

'Talking drum' shown to accurately mimic speech patterns of west African language

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The Ifesowapo dũndũn ensemble performing in Igbo Ora, southwest Nigeria.
Credit: Dr Cecilia Durojaye

Musicians such as Jimi Hendrix and Eric Clapton are considered virtuosos, guitarists who could make their instruments sing. Drummers in west Africa who play hourglass-shaped percussion instruments called dũndũns can make their instrument not only sing, but talk. New research published in the journal *Frontiers in Communication* is one of the first to

show the high degree of acoustic correlation between these talking drums and the spoken Yorùbá language.

Dùndún drumming is a musical-oral tradition where skilled drummers, manipulating the intensity and pitch of the instrument, can mimic Yorùbá, a [tonal language](#) mainly spoken in southwest Nigeria. Dubbed 'talking drums', dùndúns can be used as purely [musical instruments](#) or what scientists refer to as speech surrogates, imitating the three tones of the language.

The authors of the new paper describe how they analyzed and compared 30 spoken and sung verbal snippets with corresponding drum and song excerpts. They found that the dùndún very accurately mimics the microstructural characteristics of Yorùbá vocalization directly, while the fidelity decreases when the drums are used purely for [music](#) or less direct communication such as song. The scientists also distinguish four modes through which the talking drum connects music and language—rhythm, singing, drum talking-performative and drum talking-direct.

New understandings between music and speech

Equally important, the acoustical analysis demonstrates how studying non-[western cultures](#) can enrich the way scientists more generally understand the relationship between music and speech, as well as how humans process them, according to lead author Dr. Cecilia Durojaye, a researcher and musicologist affiliated with the Department of Psychology at Arizona State University.

"These kinds of multicultural findings are useful for considering deeper relationships and understanding of types of auditory communication and the evolution of language and music," she said. "The talking drum is unique in that it has a foot in both language and music camps, and

because its existence reminds us of the thin boundary between speech and music."

While the talking drum is specific to the Yorùbá language, speech surrogacy in music occurs across cultures, so the research can contribute to how scientists understand the phenomenon in general and in the Yorùbá culture specifically, Durojaye explained.

The study involved comparing the timing patterns between recorded drum excerpts and clips of speech and song from Yorùbá vocal performers and professional drummers. The researchers also extracted details on frequency and intensity of the recordings to understand the structural commonalities in these different forms of communication.

Purposes of speech surrogacy

"Our finding that verifies distinct drumming modes varying between musical functions and speech surrogacy helps clarify how the talking drum is used in specific functional ways relating to different types of communication," Durojaye said.

Speech surrogacy serves a number of functions, from disseminating oral history to reciting poetry and proverbs. "Through musical instruments like these drums, one can know the history of a particular culture or a form of knowledge dissemination, as well as aspects of how the people think, their [belief systems](#) and values, and what is likely important to them," she noted.

There is still much that scientists don't understand about how these [speech](#) surrogate systems operate in terms of the formal linguistic properties they contain, Durojaye said. For instance, how does each mode capture and encode tone and syllables? Or how is the information transmitted on a syntactic or semantic level? And what is the extent of

their overlap with musical properties?

"Our study, which focuses on the acoustic properties of spoken, sung and drummed forms, represents one of the first steps towards understanding these various structures," Durojaye said. "We continue to explore this unique instrument, which has the potential for enhancing our understanding of music and [language](#) processing, especially from a non-western perspective."

More information: Cecilia Durojaye et al, When Music Speaks: An Acoustic Study of the Speech Surrogacy of the Nigerian Dùndún Talking Drum, *Frontiers in Communication* (2021). [DOI: 10.3389/fcomm.2021.652690](#)

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