard. Different organs and muscles that constitute someone's voice, such as the lungs, larynx, vocal tract and articulators (lips, tongue, palate) all work together to produce something as natural as speaking.

Instruments in the lab can take voice measurements at a multi-signal level and display exactly what is working at what level when someone speaks or sings. If someone has an uncommonly weak voice, the lab will be able to pinpoint the problem, such as someone not providing enough air pressure from the lungs. Not every person uses organs and muscles to produce sound in the same way.

"Voice production is interesting in that two people could be creating the same sound while singing entirely differently, and one way may be good and the other harmful," said Radhakrishnan, assistant professor of

communication science and disorders. "The mechanics behind the voice explain why some singers can perform for 10 years, and some may ruin their voices in months."

One purpose of Radhakrishnan's lab is to provide a "holistic view of singing and abnormal voice" to help people understand concerns they may have in their own singing and speaking and hopefully correct them. His research work predominantly involves professional voice users, anyone from street vendors and lawyers to traditional Indian and western singers, to discover how classical vocalists create such a wide range and quality of voice. Radhakrishnan said he is basically trying to scientifically answer the question, 'What are great singers doing differently than everyone else?'

Radhakrishnan also is working with different departments at MU, including professors from the School of Music and researchers and doctors from University Hospital, to find subjects to conduct both research and therapy. He said the lab has great potential as an aid to teachers and students in theater or music, in that they can actually see the processes of voice production at work.

"When teachers instruct students on singing, they often use abstract phrases and terms to help a student understand the sound they want, such as 'float your larynx.' Research has shown that the larynx actually drops down in this process," Radhakrishnan said. "I hope to present a visual picture of what the vocal folds are actually doing in connection with many of these common phrases. As teachers are looking for new methods of teaching, they could combine a mix of visual feedback, audio clip and leader¿s direction."

There are very few labs in the world that look at complete vocal physiology and that can examine and treat vocal problems.

Source: University of Missouri