

Stuttering linked to rhythm perception deficiency

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Stuttering may be more than a speech problem. For the first time, researchers have found that children who stutter have difficulty perceiving a beat in music-like rhythms, which could account for their halting speech patterns.

Michigan State University's Devin McAuley, co-author of the study, said the findings have implications for treating stuttering, which affects 70 million people worldwide. The study appears online in the journal *Brain & Language*.

"Stuttering has primarily been interpreted as a speech motor difficulty, but this is the first study that shows it's related to a rhythm perception deficit—in other words, the ability to perceive and keep a [beat](#)," said McAuley, professor of psychology. "That's important because it identifies potential interventions which might focus on improving beat perception in children who stutter, which then might translate to improved fluency in speech."

About 70 percent to 80 percent of children ages 3 to 5 who stutter will eventually stop, McAuley said. Yet, despite decades of research, the underlying mechanisms behind speech disruptions in people who stutter remain unclear.

Being able to perceive and maintain a beat is believed to be critical for normal speech because it serves as a pacing signal. This is bolstered by past research showing that [speech](#) fluency improves dramatically for

adults who stutter when speaking in [time](#) with a metronome.

McAuley and colleagues tested a group of children who stuttered and a group who didn't by having them listen to and then identify rhythmic drumbeats in the context of a computer game. Even after taking into account the kids' IQs and language abilities, the study found that children who stuttered did much worse at judging whether two rhythms were the same or different.

Many past studies incorporated a motor skills element—such as having participants tap to a beat—which made it impossible to tell whether the problem was rhythm perception or a motor production deficit, McAuley said.

The research team is integrating the behavioral data with functional magnetic resonance imaging, or fMRI, to identify which brain networks may be responsible for the rhythm perception deficit.

McAuley is working with Soo-Eun Chang, assistant professor of psychiatry at the University of Michigan, who is a stuttering expert and has been conducting neuroimaging studies in [children](#) who [stutter](#) on the MSU campus since 2009. McAuley and Chang co-authored the study along with MSU [researchers](#) Elizabeth Wieland and Laura Dilley.

McAuley also works with Juli Wade, professor and chairperson of MSU's Department of Psychology, to investigate rhythm perceptions in zebra finches to probe the neurobiological source of stuttering.

Provided by Michigan State University

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