

# Variation in Perception of Music and Language across The World

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## Introduction

- Music and language are universally present across different cultures and vary in their forms<sup>1</sup>
- Although adults and children can distinguish between speech and song from their own culture<sup>2</sup>, can they differentiate speech and song across cultures?
- We investigated how adults differentiate speech and song from 17 cultures<sup>1</sup> around the world.

## Predictions

- Participants will have high accuracy in categorizing speech and song across cultures<sup>2</sup>
- Participants will perform above chance for accuracy across all cultures

## Methods

### Stimuli

- 170 audio clips, 10 clips (5 speech and 5 song samples) from 17 different languages
- All audio clips were between 1-14 seconds

### Participants

- 67 Participants (34 Female) 18- 45 years.
- 48 online (Prolific) and 19 in-person

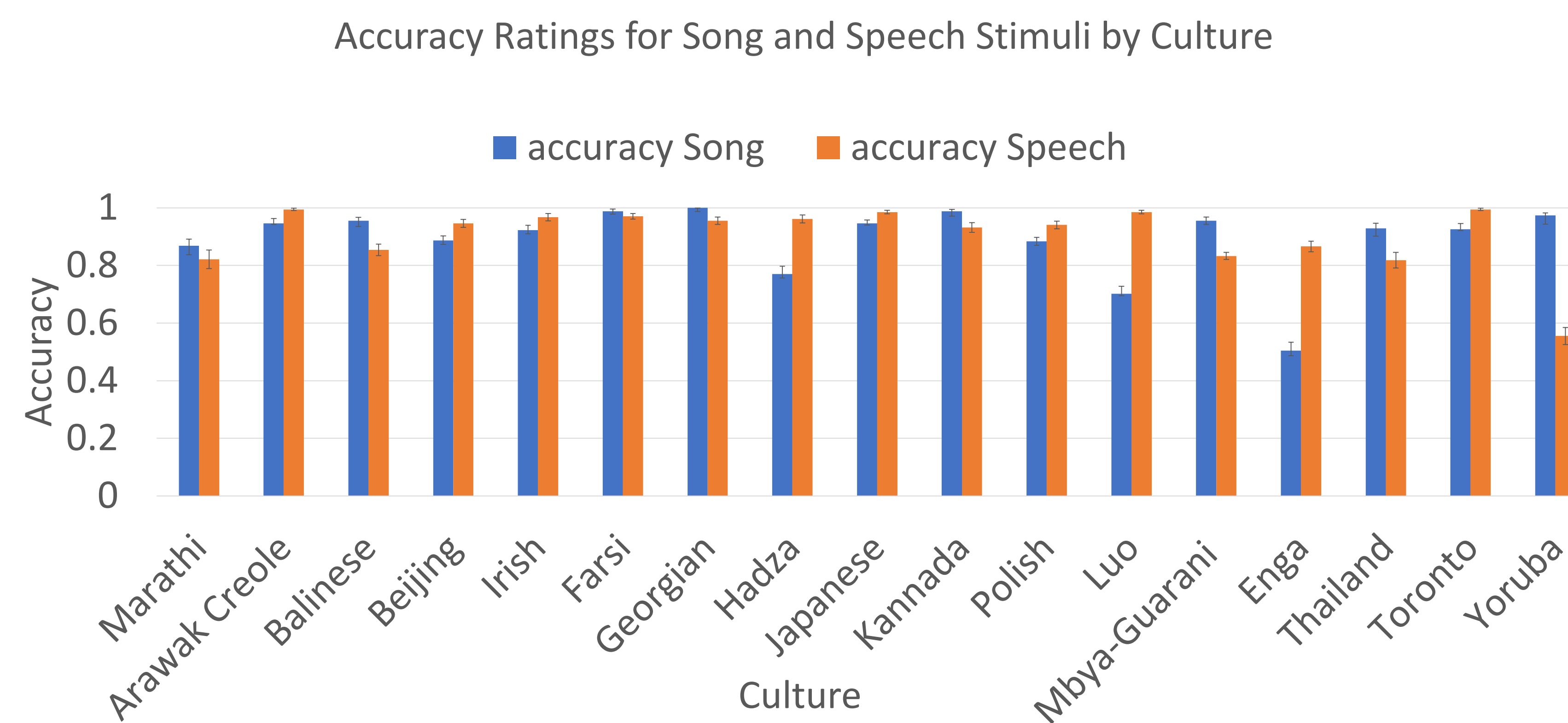
### Procedure

- Participants listened to audio clips and rated each clip on a scale from 1 to 5 (speech-like to song-like)
- Instructed to rate as quickly as possible without sacrificing accuracy.

## Results

Do participants have high accuracy in categorizing speech and song across cultures?

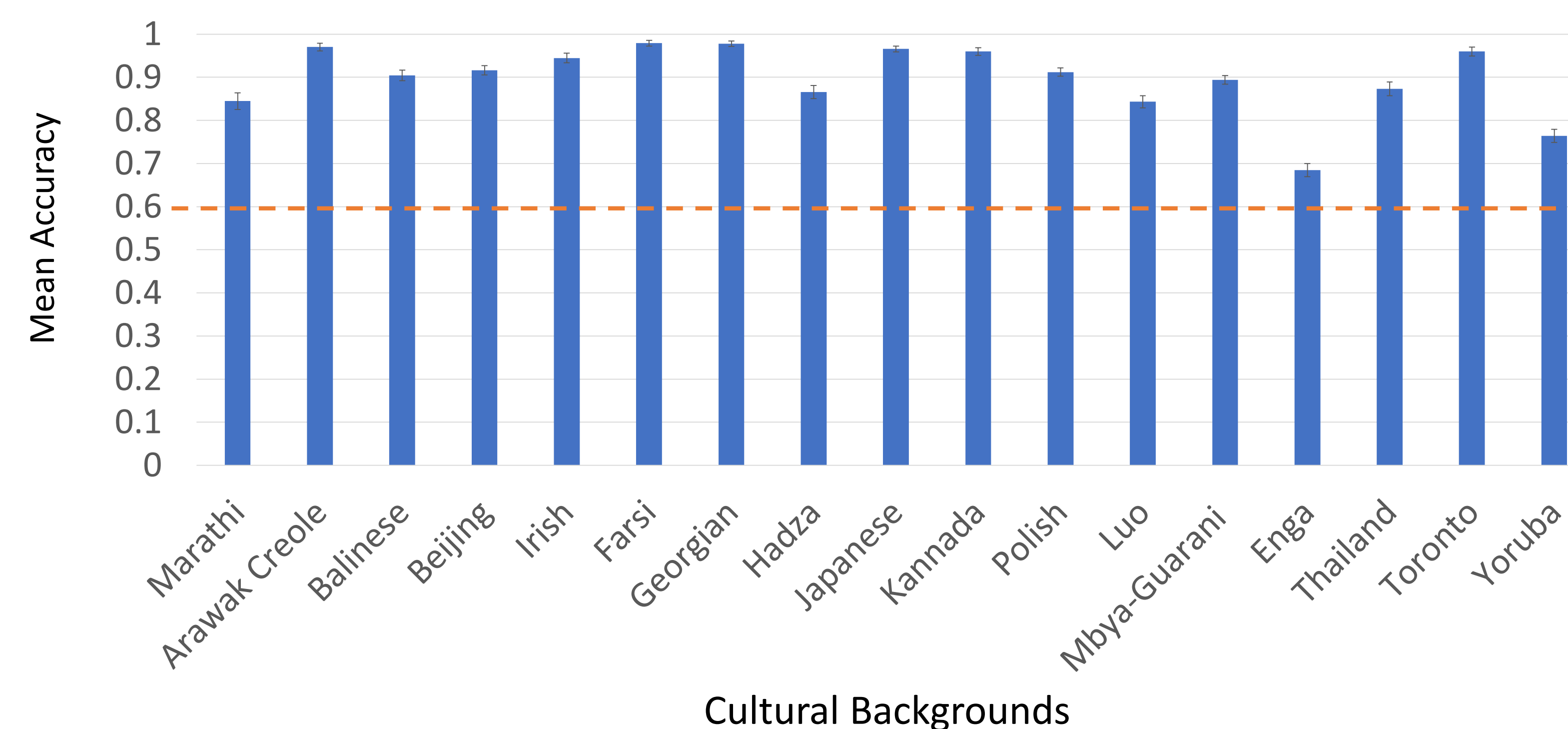
- A two –factor repeated measures ANOVA revealed a **significant main effect of culture** on accuracy rating ( $p < 0.05$ ) and **no significant main effect of modality** on accuracy rating ( $p = 0.903$ ).
- A **significant interaction** between modality and culture, illustrated that some cultures had different patterns of accuracy for speech and song (see Hadza, Luo, Enga, and Yoruba)



**Figure 1:** Accuracy for speech song stimuli across 17 different cultures. Accuracy very high (ceiling) for speech and song for majority of languages

Mean Accuracy of Speech and Song Categorization Across Cultures

Participants performed significantly above chance for each culture ( $p < 0.05$ )



**Figure 2:** Mean accuracy of speech and song stimuli across 17 different cultures

## Discussion and Conclusion

- **Adults can differentiate speech and song across cultures**, but a significant effect of culture suggests that participants are worse at categorizing speech and song in some cultures.
- Above chance performance for all cultures supports the notion of universal features for speech and song across cultures.

### Future directions:

- Examine acoustic features used to differentiate speech and song cross-culturally
- Examine what factors (e.g., tonal language) led to worse categorization for some cultures
- Investigate individual differences in familiarity with differences in participants with varying levels of musicality or familiarity with the cultures included in the study.
- Examine when in development humans categorize speech and song from their own culture and around the world. This will shed light on the importance of experience for forming categories for speech and song.

## References

1. Ozaki, Y., Tierney, A., Pfordresher, P., McBride, J., Benetos, E., Proutskova, P., Chiba, G., Liu, F., Jacoby, N., Purdy, S., Opondo, P., Fitch, T., Hegde, S., Rocamora, M., Thorne, R., Nweke, F. E., Sadaphal, D., Sadaphal, P., Hadavi, S., ... Savage, P. E. (2022). Globally, Songs and Instrumental Melodies Are Slower, Higher, and Use More Stable Pitches than Speech [Stage 2 Registered Report]. <https://doi.org/10.31234/osf.io/jr9x7>
2. Vanden Bosch der Nederlanden, C.M., Qi, X., Sequeira, S., Seth, P., Grahn, J. A., Joanisse, M. F., & Hannon, E.E. (2022). Developmental changes in the categorization of speech and song. *Developmental Science*, DOI: 10.1111/desc.13346
3. Philippe Albouy, Samuel A. Mehr, Roxane S. Hoyer, Jérémie Ginzburg, Robert J. Zatorre bioRxiv 2023. Spectro-temporal acoustical markers differentiate speech from song across cultures. 01.29.526133; doi: <https://doi.org/10.1101/2023.01.29.526133>