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ETHNOMUSICOLOGY

The world in a song

Similar songs are used in similar contexts around the world

By **W. Tecumseh Fitch** and **Tudor Popescu**

Although all human cultures appear to create music, the music of different cultures is incredibly varied, leading some scholars to question whether music is really, as Henry Longfellow claimed in 1835, a universal “language” of our species. If true, it would suggest that universal cognitive mechanisms exist that can both explain the unity and allow the diversity of the world’s musics. Do such universal mechanisms exist? If so, can we investigate them empirically? On page

970 of this issue, a multidisciplinary team led by Samuel A. Mehr presents a major step forward in this enterprise, combining the methods of modern data science with musical recordings and ethnographic records to provide an insightful overview of universal principles underlying sung music (1). Building on a new collection of song recordings and ethnographies from around the world called the Natural History of Song (NHS) database (2), the authors find that not only is music universal (in the sense of existing in all sampled cultures) but also that similar songs are used in similar contexts around the world.

The empirical quest for musical universals has a checkered history. It started with

a bang in 1900, when after hearing a group of Thai musicians perform in Berlin, psychology professor Carl Stumpf decided to use his newly acquired phonograph to record them, and later conducted perceptual experiments with the same musicians (3). Stumpf was fascinated by both the differences and similarities between Thai and European music, and his key goal was to seek universal musical principles despite this diversity. His recordings provided the seeds of the Berlin Phonogramm-Archiv, a massive collection of recordings of non-Western and folk music that by 1933 had swelled to 13,300 phonograph cylinders (4). Stumpf hired Erich von Hornbostel and Curt Sachs to curate the collection, and together they founded a thriving but short-lived Berlin School of Comparative Musicology.

The search for “universality” in this context does not suggest that precise copies of melodies or rhythms would be shared across cultures, but rather refers to deeper cognitive principles of human “musicality” (5) that could explain broader patterns,

Department of Cognitive Biology, University of Vienna, Austria. Email: tecumseh.fitch@univie.ac.at



Timania Petaulissie and Haunaq Mikkigak are Inuit throat singers from Cape Dorset, Baffin Island, Nunavut, Canada.

planet, together with detailed ethnographic descriptions of the cultures and the song contexts. They analyze vocally performed songs because the voice is the most fundamental and ever-present musical “instrument” and song is a core component of human musicality (12). To ensure a fair and unbiased sample of cultures, the NHS builds on the well-documented Probability Sample File (<https://hraf.yale.edu>), which defines a stratified random sample of cultures, allowing relatively confident generalization to all of the world’s cultures.

Employing the method of Bayesian principal components, they find that three main dimensions—formality, arousal, and religiosity—account for considerable variance in these contexts. They then analyzed recordings of four specific song types—lullabies, dance songs, love songs, and healing songs, selected on the basis of previous research (2)—finding many detailed examples of acoustic regularities.

Some of these regularities are unsurprising (for example, that dance songs are faster and more rhythmic than lullabies), and some are more intriguing (for example, that ritual healing songs are less melodically variable than dance songs). These broad, universal acoustic patterns are easily identified by native Western listeners, who successfully categorized the song type of sound recordings. The listeners’ familiarity with world music played a minor and dispensable role in their correct classification. Furthermore, on the basis of ethnographic records, acoustically similar song types occur in certain shared contexts, and not others, across the world.

Crucially, variability of song context within cultures is much greater than that between cultures, indicating that despite the diversity of music, humans use similar music in similar ways around the world. Additionally, the authors found that the principle of tonality (building melodies from a small set of related notes, built upon a base tonic or “home” pitch) exists in all cultures. This suggests the existence of a universal cognitive bias to generate melodies based on categorical building blocks (13).

A critic might protest that with so much data, some apparent patterns are inevitable, but control analyses, using geographically appropriate climate data, or nonmusical ethnographic data, failed to reveal comparable results. This demonstrates that the authors have found bona fide links between musical acoustics and cultural phenomena. The authors also show that apparent deviations in the published record may result from un-

derreporting, rather than true absence of the supposed-universal musical feature. Taken together, these new findings indicate that some basic but fundamental principles mapping musical styles onto societal functions and emotional registers exist and can be scientifically analyzed.

Despite this auspicious beginning, there is much left to do. Given the current database and analyses, considerable variance in both societal contexts and acoustic variables is left unexplained. Although some of this unexplained variance may be culture specific, some variants may reflect cultural affinities due to common descent, and other environmental contingencies [for example, the existence of yodeling in high mountain communities in both Europe and New Guinea (14)]. Furthermore, the NHS database only includes vocal song, but a massive playlist of instrumental and rhythmic music is still unexamined and remains to be analyzed in similar ways (9, 10). There also are thousands of world cultures whose musics are not (yet) part of the database, and other musical styles to be sampled beyond the four types proposed and analyzed here. Today, with smartphones and the internet, we can easily imagine a comprehensive future database, including recordings of all cultures and styles, richly annotated with video and text, being assembled in a citizen science initiative.

Overall, the approach of Mehr *et al.*, fusing data science, anthropology, and psychology, offers an exciting way to tackle age-old problems in musicology, promising deep insights into the putative psychological universals that underlie the diverse musics humans create and enjoy. A deeper understanding of these, at both cognitive and neural levels, would offer rich new insights into the cognitive biology of our species. ■

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just as for linguistic universals (6). Unfortunately, with the rise of Nazism, the key members of this school (who were mostly Jewish) were forced to flee Berlin, and this research program was destroyed (4).

After this ill-fated foray, the search for musical universals fell by the wayside, and by the 1970s ethnomusicologists were discouraged from even discussing musical “universals.” Cultures and their musics were so diverse, it was said, that it was pointless to compare them (7), and both the empirical search for universal principles and the evolutionary perspective of the Berlin School were viewed with distaste by many, particularly in the English-speaking world. So with few exceptions—most prominently Alan Lomax’s visionary “Cantometrics” project (8)—comparative musicology languished until recently, when a few brave researchers again began to attack these fundamental questions using new methods (9–11).

The new work by Mehr *et al.* analyzes songs performed by a carefully selected sample of human cultures spanning the

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