"D" for danger! Speech sounds convey emotions

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Zachary Estes in his office at Bocconi University, Milan. Credit: Paolo Tonato

Individual speech sounds—phonemes—are statistically associated with negative or positive emotions in several languages, according to new research published in the journal *Cognition* by Bocconi Professor

Zachary Estes, his Warwick colleague James Adelman and Bocconi student Martina Cossu. These associations can quickly signal people to avoid danger, because the phoneme-emotion associations are strongest at the beginning of the word and the phonemes that are spoken fastest tend to have a negative association.

It has long been known that phonemes systematically convey a range of physical properties such as size and shape. For example, the "e" sound in "beetle" sounds small, whereas the "u" sound in Hummer sounds big. This is known as sound symbolism.

Given the evolutionary importance of avoiding danger and approaching rewards, Estes and colleagues hypothesized that, like size and shape, emotion should also have sound symbolic associations. They tested this prediction in five languages—English, Spanish, Dutch, German and Polish—and in all five languages, particular phonemes occurred more often in positive or negative words.

Estes and colleagues also tested whether this emotional sound symbolism could be an adaptation for survival. To aid survival, communication about opportunities and especially danger needs to be fast. The researchers tested this assumption in two ways.

First, they showed that in all five languages, the phoneme-emotion associations are stronger at the beginnings of words than at the middle or ends of words. This conveys emotion rapidly, even before the whole word is spoken.

Second, they examined the speed with which specific phonemes can be spoken. Estes and colleagues discovered that phonemes that can be spoken faster are more common in negative words. This allows danger to be understood faster than opportunities, and this aids survival, because avoiding danger is more urgent than winning rewards. For instance,

being too slow to avoid a snake can be fatal, but if you're too slow to catch a bird, you will probably have other chances.

Estes and his colleagues argue that emotional sound symbolism evolved due to its adaptive value to humans. It made communication about danger and opportunities more efficient, allowing a quicker reaction to important stimuli and thereby supported the fitness and survival of the human species.

First author James Adelman said, "In debates about whether human language abilities evolved from more general cognitive skills or more specific communicative adaptations, these findings reveal one specific adaptation. Our findings suggest that the ability to appreciate very short speech sounds could have helped humans to efficiently warn kin and peers, aiding survival."

Zachary Estes said, "We have also begun testing applications in business, because emotional phonemes provide an opportunity for companies to inform consumers about their products. For example, a pharmaceutical company might want to use positive sounds for a drug that promotes health benefits like a vitamin, but they might want to use negative sounds for a drug the prevents health detriments like an anti-malarial drug."

More information: James S. Adelman et al, Emotional sound symbolism: Languages rapidly signal valence via phonemes, *Cognition* (2018). DOI: 10.1016/j.cognition.2018.02.007

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