EVALUATION OF PERCEIVED TONALITY ACROSS THE MUSICAL PITCH RANGE

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1. INTRODUCTION

A three-level hierarchy of tonal stability (tonic triad, other scale, nonscale notes) has been empirically demonstrated for the perception of key structure within the Western tonal-harmonic idiom (e.g., Cuddy & Badertscher, 1987; Krumhansl & Kessler, 1982). This study addresses the issue whether this hierarchy is stable throughout the frequency range typically employed in music.

2. METHOD

2.1 Participants

Forty participants, 23 females and 17 males, were recruited from the Queen's University community. Participants received course credit or cash payment. Twenty of the participants had extensive formal music training (mean = 12.3 yrs., minimum of VIII Royal Conservatory). The other 20 participants had little formal training (mean = 2.52 yrs.). No participant reported any hearing difficulties.

2.2 Materials

Stimuli were sampled piano tones generated by a Roland FP-1 under the control of a Macintosh PowerPC. A trial consisted of a 4-note tonal sequence (do-mi-do-sol) in the key of D# major or A major followed by a probe tone, one of the 12 possible notes of the chromatic scale. Sequences and probe tones were contained within one octave. Fifteen different (overlapping) octaves were sampled within the range of fundamental frequencies 19.4 to 4709.1 Hz. All tones were equalized for loudness.

2.3 Procedure

The listeners' task was to rate the degree to which a probe fit into the preceding sequence, on a 7-point scale that ranged from "Fits very well" to "Fits very poorly". Listeners were encouraged to assess the probe within the context of the entire 4-note sequence rather than on how well the probe continued the melody.

3. RESULTS AND DISCUSSION

Following Krumhansl and Kessler (1982), the set of 12 ratings is called a probe-tone profile. To assess recovery of the tonal hierarchy, correlations were calculated between the obtained profiles from individual listeners and the standardized profile for key-defining contexts provided by Krumhansl and Kessler (1982). Figure 1 reveals that recovery of the tonal hierarchy was most evident for trained listeners in the central octaves. In the shaded areas of figure 1, however, it can be seen that the number of trained and untrained listeners able to recover the tonal hierarchy was particularly low in the pitch ranges below A1 (55 Hz) and above D#7 (2489 Hz). Hence, for most listeners, the audible pitch range of tonality may be narrower than the musical pitch range. These findings implicate a dominance region for musical pitch perception.

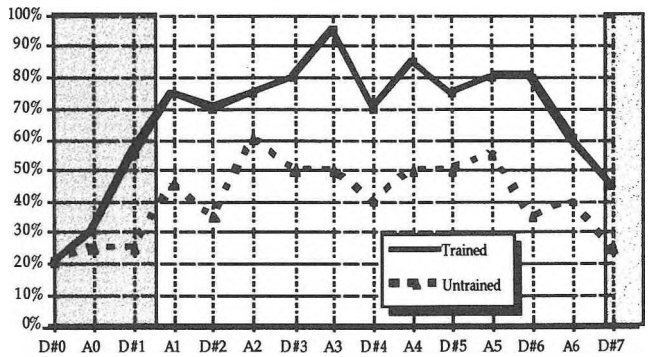

Figure 1: Recovery of tonal hierarchy as expressed by percentage of listeners having responses significantly correlated with standardized profile in each octave tested

4. REFERENCES

Cuddy, L.L., & Badertscher, B. (1987). Recovery of the tonal hierarchy: Some comparisons across age and level of musical experience. Perception and Psychophysics. 41, 609-620.

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