Study finds hidden emotions in the sound of words

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In the midst of the COVID-19 crisis, it's common to feel stress levels rise every time we hear the word "virus." But new Cornell-led research reveals that the sound of the word itself was likely to raise your blood pressure—even before "corona" was added to it.

The study, "Affective Arousal Links Sound to Meaning," published July 14 in the journal *Psychological Science*, shows that some sound combinations, like those in the word "virus," elicit more emotionally intense responses than others. This may play a role in both children's language acquisition and how we might have evolved language in the first place.

The research also explains why, when people are presented with a spiky shape and a rounded shape and asked to guess which is called "bouba" and which "kiki," the majority call the spiky shape "kiki" and the rounded one "bouba." This well-studied psychological "matching" effect holds across age and cultural backgrounds, though scholars have disagreed about the reason.

The study's authors were Morten Christiansen, the William R. Kenan, Jr. Professor of Psychology and co-director of Cornell's Cognitive Science Program; Arash Aryani, a researcher at Freie Universität Berlin; and Erin Isbilen, a graduate student in psychology and a member of Christiansen's Cognitive Neuroscience Lab.

The new study shows that the level of emotional intensity, or "arousal," we feel when seeing objects or hearing sounds might provide the missing link that connects spikiness to "kiki" and roundedness to "bouba."

"For most words," the authors wrote, "the relationship between sound and meaning appears arbitrary: The sound of a word does not typically tell us what it means. A growing body of work, however, has shown that the sounds of words can carry subtle cues about what they refer to."

The researchers first asked study participants to rate the level of arousal experienced for the visual and auditory stimuli from eight previous studies of the matching effect, and found that the level of arousal can explain the matching preferences. They found that spiky shapes and kiki-like nonwords are indeed emotionally stimulating—similar to the word "virus"—whereas rounded shapes and bouba-like nonwords are calming.

These results were confirmed in a second experiment, using an acoustic model generated from the arousal ratings for more than 900 unrelated nonsense words. Their final experiment asked participants to match a subset of these nonsense words that varied in their level of arousal to the visual stimuli from the eight prior studies. Once again, they found that spiky shapes were chosen for high-arousal words, rounded shapes for low-arousal words.

According to the researchers, these findings

suggest that many of the mappings in our vocabulary between sound and meaning are driven by our emotional responses to the auditory and visual input.

"Our emotional states may thus help children map sound to meaning when learning new words," Christiansen said. "The arousal link between sound and meaning may also have allowed early humans to get language off the ground in the first place, by making it easy to associate a word with its meaning."

According to the researchers, the study highlights the previously underappreciated role that human emotion may play in the emergence of language, both developmentally and evolutionarily, by grounding associations between abstract concepts (like shapes) and linguistic signs (like spoken words) in the affective system.

It also shows how the sounds of words might affect our emotional states independently of what they mean.

More information: Arash Aryani et al, Affective Arousal Links Sound to Meaning, *Psychological Science* (2020). DOI: 10.1177/0956797620927967

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