Lab experiment demonstrates form of musical evolution

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(Phys.org)—A trio of researchers has conducted an experiment that they claim demonstrates musical evolution in the lab. In their paper published in the journal *Nature Human Behavior*, Andrea Ravignani with the University of Edinburgh, Tania Delgado with Universiteit Brussel and Simon Kirby with the University of California describe lab experiments they conducted using sound with volunteers, and what they believe their results show regarding rhythmic evolution in music.

As the authors note, there are many varieties of music in the world that, in many instances, do not sound at all similar—but, they also note, most do have some elements in common, one of which is rhythm. Most music, they point out, has a steady underlying beat that occurs either in pairs or triplets. To learn more about how such rhythms might have evolved, they designed an experiment very similar in nature to the game of telephone—in which one participant whispers a bit of information to another and that participant conveys it to the next until it has been transmitted to all of the people in a group. The last participant recites their version and everyone laughs at how the information has evolved into something else.

The rhythm-based version of the game consisted of first generating 32 random drum sequences that varied in volume and amount of time between beats. The researchers then played a given sequence to one person, who was asked to repeat as accurately as they could what they had heard to another person, who then repeated what they were told to the next, and so on, until all of the volunteers had been included. The last person was then asked to produce the drum sequence out loud for all to hear. The researchers repeated the game for all 32 sequences and then analyzed their results.

The researchers report that each person in the chain tended to introduce small errors into their transmission effort, which tended to skew toward reducing the chaotic nature of the timing. By the time the last person attempted to repeat what they had heard, the drum sequence had become organized into a something that was very close to the type of rhythm that the researchers describe as having a universal quality. They suggest that the patterns that evolved appeared to be tied to the way humans learn, process memory and experience cognition and based on that, conclude that rhythm likely arose at least in part from such influences during cultural evolution.

More information: Andrea Ravignani et al. Musical evolution in the lab exhibits rhythmic universals, *Nature Human Behaviour* (2016). DOI: 10.1038/s41562-016-0007

Abstract

Music exhibits some cross-cultural similarities, despite its variety across the world. Evidence from a broad range of human cultures suggests the existence of musical universals, here defined as strong regularities emerging across cultures above chance. In particular, humans demonstrate a general proclivity for rhythm, although little is known about why music is particularly rhythmic and why

the same structural regularities are present in rhythms around the world. We empirically investigate the mechanisms underlying musical universals for rhythm, showing how music can evolve culturally from randomness. Human participants were asked to imitate sets of randomly generated drumming sequences and their imitation attempts became the training set for the next participants in independent transmission chains. By perceiving and imitating drumming sequences from each other, participants turned initially random sequences into rhythmically structured patterns. Drumming patterns developed into rhythms that are more structured, easier to learn, distinctive for each experimental cultural tradition and characterized by all six statistical universals found among world music; the patterns appear to be adapted to human learning, memory and cognition. We conclude that musical rhythm partially arises from the influence of human cognitive and biological biases on the process of cultural evolution.

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