**Background**

- Although intonation is continuously variable, linguists treat intonation in terms of discrete categories (1, 2, 3).
- There has been little behavioral evidence (4), however, to show that these categories exist in the minds of speakers rather than merely being endpoints of a continuum.

**Method: Iterative Mimicry**

- Telophonic speakers of Southern British English, four sessions each.
- 120 intonation contours were made, each randomized with a tributary, physiologically possible, & context. Sessions were about 12 seconds long.
- In session 1, subjects mimicked each initial contour. They heard S1 and produced R1. Each production was printed, amplitude normalized, and stored.
- In sessions 2 through 4, the subject mimicked his/her own productions from the preceding session (S2→R2→...).
- The first task of each session was to obtain each ESFX get/4. Each task was time-normalized.

**Results**

- In the first session, the produced & contours generally resembled those of the initial stimuli, but showed some grouping.
- As sessions proceeded, f contours for most subjects progressively collapsed into two distinct, separate cells or branches.

**Statistical Analysis**

- To test for the presence of the two branches in each session, we examined a slice of the data near the middle of each contour.

- Using a Bayesian Markov Chain Monte Carlo procedure, we determined the likelihood ratio of a single mixture and of two mixtures to the data. The data fit a single Gaussian or two Gaussian mixture equally well.

- For some of the ten participants, all with two distinct voices, p < 0.001 in sessions 2 through 4.

**Conclusions**

- Subjects can perceive and link intonation contours that are far from phonological and lexical, retaining substantial phonetic detail.
- Over several successive sessions, however, their intonation contours converge onto a small set of distinct contours.
- These distinct contours are common English intonation contours. Mathematically, they are stable attractors of the mapping between stimuli and responses.
- Stable attractors and the related Perceptual-Motor Theory of Phonological Learning (5, 6) suggest that linguistic categories may emerge from a continuous (variable) space.
- These attractors may equate to some sort of latent mental categories; that is, distinct sets of intonation contours that are treated similarly.
- A purely symbolic representation of intonation, however, is insufficient to explain the facts of mimicry.

**Speculations**

- The distribution of contours that adults hear over time will have peaks at attractors.
- Children may construct their own attractors based on the adult distribution.
- This could fund the transmission of the intonation aspects of a language from one generation to another.

**Notes**

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