Familiar, but I don't know about preference:
Acquisition and generalization of modal pitch distributions.

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Introduction

With sufficient exposure to melodies generated by a novel second-order rule system (Loui, Wessel, & Hudson Kam, 2010) new melodies are recognized, thus demonstrating acquisition of the statistical regularities of the system. This study is concerned with a first-order rule system: pitch distribution. We explored an interaction between distinctiveness of the distribution and retrieval instructions (explicit or implicit) on melody recognition.

Stimuli and Methods

• **Participants**

82 Participants with less than five years of formal music training were recruited from Queen's University and compensated $15 for their time.

• **Stimuli**

Tone sequences were randomly generated from a version of Temperley's (2007) pitch model using pitch profiles of medieval modes (Hypophrygian or Lydian, see Huron & Veltman, 2006), versions of pitch profiles were constructed to be more or less distinctive following an algorithm described by Smith & Schmuckler (2004) (see Figure 1).
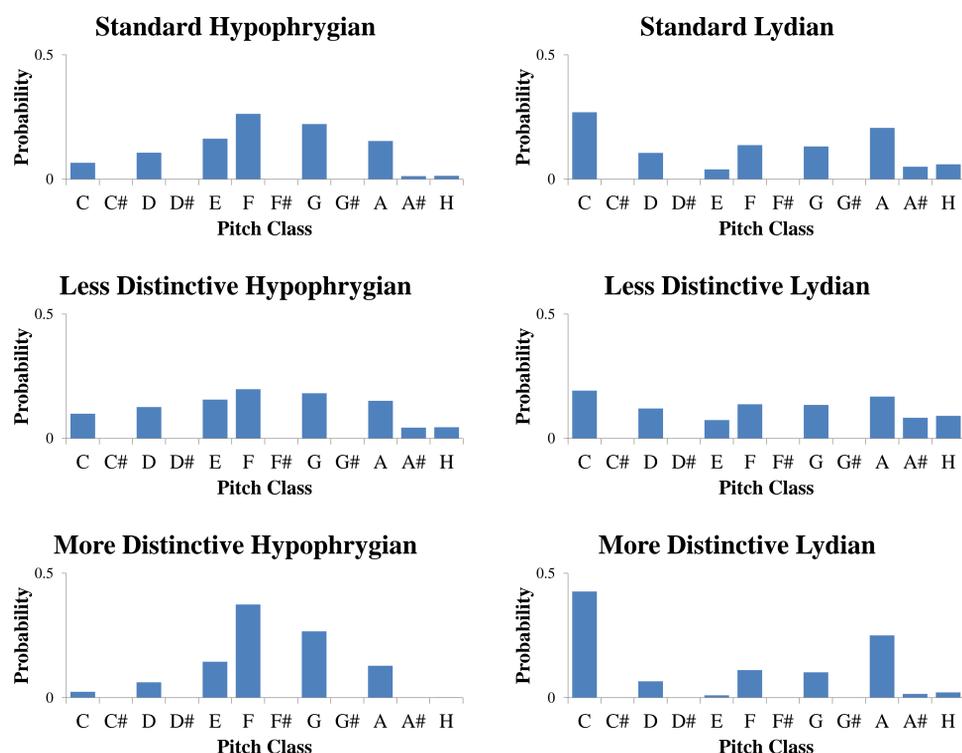

Figure 1. Six pitch probability profiles used to create the tone sequences.

• **Design**

Between Subjects: 2 factors with 2 levels each
Factor 1 Expectancy - participants were told or not told to expect the test phase
Factor 2 Retrieval instructions at test phase - participants judged which member of each pair was more familiar (explicit) or which they preferred (implicit)

Within Subjects: 1 factor with 3 levels
Factor 3 Distinctiveness - pairs were generated from either standard pitch profiles, less distinct or more distinct pitch profiles - 10 pairs per level

• **Two phases**

An exposure phase (about 20 min) involved listening to 100 melodies generated from a standard pitch profile, the "exposed mode". A subsequent test phase involved listening to 30 pairs of melodies that paired melodies generated from the exposed profile with melodies generated from an unexposed profile at each level of distinctiveness (10 pairs per level).

Results

• No effect of expectancy so data were pooled across this factor for further analysis

• Participants under familiarity instructions performed higher than chance (one-sample t-tests, less distinctive $t(41)=2.65$, $p < .05$, original level $t(41)=3.18$, $p < .01$, more distinctive level $t(41)=5.67$, $p < .01$), but those under preference instructions did not ($ps > .05$)

• Moreover, there was an interaction between retrieval instructions (familiarity vs. preference) and distinctiveness, with the effects of distinctiveness being visible for the familiarity group, see Fig. 2 ($F(1,78)=7.97$, $p<.01$).
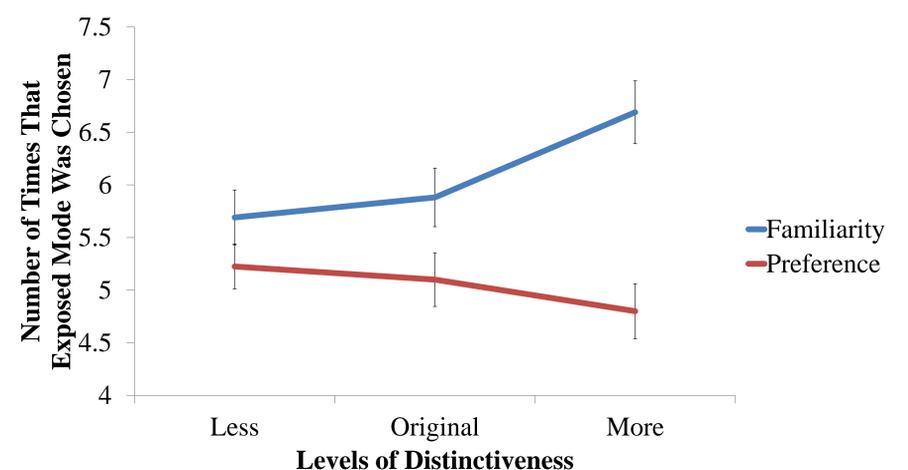

Figure 2. Interaction between levels of distinctiveness and type of retrieval instructions. Participants in the group with explicit retrieval instructions (familiarity) displayed acquisition of the exposed modal pitch distribution and effects of distinctiveness (generalization). Error bars indicate the standard error of the mean.

Conclusions and Discussion

• Melodies generated from the exposed mode were chosen more often than predicted by chance in the familiarity group, demonstrating acquisition of a first-order rule system

• As there was no effect of expectancy this demonstrates successful passive learning of modal pitch distribution

• Exaggerating the properties of the profile aided participant's recognition in the familiarity group, supporting the theory that salient pitches are important for acquisition of pitch profiles and the tonal hierarchy, and demonstrating that participants were able to generalize the pitch distribution

• The absence of an effect of distinctiveness in the preference group suggests a single dissociation between knowledge and affect

• Future studies might want to explore a possible double dissociation between knowledge and affect using a first-order rule system

References

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