Press Release

Keio University

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Singing researchers reveal global relationships between speech and music

— Across languages, songs and instrumental melodies are slower, higher, and use more stable pitches than speech —

A team of 75 researchers from around the globe led by Dr. Yuto Ozaki and Associate Professor Patrick Savage from Keio University in Japan have identified consistent similarities and differences in speech, song, and instrumental music throughout the world. Acoustic analysis of hundreds of recordings of singing, recited lyrics, instrumental melodies, and spoken descriptions from over 50 diverse languages by the researchers themselves in their native/heritage languages revealed that songs and instrumental melodies are consistently slower and use higher and more stable pitches than speech. The researchers speculate that these differences may have evolved to help bond people together through group music making. The 75 coauthors include 8 Keio University coauthors from Associate Professor Savage's CompMusic Lab and Associate Professor Shinya Fujii's NeuroMusic Lab. The results were published in the open-access journal *Science Advances* on May 15th, 2024.

Photos: Study coauthors Latyr Sy (Senegal), Gakuto Chiba (Japan), Neddiel Elcie Muñoz Millalonco (Chile), and Aleksandar Arabadjiev (Macedonia)

1. Main Points of Research

- Seventy-five researchers from 46 countries recorded themselves performing traditional music and speaking in their own languages in a novel experiment investigating cross-cultural differences and similarities.
- With rare exceptions, the rhythms of songs and instrumental melodies were slower than for speech, while the pitches were higher and more stable.

2. Background of Research

Unique for the number of languages represented (55) and the diversity of the researchers, the study provides "strong evidence for cross-cultural regularities," according to Assoc. Prof. Savage, the senior author of this study, who is also affiliated to Waipapa Taumata Rau, University of Auckland, and sang the traditional English ballad

Scarborough Fair for the study.

Speculating on underlying reasons, Assoc. Prof. Savage, suggests song is more predictably regular than speech to facilitate synchronization and social bonding. “Slow, regular, predictable melodies make it easier for us to sing together in large groups,” he says. “We’re trying to shed light on the cultural and biological evolution of two systems that make us human: music and language.”

3. Content of Research and Results

Tapping into academic networks for cost-effective global reach, Savage and lead author Dr. Yuto Ozaki from Keio University recruited researchers across Asia, Africa, the Americas, Europe, and the Pacific to sing, perform instrumentals, recite lyrics, and describe songs, providing audio samples to be analyzed for features such as pitch, timbre, and rhythm.

For example, Dr. Ozaki sang the Japanese folk song *Ōmori Jinku* from his hometown of Tokyo and Assoc. Prof. Fujii sang *Dekansho-bushi* from his hometown of Tanba-Sasayama in Hyogo prefecture. In Auckland, Prof. Suzanne Purdy sang the Māori love song *Pōkarekare Ana*. Other languages recorded in the study included Yoruba, Mandarin, Hindi, Hebrew, Arabic, Ukrainian, Russian, Balinese, Cherokee, Kannada, Spanish, Aynu, and dozens more.

Researchers with extensive vocal training included Dr. Shantala Hegde, a Hindustani classical music singer and neuroscientist, and expert instrumentalists included Senegalese drummer Latyr Sy, and Gakuto Chiba who is a national champion of Japan’s Tsugaru-shamisen instrument.

Experts in ethnomusicology, music psychology, linguistics, and evolutionary biology took part, including the two most recent presidents of the Society for Music Perception and Cognition, Prof. Peter Pfordresher (a native English speaker, pianist, and psychologist) and Assoc. Prof. Psyche Loui (a native Cantonese speaker, violinist, and neuroscientist).

Limitations of the study included the small sample size within each language. Additionally, while everyone taking part could sing a traditional song in their own language, not all participants could play its melody on an instrument. In some traditions, this idea didn’t even make sense. In those cases, researchers performed just the song’s rhythm using percussive instruments like a drum or clapping their hands.

Additional studies funded by the Japan Society for the Promotion of Science and the Royal Society Te Apārangi will include more participants from a subset of the languages, including Japanese, Māori, and English.

For a three-minute video of researchers singing, speaking, and playing traditional instruments from their cultures, see https://youtu.be/a4eNNrdcfDM.

4. Special Notes

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