

The emotional meaning of single intervals: A validation of an ancient Indian music theory?

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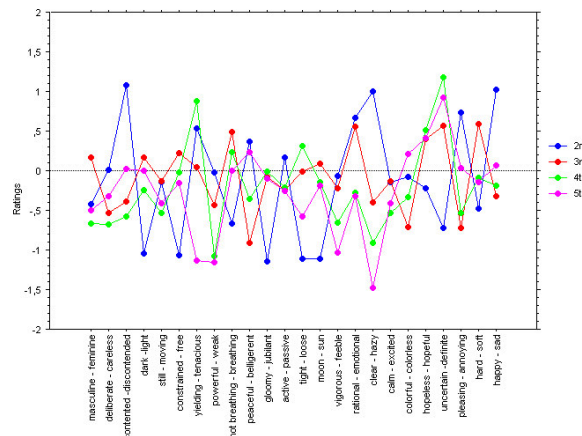


Abstract. According to ancient Indian music theory, intervals evoke specific emotional states. This study investigates whether a specific emotion is also attributed to an interval within Western culture and whether such meaning is in agreement with ancient Indian music theory. In two experiments, participants (N=34 and N= 33) assessed four natural intervals (2nd, 3rd, 4th and 5th) constituted by two sine waves. Participants rated the expression of each interval in a consistent and reliable way. After grouping participants according to their musical expertise (i.e., Professionals, Amateurs and musically Naïve), it was found that each interval was rated differently but the groups of participants did not differ in their attributions. However, 'Professionals' and 'Amateurs' were significantly less variable in their ratings than the 'Naïve' group. Importantly, there was substantial agreement between the choice of adjectives given by contemporary Norwegians and those attributed to the same interval according to classical Indian music theory. These findings suggest that the meaning attributed to natural intervals might be universal, across cultures and time.

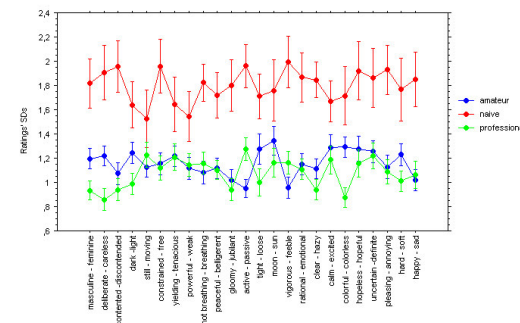
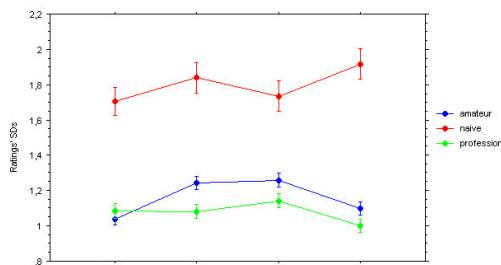
Introduction. 1) Do individuals within one culture (i.e., contemporary Norwegians) agree with one another and themselves on an emotional characterization of a specific interval ? 2) Would contemporary attributions of emotional meaning to intervals also be consistent with that of another tradition distant in both space and time (i.e., medieval Northern Indian) ? Although there is little research (cf. Gabriellsson & Lindström, 2001) and much ambiguity about the emotional attributions that Westerners give to single intervals, there is at least one non-Western tradition, developed in Northern India (about 1200 - 1700 AD), where such attributions have been clearly specified by the musicians themselves and music theorists. According to these historical sources, musical intervals evoke specific emotional states, which Alain Daniélou (1968) has summarized in *The raga-s of Northern Indian Music*.

Experiment 1: Methods

Lines of equal length were drawn between two opposite names and participants were requested to indicate the degree of appropriateness of the probed expression by marking with a pencil the line. Most of these items named emotions and moods (e.g., happy-sad, pleasing-annoying), whereas a few items mentioned objects (e.g., sun-moon) or objects' attributes (e.g., light-dark). Most names were taken from Daniélou's description of the four intervals used. The sounds were played on a CD-player four times for the duration of two minutes and heard through headphones. The intervals had all the same fundamental tone (c'): c'-d' (9:8; 261.63:293.67 Hz), c'-e' (5:4; 261.63:329.63 Hz), c'-f' (4:3; 261.63:349.23 Hz) and c'-g' (3:2; 261.63:391.99 Hz). A Latin square design was used in ordering the presentations of the intervals. The participants were: 'Naïve' listeners (N= 6), who had no musical training; 'Amateurs' (N= 14), who have learned to play an instrument since childhood; and 'Professionals' (N= 14), who had training from the conservatory and currently practicing their instrument (at least four hours a day). Averaged ratings and SDs were used as the dependent variables in two separate repeated-measures ANOVAs with Group (Professionals, Amateurs, and Naïve), Interval (2nd, 3rd, 4th, 5th) as the between-subjects factors, and Expression (the 24 items) as the within-subject factor.



The significant interaction, $F(69/2139) = 9.1$, $p < .0001$, of Expression by Interval indicates that each interval elicits a different profile of emotional meaning or expression.



The groups of Naïve, Amateurs and Professional participants differed in reliability of their ratings, $F(2/1794) = 7.7$, $p < .002$. Naïve participants were the least reliable in their ratings of each interval's expressions.

Experiment 2. The 2nd experiment was conducted in order to rule out the possibility that each interval's profile of expressions, as observed in the 1st experiment, could have been determined by either the specific pitches constituting the intervals or by the particular musical key formed by the four intervals chosen. Specifically, in the 1st experiment, all intervals shared the same lower pitch tone and this could have created a tonal context that determined the listeners' ratings. Thus, in the 2nd experiment, whereas the intervals shared the higher tone, the lower pitch tones now differed for each interval. Moreover, since a subset of the participants (N= 18) in the 2nd experiment had also participated in the 1st experiment (a year before), it was possible to assess whether the expressions chosen by these individuals for each of the intervals were related across experiments; which would provide additional evidence that the rated emotional meaning depended on the intervals per se (and not on pitch or key).

Experiment 2: Methods

Methods and procedure were the same of Experiment 1, except that the higher tone of each interval was kept constant whereas the lower tone changed: c''- b^{b'} (9:8; 466.16:523.25 Hz), c''- a^{b'} (5:4; 415.30:523.25 Hz), c''- g' (4:3; 391.99:523.25 Hz) and c''- f' (3:2; 349.22:523.25 Hz). The participants, N=33, were 'Naïve' listeners (N= 9), 'Amateurs' (N= 9), and 'Professionals' (N= 15). A repeated-measures ANOVA was performed on all participants (N= 33). In addition, three separate regression analyses were performed on those participants (N= 18) who were included in both experiments.

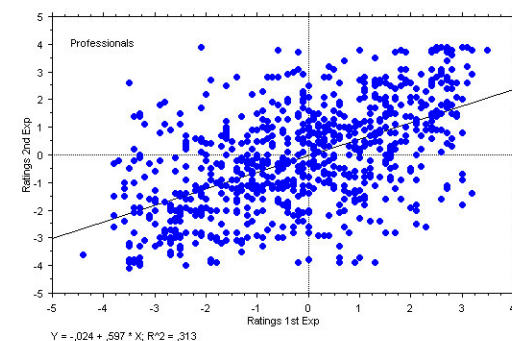
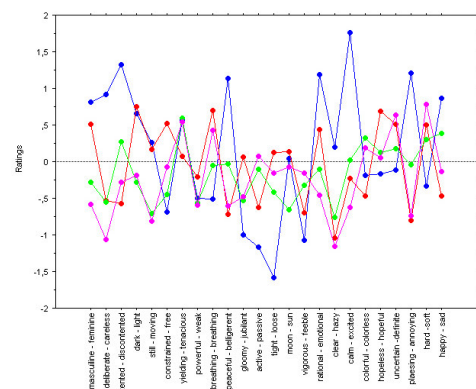
References

Daniélou, A. (1968). *The raga-s of Northern Indian music*. London: Barrie & Rockliff.

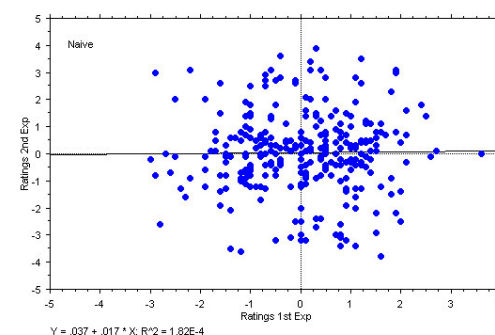
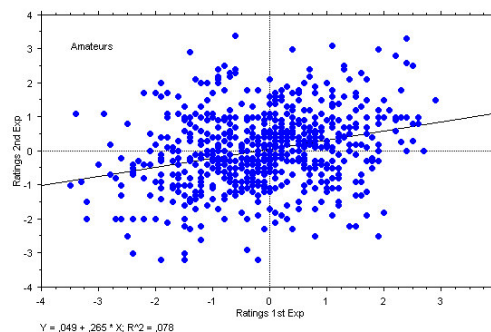
Gabrielsson, A. & Lindström, E. (2001). The influence of musical structure on emotional expression. In: P.N. Juslin & J.A. Sloboda (eds), *Music and emotion: Theory and research* (pp. 221-248), Oxford: Oxford University Press.

Conclusions

Among the expressions that differed significantly (according to t-tests) from the neutral point, it appeared that 77% of these expressions were rated by our participants in accordance with an ancient Indian music theory. Given that such a proportion of common attributions of musical meaning to intervals does not differ significantly (at the 1% level, $Z = 2.32$), we conclude that the meaning attributed to natural intervals might be universal, across cultures and time.



The significant interaction, $F(69/2070) = 9.3$, $p < .0001$, of Expression by Interval confirms that each interval elicits a different profile of emotional meaning or expression. There was no significant interaction of Expression and Interval with Group.



Three separate regression analyses (for each group of participants) were performed on the ratings of a same interval in the 1st and in the 2nd Experiment and for each of the probed expressions. Professionals showed a moderate correlation, $R = .56$, Amateurs a weak correlation, $R = .28$, and Naïve participants no correlation, $R = .01$.