

Tonality in language and sensitivity to pitch

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1. Introduction

Tonal languages, such as Mandarin or Vietnamese, use pitch as a phonemic distinction (a change in pitch can change the meaning of a word), as opposed to non-tonal languages, such as French or English, for which pitch does not differentiate words. Since tonal language native speakers are accustomed to using pitch to convey different meanings, we can suppose that they might develop heightened sensitivity to pitch variations. This sensitivity could extend beyond language to other auditory domains, such as music (Deutsch et al., 2006).

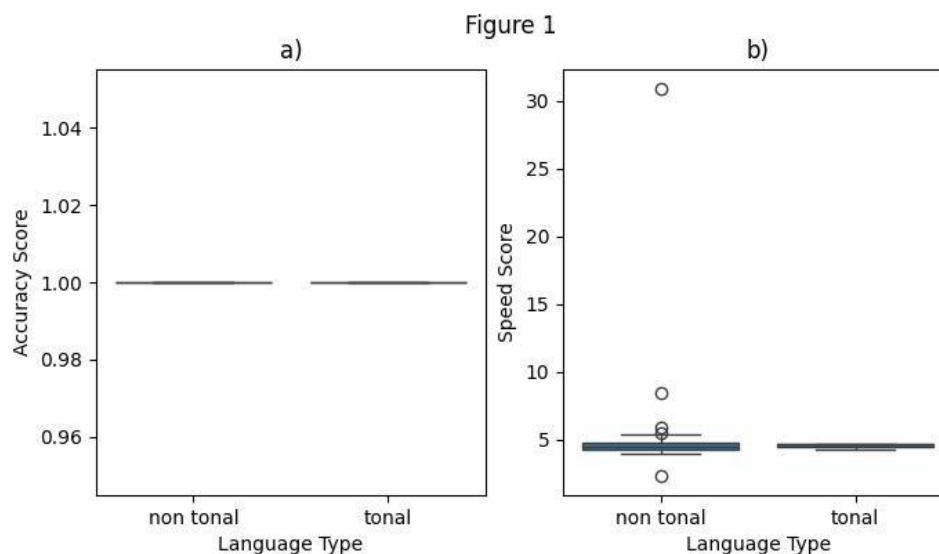
Does speaking a tonal language allow for better distinction of musical notes?

We anticipate that if this is the case, we should observe:

- **Prediction 1:** Native speakers of tonal languages should be more accurate at discriminating notes.
- **Prediction 2:** Native speakers of tonal languages should be faster at discriminating notes.

2. Data

An experiment was designed using PsychoPy and hosted on Pavlovia before being shared on Prolific. A total of 59 participants took part in the study. The experiment involved listening to twenty pairs of musical notes and determining whether they could be distinguished from one another. It recorded both the accuracy of the responses and the reaction times. Additionally, participants were asked to report their native language(s).



3. Methods

Since all participants answered correctly, we cannot perform a T-test to test prediction P1. To test prediction P2, we performed a T-test.

4. Results

Native speakers of tonal languages as well as native speakers of non-tonal languages answered all questions correctly ($\mu_1 = 1$, $\mu_2 = 1$, see **Figure 1**). As for their speed, it is slightly different ($\mu_1 = 5.127122$, $\mu_2 = 4.571228$, see **Figure 1**); however, this difference is not significant ($t = -0.2460$, $p = 0.8067$).

5. Conclusion

Our results are not significant enough to conclude whether the native language(s) has an influence on the discrimination of musical notes. Thus we **cannot confirm our prediction 2**. However, everyone was able to pass the test without any mistakes, which **contradicts our prediction 1**.

It should be noted that out of 59 participants, only 3 spoke a tonal language, which was Mandarin. This is a very unbalanced ratio and a very small sample. The study could therefore be repeated with more participants. The study could also be redone with a more subtle difference between the notes: for example quarter tones, which are not generally used in Western music, and to which people are generally less accustomed.

6. References

DEUTSCH, HENTHORN, MARVIN, XU, « Absolute pitch among American and Chinese conservatory students: Prevalence differences, and evidence for a speech-related critical period. », J. Acoust. Soc. Am. 1 February 2006; 119 (2): 719–722.).