Group drumming stimulates behavioral and physiological synchronization that contribute to the formation of social bonds

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Group work and cooperation are crucial in everyday life. As such, it is important to explore the avenues by which synchrony within a group may enhance cohesion and influence performance. What role can music play in this effort? In an interdisciplinary study published today in the journal *Scientific Reports*, researchers have reported their discovery that while drumming together, aspects of group members' heart function—specifically the time interval between individual beats (IBI)—synchronized.

This physiological synchronization was recorded during a novel musical drumming task that was especially developed for the study in a collaboration between social-neuroscientists and scholars from the Music Department at Israel's Bar-Ilan University.

The drumming involved 51 three-participant groups in which IBI data were continuously collected. Using individual drumming pads within an electronic drum set shared by the study groups, participants were asked to match their drumming to a tempo that was presented through speakers. For half of the groups, the tempo was steady and predictable, and thus, the resulting drumming and its output were intended to be synchronous. For the other half, the tempo changed constantly and was practically impossible to follow, so that the resulting drumming and musical output would be asynchronous. The task enabled the researchers to manipulate the level of behavioral synchronization in drumming between group members and assess the dynamics of changes in IBI for each participant throughout the experiment.

Following this structured drumming task, participants were asked to improvise drumming freely together. The groups with high physiological synchrony in the structured task showed more coordination in drumming in the free improvisation session.

Analysis of the data demonstrated that the drumming task elicited an emergence of physiological synchronization in groups beyond what could be expected randomly. Further, behavioral synchronization and enhanced physiological synchronization while drumming each uniquely predicts a heightened experience of group cohesion. Finally, the researchers showed that higher physiological synchrony also predicts enhanced group performance later on in a different group task.

"Our results present a multi-modal behavioral and physiological account of how synchronization contributes to the formation of the group bond and its consequent ability to cooperate," says Dr. Ilanit Gordon, head of the Social Neuroscience Lab at Bar-Ilan University's Department of Psychology and

a senior researcher at the University's Gonda (Goldschmied) Multidisciplinary Brain Research Center, who led the study together with Prof. Avi Gilboa and Dr. Shai Cohen, of the Department of Music. "A manipulation in behavioral synchrony and emerging physiological coordination in IBI between group members predicts an enhanced sense of cohesion among group members."

"We believe that joint music making constitutes a promising experimental platform for implementing ecological and fully interactive scenarios that capture the richness and complexity of human social interaction," says Prof. Gilboa of the Department of Music, who co-authored the study. "These results are particularly significant due to the crucial importance of groups to action, identity and social change in our world."

More information: Ilanit Gordon et al. Physiological and Behavioral Synchrony Predict Group Cohesion and Performance, *Scientific Reports* (2020). DOI: 10.1038/s41598-020-65670-1

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