Effects of Tonality, Contour, Pitch Intervals, and Hemisphere on the Representation of Melodic Information

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Abstract

Tonality, contour, interval, and hemisphere are important predictors of melody recognition. Using forced-choice comparisons, listeners attempted to recognize the contour and interval information for diatonic and nondiatonic melodies presented to the left or right ear. For diatonic melodies, scale was more salient than contour whereas listeners relied on contour in nondiatonic melodies.

Introduction

Considerable research (Bartlett & Dowling, 1980; Dowling, 1978; Freedman, 1989) has shown that, for brief delays, scale and contour information is important, whereas, as the delay increases, interval information becomes relatively more important than contour information. Freedman (1989) found that diatonicism mediates the integration of interval information. In cognitive neuroscience, Peretz and Babaie (1992) found that the left hemisphere represents interval information whereas the right hemisphere represents contour.

Because it is not clear whether scale information mediates hemispheric differences in the mental representation of contour and interval information, the present study investigates these variables simultaneously.

Method

Subjects

Subjects were 24 male and female right-handed college students ranging in age from 16 to 42, M = 21.8, SD = 7.5.

Stimulus

Computer-generated seven-tone standard melodies were constructed in the key of C- or G- major and melodies were either diatonic or nondiatonic. Each tone was 150 ms with 50 ms between tones.

Procedure

At the beginning of each trial, an arrow indicated the ear in which the target melodies would be presented. On each trial, listeners compared a standard melody to two comparisons. While the standard was presented, a distracter melody was played simultaneously in the opposite ear. Following the standard, listeners heard one of these types of comparisons: (a) melodies identical to the standard vs. different-contour (DC) lures; (b) contour-preserving melodies vs. DC lures; and (c) contour-preserving melodies vs. the standards. Contour-preserving melodies included Preserve-Contour-Only (PCO) melodies that changed the intervals and pitches but maintained the contours and transposed (KT) melodies that changed the key of the standard to preserve the contour and interval information. Listeners had five seconds to decide which comparison melody was most like the standard.

Results and Discussion

Using the percentage correct, a 2 X 2 X 2 X 2 (Ear X Tonality X Contour X Comparison) ANOVA was calculated. A Comparison X Contour interaction, $F(1,23) = 75.360$, $p < .001$, indicated that, in PCO comparisons, accuracy was higher in the PCO vs. DC comparison than in the PCO vs. standard comparison (M = .765 vs. .633). In KT comparisons, accuracy was worse in the KT vs. DC comparison than in the KT vs. standard comparison (M = .589 vs. .794). Thus, although listeners detected the contour for PCO comparisons, listeners relied on scale information when KT melodies were used.

Nondiatonic melodies were recognized more accurately than the diatonic melodies, $F(1,23)=4.722$, $p < .05$. A Tonality X Contour interaction indicated that, for diatonic melodies, recognition was superior for PCO melodies than for KT melodies (M= .717 vs. 646), but, for nondiatonic melodies, KT melodies were recognized better than PCO melodies (M= .736 vs. .680), $F(1,23)=25.862$, $p < .001$. Thus, in diatonic melodies, scale information predominates over contour information, but, for nondiatonic melodies, listeners relied on the contour information. Contrary to the previous research, no hemispheric differences were found. The relatively long interval between the standards and comparisons may allow inter-hemispheric communication.

References

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