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Cognition of South Indian Percussion

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ABSTRACT

Background

The *mridangam* is a double-headed pitched drum prominently featured in South Indian (Carnatic) music. Carnatic music utilizes a series of looped percussive patterns that often feature rhythmic accents between pulses. While previous studies in rhythmic memory have dealt with Western rhythms (Iversen, Repp, & Patel, 2009), few have focused on Indian rhythms (Srinivasamurthy, Tronel, Subramanian, & Chordia, 2012) . Studies on the cognitive representation of rhythm suggest that listeners' attention is directed toward the downbeat of a rhythm, then organizes other parts of the rhythm in reference to the downbeat in a "hierarchical" sequence (Fitch, 2013).

Aims

We aim to explore what inherent qualities of Carnatic rhythm aid and impede rhythmic memory, understand how ordering affects rhythmic recognition accuracy, and determine to what extend memory for isolated Carnatic rhythms is modulated by delay between stimuli.

Method

In Experiment 1, we evaluated naïve participants' (N = 36) memory for 27 natural and mechanical (computer generated) versions of mridangam rhythmic patterns, with a "target" rhythm memorized in contrast to two lure patterns, designated as "similar" and "different", separated by three delay times (3s, 6s, and 12s).

In Experiment 2 (N = 24), listeners heard a series of 20 rhythmic trials. Each trial began with a "target" rhythm, followed by a pool of three answer choices comprised of a random order of the "target," a similar lure, and a different lure. Participants were instructed to determine which of the three was the "target," and to rate their confidence in their answer using a 6-point Likert scale.

Results

Results of Experiment 1 suggested that there was not a significant difference in listeners' ability to distinguish between natural and mechanical versions, $F(1, 35) = .52$, ns. Difference between "similar" and "different" lures was significant, $F(1, 35) = 16.85$, $p < .001$; delay time between samples also appeared to have an effect on identification, $F(2, 70) = 5.06$, $p < .01$.

Mean accuracy rate in Exp. 2 was high (91%), though accuracy decreased with ordering of the target (i.e., position 3 targets had lower accuracy than position 1). We used general estimations equation modeling (GEE) and receiver operating characteristic (ROC) to test the significance of position, trial type, and confidence level on recognition accuracy.

Conclusion

From Experiment 1, we can conclude that trial type was significant in affecting listeners' ability to identify rhythmic samples. Delay time between samples also played a role in the identification task. The results of Experiment 2 indicate that recognition accuracy was highest when the correct answer was in position one, while the lowest accuracy rate occurred when the correct answer was in position three. We conclude with a discussion of implications of our findings for our understanding of culturally unfamiliar rhythms.

Keywords

rhythm; cross-cultural music cognition; South Indian music; n-back; memory

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