MUSIC-MELODY PERCEPTION IN TONE-LANGUAGE AND NON-TONE-LANGUAGE SPEAKERS

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affects music-pitch perception and vice-versa. Music experience may facilitate processing of prosody and intonation [Stevens et al., 1], detection of small pitch changes in final words and notes [e.g., Schön et al., 2], identification of intonation-phras . 3], and discrimination of phrasal intonation contours (*ibid.*). Music experience is correlated with comparatively high performance on behavioral lexical-pitch perception tasks such as recall and identification of lexical-tone variation [Delogu et al., 4], non-native tone-pattern learning [Wong & Perrachione, 5], and identification and discrimination of isolated lexical tones [e.g., Alexander et al., [6]; Gottfried, [7]]. Music ability is also correlated with increased neurophysiological linguistic-pitch-processing ability: relative to non-musicians, musicians display more robust and faithful encoding of lexical pitch at the brainstem [Wong et al., 8]. Tone language experience may also influence nonspeech-pitch processing ability. Native tone-language speakers may be more likely than non-tone-language speakers to possess absolute pitch [Deutsch et al., 9] and more easily discriminate two-note music contours [Stevens et al., 1]. But native Mandarin listeners more often misidentify flat and falling sine-wave pitch contours than English listeners [Bent et al., 10].

The above studies suggest that experience processing one type of pitch (lexical or musical) affects perception of the other. This study seeks a more nuanced view of this phenomenon. We examine the discrimination and identification of pitch in short (five-note) musical melodies by listeners who differ with respect to their experience with linguistic pitch (native English speakers and native Mandarin speakers). We

lexical-pitch categories will interfere with their ability to identify music pitch patterns, and that they will perform the task more poorly than the English listeners, who lack existing lexical pitch categories. However, we predict that in the pitch discrimination task, where listeners do not compare the input to stored categories but instead focus on small acoustic differences between pairs, Mandarin listeners will prevail due to their experience discriminating short, rapidly-changing, lexical pitch sequences.

2. METHOD

2.1. Stimuli

Stimuli consisted of 48 five-note melodies replicated from Dowling [11]. In keeping with

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English speakers had no experience with any tone language. The groups did not differ in age (M=25 y.o., SD=3.98 y.) nor music-training duration (t(25.97)= -0.82, p=0.42). All had minimal music training (max=4.5 y. music training (n=1); mode=0 y. (n=13); M=1.4 y.). None reported hearing, speech, or neurological deficits. Musicianship and language experience were assessed via questionnaire.

2.3. Experiments

2.3.1. Experiment 1

Experiment 1 was a 2 AFC AX discrimination task; melodies were arranged in pairs. In two blocks of 48 trials (96 trials total), half were two melodies had the same starting pitch, but differed by (a) the 2nd, 3rd, 4th, and 5th notes; (b) the 3rd, 4th, and 5th notes; (c) the 4th and 5th notes; or (d) the 5th note. Each melody was paired just once with any other melody, and each appeared in one trial where (a) or (b) was the case AND in one trial where either (c) or (d) was the case. The experiment took place in a quiet booth with a Dell computer. Stimuli were presented in random order via Sennheiser HD linear II or Sony Dynamic Stereo MDR-V700 headphones; accuracy and reaction time were recorded via Cedrus Model RB-730 response pad in E-PRIME [Schneider et al., 2002]. Results for experiment 1 are shown in Figure 2.

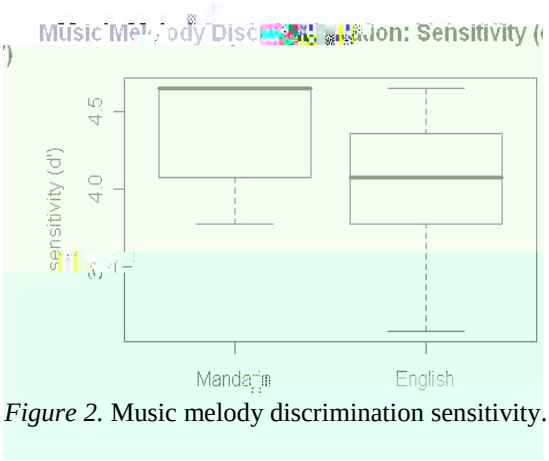

Figure 2. Music melody discrimination sensitivity.

Fig. 2 shows that the Mandarin speakers more accurately discriminated the melodies than English speakers (Mann-Whitney U=140.5, p<0.05; two-tailed t(21.86)=2.45, p<0.05, d= 0.93). Both groups spent the same amount of time on the task (Mann-Whitney U=99, p>0.05; 2-tailed t(22.6)=0.12, p>0.05).

2.3.2. Experiment 2

Experiment 2 was a 2-AFC identification task; a melody corresponded to a sequence of four arrows. Each arrow corresponded to a different note in the melody. An up-pointing arrow indicated that a note was higher in pitch relative to the one preceding it; a down-pointing arrow, the opposite. This aimed to mimic the concept that relative pitch height and contour are essential to lexical-t