

ABSTRACT

This study examined the role of musical expertise and culture in the perception of two types of modulation in South Indian classical (Carnātic) melodies. Indian and Western musicians and nonmusicians rated brief excerpts using the concurrent probe-tone technique¹. We compared baseline profiles of four rāgams (modes) with profiles of modulating excerpts containing the same rāgams. Results indicated that musicians' profiles tracked the modulations whereas nonmusicians' profiles did not reflect the modulations.

BACKGROUND

Previous investigations show that:

- people form mental representations of tonal hierarchies of a musical scale at a very young age².
- age and musical experience did not affect the formation of mental representations of tonal hierarchies; mere exposure to an individual's culture leads to the formation of such representations, whereas training enhances it³.
- even nonmusicians have a sophisticated implicit understanding of tonal hierarchy and expectancies in music⁴.
- listeners access their mental representations of the hierarchy of notes in musical scales of their own culture when listening to culturally familiar and unfamiliar melodies⁵.
- with culturally familiar music, listeners use culture-specific and psychophysical cues, whereas with culturally unfamiliar music they use psychophysical cues⁶ and schematic knowledge imported from their own culture⁵.
- musicians can track modulations successfully, whether with schematic chord sequences⁷, continuously modulating melodies⁸, or excerpts of real music¹.

PARTICIPANTS

Music Teachers

- 10 Indian (I) and 10 western (W)
- age range = 59 to 78 years (I: 71.5 years, W: 69.6 years)
- musical training, I: 27.4 years, W: 27.7 years
- music teaching, I: 24.3 years, W: 25.1 years
- performance, I: 29.3 years, W: 35.8 years

Nonmusicians

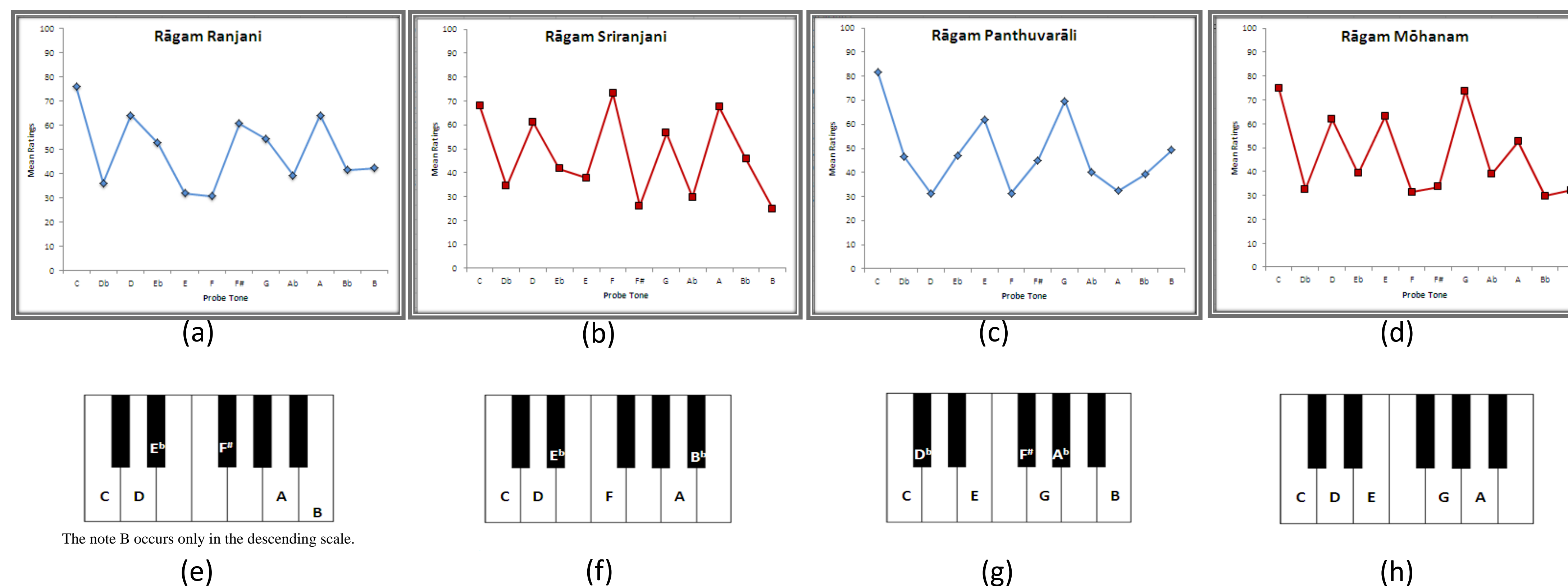
- 10 Indian and 10 western
- age range = 56 to 88 years (I: 69.5 years, W: 69.3 years)
- musical training, I: 1.5 years, W: 1.2 years

STIMULI

- Two types of modulation:
 - Rāgamālikā: retaining tonal center (e.g., C major to C minor).
 - Grahābēdham: shift of tonal center (e.g., C major to A minor).
- One excerpt in each type of modulation.
- Excerpts modulated from rāgams A to B, and back to rāgam A.
- Excerpts were 1 to 1.2 min taken from CD recordings.
- Each excerpt was presented 13 times forming a block.
- Trial 1: familiarizing trial; participants heard the excerpt in both ears without the probe tone.
- Trials 2 to 13: participants heard the excerpt in one ear only; in the other ear, they heard a constant drone (i.e., probe tone) corresponding to one of the 12 pitches in the octave (i.e., C, C#, D, D#, etc.).
- Each probe tone consisted of sine waves sounded in 3 octaves (in the range of A3 to D7) spanning the range of the melodies.

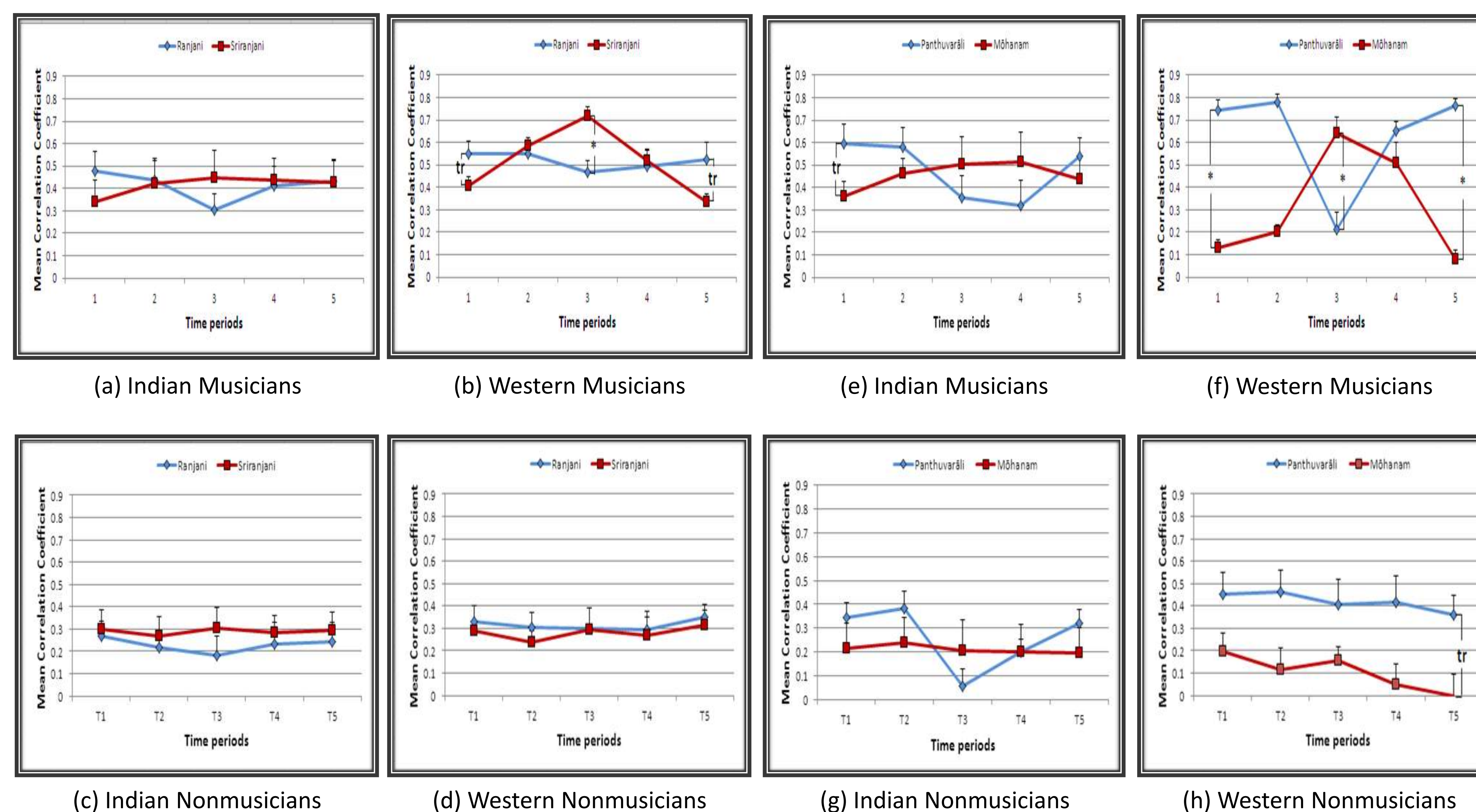
RESULTS – BASELINE PROFILES OF INDIAN MUSICIANS

Figure 1. Top panel (a to d)—Baseline profiles of Indian musicians. Bottom panel (e to h)—Notes of each rāgam depicted on a piano keyboard with C as tonic.



RESULTS – PROFILES OF MODULATING EXCERPTS

Figure 2. Left panel (a to d)—Profiles of rāgamālikā (modulation retaining tonal center; e.g., C major to C minor). Right panel (e to h)—Profiles of grahābēdham (shift of tonal center; e.g., C major to A minor). Responses were averaged and smoothed across a jumping window of time. Finally each profile generated was correlated with Indian musician baseline profiles of the corresponding rāgams (modes) obtained in Experiment 1. The shift from rāgam 1 (Ranjani or Panthuvārālī) to rāgam 2 (Sriranjani or Mōhanam) occurs between time periods T1 and T2, and the return to rāgam 1 lies between time periods T3 and T4. Error bars indicate standard error of the mean. tr = trend approaching significance. * p < .001.



TASK

Rate continuously how well each tone fits the melody on a 0 to 100 scale.

DISCUSSION AND SUMMARY

- Indian and Western musicians' profiles reflected the modulations.
- Indian musician profiles were less marked than Western musician profiles (see Figure 2a & 2e vs. 2b & 2f):
 - related to culture-specific cues and individual differences
- Western musicians responded more strongly than Indian musicians:
 - in the absence of emotional context
- Our findings supported previous research and identified three types of cues that musicians used:
 - 1) culture-specific cues by Indian musicians—theoretical knowledge and familiarity of the rāgams and modulations in the study,
 - 2) psychophysical cues by Indian and Western musicians—pitch and rhythmic cues, and
 - 3) transference of Western schematic knowledge by Western musicians—better performance both with rāgams resembling Western modes—Sriranjani (dorian) and Mōhanam (major pentatonic)—and with modulation that changes tonal center (grahābēdham)—more prevalent in Western music (see Figure 2b & 2f).
- Indian nonmusicians' rāgamālikā profile did not reflect the modulation, whereas their grahābēdham profile tracked the modulation with rāgam 1.
- Western nonmusicians were unable to track the modulations.
- Musical training facilitated performance on the binaural probe-tone task and in applying these cues.

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