Implicit learning of Indian music by Westerners

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Studies by Bigand and Barrouillet (1996), Perruchet, Bigand, and Benoit-Gonin (1997), Bigand, Perruchet, and Boyer (1998),Tillmann, Bharucha, and Bigand (2000) show that listeners exposed to only a few minutes of stimuli organized according to inherent rules of an artificial grammar successfully distinguish between stimuli that obey and disobey the rules. The present study considers the extent to which subjects learn rules of a musical tradition with which they have had no contact.

Although master musicians have differed in detail for centuries concerning the rules or conventions of particular North Indian (Hindustani) rags, within Bhatkande's (1966) monumental anthology the examples of rag Alhaiya Bilawal are sufficiently regular in their melodic progressions to provide a basis for inferring quite precise specifications of what happens, or tends to happen, in particular realizations, and these specifications also accord with Bhatkande's explicit prescriptions. Of importance to the present study are the following regularities:

i) Relative to a tambura drone comprising C and G, each melody employs all and only the tones C D E F G A B-flat and/or B, i.e., 7-35 or 8-23 in Forte's numbering (1973) -- the second understood as a 'chromatic' version of the first (Rahn 1991);

ii) Among all the melodies, each possible stepwise progression between two of these tones occurs, except between B-flat and B.

The study tested the hypothesis that after 15 minutes of exposure to Alhaiya Bilawal subjects who had not previously encountered classical North Indian music would correctly distinguish between instances of the rag and examples that diverged.

15 subjects (all non-musicians, all Western undergraduates) heard 30, 2-phrase (i.e., 2-tala-cycle) passages of ~30 seconds each from Bhatkande's model melodies for rag Alhaiya Bilawal. In the second, ~10-minute session, the 15 subjects, who had scored well on the first session's attention task, heard 20 passages of the same length and musical format: i.e., sequenced with a harmonium-like patch and accompanied in Tintal tala (4+4+4+4) realized by tabla and tambura via an electric sruti box. 10 of these were additional, regular passages from Bhatkande's model tunes; 5 were variations of regular passages heard in the first and/or second session; 5 were variations of regular passages not otherwise heard in the two sessions. All the variations involved changes to Bhatkande's tunes that broke a rule of the rag (Table 1).

None of the non-Indian/non-musician subjects seems to have defected from the first session's task ($p<=.05$). As a group, the subjects correctly distinguished variations from regular passages about 80% of the time in the second session ($p<=.05$). Conversely, and of arguably greater music-theoretical interest, a pair of stimulus-pairs that resulted in correct identifications by only 8 of the 15 subjects involved transformations of Clough and Douthett's (1991) 'usual diatonic' collection into anhemitonic pentatonic (1991: cf.also Rahn 1983, 1999).

In conclusion, an implicit-learning design holds promise for clarifying musical relationships within and between particular cultural settings.

Table 1. Variants of regular rag Alaiyah Bilaval melodies ('lures') correctly judged 'irregular' by 15 French undergraduate psychology students.

'lures'	% 'irregular'	p=	tones employed	irregular progressions	'lures' grouped	% 'irregular'	p=
A	100 (= 15/15)	0.00	CDEFGA_B	D-A G-D B-D D-B	A-B	93 (= 28/30)	0.00
B	87 (= 13/15)	0.00	CDEFGABbB	D-F A-D Bb-E D-Bb D-B E-Bb			
C	93 (= 14/15)	0.00	CDEF#GA_B	E-F# F#-G F#-E G-F#	C-D	87 (= 26/30)	0.00
D	80 (= 12/15)	0.02	CDEF#GA_B	E-F# F#-G F#-E G-F#			
E	87 (= 13/15)	0.00	CDEFGABbB	G-Bb Bb-C	E-H	84 (= 38/45)	0.00
F	87 (= 13/15)	0.00	CDEFGABb	C-Bb			
G	80 (= 12/15)	0.02	CDEFGABb	Bb-C			
H	60 (= 9/15)	0.30	CDEFGABb	Bb-C			
I	67 (= 10/15)	0.06	CDE_GA__	none	I-J	60 (= 18/30)	0.18
J	53 (= 8/15)	0.50	CDE_GA__	none			

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