

Rare pitch-classes are larger and stronger: implicit absolute pitch, exposure effects, and qualia of harmonic intervals

Zohar Eitan,^{*1} Moshe Shay Ben-Haim,^{#2} Eran Chajut,^{&3}

^{*} School of Music, Tel Aviv University, Israel

[#] School of Psychological Sciences., Tel Aviv University, Israel

[&] Department of Psychology and Education., The Open University, Israel

¹zeit@post.tau.ac.il, ²Shay.mbh@gmail.com, ³Eranch@openu.ac.il

ABSTRACT

Background

Three well-established findings generated this study: (1) Long-term memory for pitch chroma is widespread, independently of musical training. (2) In Western musical repertoires some pitch-classes are much more frequent than others. (3) Exposure rate significantly affects perceptual and cognitive processing in diverse realms. Together, these premises suggest that pitch occurrence frequency may affect pitch processing, such that common pitches would be processed and experienced differently from rarer ones. We (Ben-Haim et al., 2010; Submitted) examined this hypothesis with a pitch identification learning task, where findings reveal better performance for common pitches, and for an evaluation task of single tones, where common pitches were rated as significantly less pleasing than rarer ones. Here we investigate whether pitch occurrence frequency affects the expressive connotations of harmonic pitch intervals.

Aims

Pitch-related qualities, including pitch height and harmonic dissonance, were shown to affect the expressive attributes of musical sound. Here we set to examine whether emotional and cross-modal meanings associated by listeners with harmonic pitch intervals are affected by the *occurrence frequency* of their component pitch-classes in Western music repertoire.

Method

96 undergraduates with little or no musical training were requested to rate harmonic intervals (6 minor 3rds and 6 perfect 4ths, sampled guitar sounds) on 10 bi-polar expression scales (e.g., Weak-Strong, Happy-Sad). Half of the intervals of each type were comprised of common pitches, and half of rarer pitches.

Results

Ratings were significantly associated with interval type (3rd or 4th), pitch height, and (relevant to our hypothesis) occurrence frequency. In accordance with previous studies, Participants rated higher pitch intervals as happier, harder, brighter, smaller, sweeter, weaker, and more relaxed than lower ones ($p < 0.005$). Most importantly, participants also rated rarer pitch combinations in both intervals as larger and

stronger than their adjacent common counterparts ($p < 0.05$, two tailed, Benjamini & Hochberg FDR correction).

Conclusions

Corroborating our previous findings, results suggest that rates of exposure to absolute pitches in music affect the ways pitch combinations (harmonic intervals) are experienced, such that ratings of expressive and cross-modal qualities differ for frequently-heard and rarer transpositions of the same interval. Specifically, frequency of occurrence affected “potency” scales (Osgood et al., 1957), associated with power and magnitude, as rarer intervals were rated higher in potency (stronger, larger). This novel exposure effect suggests that implicit absolute pitch abilities are not only widespread among non-musicians, but partake significantly in the perception of the expressive qualities of musical sound.

Keywords

Absolute pitch, exposure effects, emotion, metaphor, cross-modal.

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