

Study shows listeners perceive repeated environmental sounds as music

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Credit: University of Arkansas, Fayetteville

Water dripping. A shovel scraping across rock. These sounds don't seem very musical. Yet new research at the University of Arkansas shows that repeating snippets of environmental sounds can make them sound like music.

The new findings from the Music Cognition Lab at the University of Arkansas build upon research by Diana Deutsch and colleagues. These

researchers showed that repetition can musicalize [speech](#), a phenomenon they called "speech-to-song" illusion. Researchers at the University of Arkansas Music Cognition Lab have now demonstrated that repetition can also musicalize non-speech sounds. They call this a "sound-to-music" illusion.

This underscores the role of repetition in generating a musical mode of listening and shows that the effect does not depend on the special relationship between music and speech, but can occur for broader categories of sound.

The findings will be published in the journal *Music & Science* in early 2018.

In their article, "The sound-to-music illusion: Repetition can musicalize nonspeech sounds," doctoral student Rhimmon Simchy-Gross and music professor Elizabeth Hellmuth Margulis demonstrate that repetition can musicalize environmental sound, whether the clips are presented in their original sequence or in a jumbled version, contrasting with previous research on speech, where the effect only occurred for exact replications.

"This difference suggests that what works as a repetition depends not just on the acoustic characteristics of the sound, but also its function," Margulis said. "Jumbling speech sounds disrupts the words' meaning, but jumbling the components of a string of environmental sounds doesn't change the fact that it sounds like water dripping or a shovel scraping across rock.

"Composers and performers have been playing with repeated sound samples and speech for more than 50 years," Margulis said. "Like so much else in the cognitive science of music, this research is inspired by actual musical practice. It uses new experimental methods to pursue

some of the ideas about repetition's special role in musicalization outlined in my 2014 book *On Repeat: How Music Plays the Mind*."

Researchers used digitally excised clips of 20 environmental sounds, ranging from a bee buzzing to machine noise. They played each clip a total of 10 times to measure the reaction of participants, who rated them along a spectrum from "sounded exactly like environmental sound" to "sounded exactly like music." The degree of musicality participants heard in the clips rose with repeated exposure.

"In other words, sound that initially seemed unambiguously like environmental noise, through the simple act of [repetition](#), came to [sound](#) like music," Margulis said. "The sounds themselves didn't change, but something changed in the minds of the listeners to make them seem like [music](#). This finding can help future studies investigate the characteristics that define musical listening."

To hear examples of the sounds the researchers use, visit the [Research Frontiers website](#).

More information: The Sound-to-Music Illusion: Repetition Can Musicalize Non-Speech Sounds: www.elizabethmargulis.com/s/so...o-music-preprint.pdf

Provided by University of Arkansas

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