The taste of scales and chords

Taste of scales

Crossmodal taste associations with elementary musical structures

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We explore crossmodal music-taste associations between musical scales, chords and basic tastes. Several of these elementary musical structures show non-random associations with basic tastes. In agreement with previous studies using more complex music, the percentage of sweet (bitter) taste matchings correlates with consonance (dissonance) measures, and dissonant chords are mainly associated with sour taste.

CCS CONCEPTS • Human-centered computing

Additional Keywords and Phrases: Crossmodal correspondences, Music, Taste.

ACM Reference Format:

First Author's Name, Initials, and Last Name, Second Author's Name, Initials, and Last Name, and Third Author's Name, Initials, and Last Name. 2018. The Title of the Paper: ACM Conference Proceedings Manuscript Submission Template: This is the subtitle of the paper, this document both explains and embodies the submission format for authors using Word. In Woodstock '18: ACM Symposium on Neural Gaze Detection, June 03–05, 2018, Woodstock, NY. ACM, New York, NY, USA, 10 pages. NOTE: This block will be automatically generated when manuscripts are processed after acceptance.

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1 INTRODUCTION

Reliable crossmodal correspondences between basic tastes and music features have been found in recent studies [1,2]. This research shows that sweet taste tends to be matched with sounds that are high in pitch, with slow tempo music that is "legato" in articulation and soft in dynamics, and with consonant harmonies. Sour taste is matched with extremely high-pitched sounds, fast tempo and dissonant music. Bitter taste is matched with sounds that are low in pitch and dissonant. Salty taste is mostly associated with "staccato" music. While previous studies focused either on single notes or complex music, here we considered the intermediate domain of basic music scales and chords.

2 ONLINE ASSOCIATION EXPERIMENT

Forty five non-musicians (26 females; mean age 35.6 years) filled a Google Form survey. They were presented with 25 short sound files, each containing a scale or a chord, and asked to match a single taste word to each of them, among the four basic taste words bitter, sweet, salty and sour. All scales and chords were presented in a MIDI classical piano timbre, in the middle C4 octave. Audios were mastered to have a homogeneous loudness. Each participant listened to the audio files over earphones. The scales and chords were based on C. The duration of notes in chords and scales was fixed to 2s and 0.5s respectively; scales were presented in ascending and descending form.

Scale types were: Major, Minor Melodic, Minor Harmonic, Chromatic, Whole-tone, Octatonic. Chord types were: Major triad, Minor triad, Diminished triad, Augmented triad, Minor 7th, Major 7th, Minor major 7th, Diminished 7th, Dominant 7th, Half-diminished 7th, Augmented 7th, Augmented major 7th, French augmented 6th.

3 RESULTS

Associations for each taste are shown in Figure 1. We ran a chi-squared test under the null hypothesis of random responses (25% for each taste). For 13 out of the 25 musical structures the null hypothesis was rejected (significance level of 0.01).

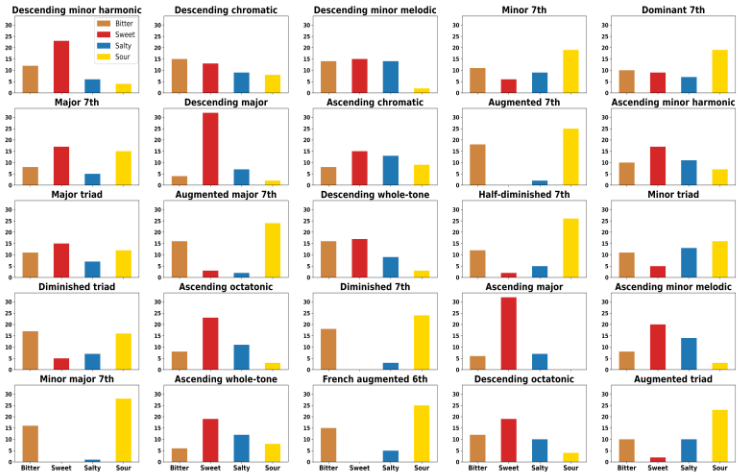

Figure 1: Frequency of taste matches for each musical stimulus for the 45 participants.

. These 13 structures are shown in Figure 2, where we performed a hierarchical clustering of the taste frequency profiles based on Euclidean distance. Two main clusters emerged: scales (mainly sweet, sweet and salty or bitter and sweet associations) and chords (mainly sour or bitter and sour).

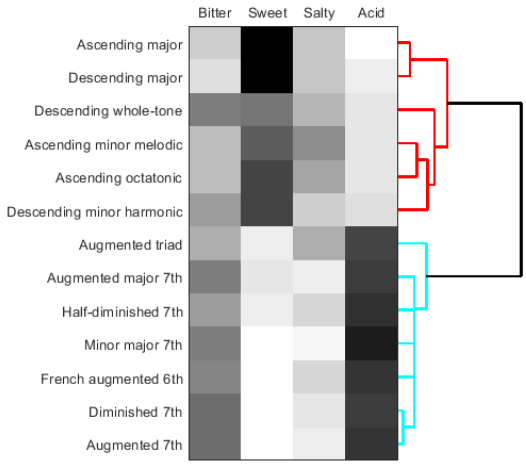

Figure 2: Proportion of taste matches and clustering for the 13 structures with non-random matches.

4 CONSONANCE AND TASTE. SWEET VS. SOUR

To test the influence of interval content or melodic/ harmonic consonance of the scales and chords on taste choices, we computed, for each taste, Pearson correlations between the percentage of associations of each given musical structure with that taste, and three measures of consonance/dissonance: Correlation consonance [3], Aggregate dyadic consonance [3], and Interval Dissonance Rate [4]. In agreement with previous results [1-2], we find positive (negative) correlations between consonance and sweetness (bitterness) (Figure 4). Note also in Figure 4 a strong anticorrelation between sour and sweet taste-music associations, which is consistent with the results in [1].

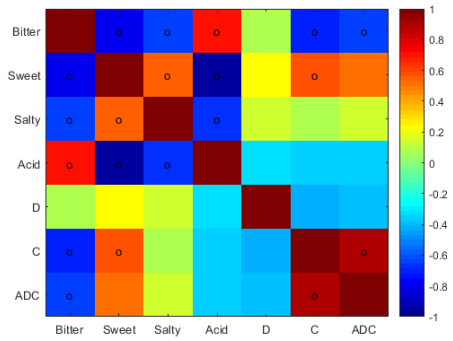

Figure 3: Correlations between frequencies of taste matches and measures of consonance/dissonance: D (Interval Dissonance Rate), C (Correlation consonance), ADR (Aggregate Dyadic Consonance). Circles indicate significant correlations (significance level of 0.05).

5 CONCLUSIONS

Previous work on crossmodal correspondences has focused either on single notes or complex music. Here we considered the intermediate domain of basic music scales and chords, keeping constant the duration, intensity, register and timbre of the audio files. We show that the appearance of correspondences still occurs in this case, and that scales differ from chords in their matched taste profiles. In conclusion, in this limited context where the main source of variance in the stimuli is interval content, and consequently melodic and harmonic consonance (in turn related to auditory pleasantness), we find that more consonant musical structures are rated as sweeter, more dissonant structures are rated as more bitter and sour, music that is more sweet is less sour and vice versa, and all this is consistent with crossmodal correspondences found in other more complex musical situations.

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