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JUDGMENTS OF INTERVAL SIZE BY MUSICALLY TRAINED AND UNTRAINED LISTENERS

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ABSTRACT

The current experiment sought to clarify the appropriateness of the musical scale for representing phenomenological judgments of interval size. Musically trained and untrained listeners were asked to judge the size of ascending and descending intervals that varied in log frequency distance from 50 cents (1/2 semitone) to 2400 cents (2 octaves). All intervals were presented melodically (two-tone sequence) in both a lower pitch register and a higher pitch register. Although interval size judgments were well predicted by log frequency distance, two unexpected findings were revealed. First, the rate of expansion in size judgments for increasing interval sizes presented in the upper register was greater than the rate of expansion in interval size judgments for increasing interval sizes presented in the lower register. Second, for trained listeners, the rate of expansion in size judgments for increasing interval sizes that were smaller than an octave (e.g., 100 to 400 cents) was greater than the rate of expansion in size judgments for increasing interval sizes that were larger than an octave (e.g., 1300 to 1600 cents). For untrained listeners, the slope of the best fitting line did not vary as a function of whether intervals were smaller than or larger than an octave.

BACKGROUND AND AIMS

Perception of interval size is influenced by more than just log frequency distance. For example, in the case of pure tones, the pitch distance corresponding to "half as high" is known to vary as a function of frequency region (Stevens, Volkman & Newman, 1937). This classic finding is difficult to reconcile with the musical scale in which a given interval (e.g., the octave) is accepted as being the same independent of the frequency region or orientation that it is presented in. The current experiment sought to clarify the appropriateness of the musical scale for representing phenomenological judgments of interval size by musically trained and untrained listeners.

METHOD

Musically trained and untrained listeners were asked to judge the size of ascending and descending intervals that varied in log frequency distance from 50 cents to 2400 cents. All intervals were presented melodically in both a lower pitch register and a higher pitch register. Intervals in the lower pitch register were centered on the F below middle C. Intervals in the higher pitch register were centered on the F above middle C. Tones consisted of 12 harmonically related equal-intensity components. Before testing commenced, listeners were familiarized with examples of the smallest and largest intervals in the experimental set. Judgments of interval size were made on a scale that ranged from 1 to 100.

RESULTS

As expected, interval size judgments were positively correlated with log frequency distance (cents) in all conditions and for intervals smaller than an octave as well as for those larger than an octave. However, a few striking findings were revealed concerning the slope of the best fitting line. First, for both trained and untrained listeners, the slope of the best fitting line for ascending intervals was steeper in the higher register than in the lower register. That is, the rate of expansion in size judgments for increasing interval sizes presented in the upper register was greater than the rate of expansion in interval size judgments for increasing interval sizes presented in the lower register. Remarkably, however, pitch register had no effect for descending intervals. Second, for trained listeners, the slope of the best fitting line was steeper for intervals smaller than an octave than for intervals larger than an octave (for ascending and descending intervals in both the high-pitch and low-pitch region). In contrast, for untrained listeners, the slope of the best fitting line did not vary as a function of whether intervals were smaller than or larger than an octave.

CONCLUSIONS

Although interval size judgments were well predicted by log frequency distance, two unexpected findings were revealed. First, for both trained and untrained listeners, the perceived size of ascending intervals was expanded simply by presenting them at a higher register. Second, for trained listeners only, the rate of expansion in size judgments for increasing interval sizes that were smaller than an octave (e.g., 100 to 400 cents) was greater than the rate of expansion in size judgments for increasing interval sizes that were larger than an octave (e.g., 1300 to 1600 cents).

TOPIC AREAS

Interval Size
Psychophysics
Musical Training