

# The Untapped Potential of Human Language: Investigating the Perception of Typologically Rare and Unattested Consonants

Cath Brislane, The University of York, clb628@york.ac.uk



## Introduction

- This research stemmed from the question "why are some sounds more common than others, or not attested in language at all?"
- There is a lack of studies on unattested pulmonic consonant perception – studies on L2 acquisition provided some background:
  - Native Language Model (Kuhl et. al. 1992) – non-native phoneme discrimination may be difficult if the phoneme resembles a native language prototype.
  - Speech Learning Model (Flege, 1995) – L2 categories will be more distinct the more they contrast from learned L1 phonemes.
  - Dispersion Theory (Flemming, 2004) – selection of phonological contrasts will vary depending on the distinctiveness, articulatory effort and the number of contrasts between two given sounds.

## Aims

- Aim 1: Begin to determine why some sounds may be rare or unattested.
- Aim 2: Provide advice for creators of constructed languages (conlangs).

## Methodology

ABX discrimination test variant – testing for perceptual similarity instead of a match (see figure 1).

- Online survey
- Anyone 18+ with no reported hearing loss could participate.
  - Known languages and linguistic background accounted for in the final analysis.

Two phases of testing were used to test for symmetrical relationships :

### Phase 1

- Sound 1: Closest (common) non-English
- Sound 2: **Closest English**
- Sound 3: **Rare/ unattested**

### Phase 2

- Sound 1: Closest (common) non-English
- Sound 2: **Rare/ unattested**
- Sound 3: **Closest English**

Usage frequency was measured for common and rare sounds with the PHOIBLE corpus.

Choose whether sound 1 or 2 is more perceptually similar to sound 3.



Figure 1: Experimental item example

## Analysis

- 104 valid responses
- Simple logistic regression analysis compared participant sound choice against the sound set presented.
- Two categories of language exposure were also analysed:
  - Monolingual English
  - French (the most common non-English language declared by participants)

## Results

- No strong sound type preferences by manner or place of articulation.
- Neither past language exposure categories reached significance.
- Significance was reached based on the following categories:
  - Place features – Participants were more likely to deem sounds that shared place features (eg. [±LAB]) most perceptually similar to each other.
  - Manner of articulation – Sounds that shared an identical or similar closure type (eg. taps vs stops) were also deemed more perceptually similar to each other if the third sound did not share this trait.
  - Voicing – Even if two sounds were identical in place and manner of articulation, they were normally not deemed to be perceptually similar to each other if they varied by voicing. However, this also depended on the degree of variance of the remaining sound in the set.

The results broadly agree with Dispersion Theory, implying that rare or unattested consonants may not be used because they are not perceptually distinct enough from common sounds today.

## Participant Sound Choice by R/U Soundsets (logistic regression, phase 1)

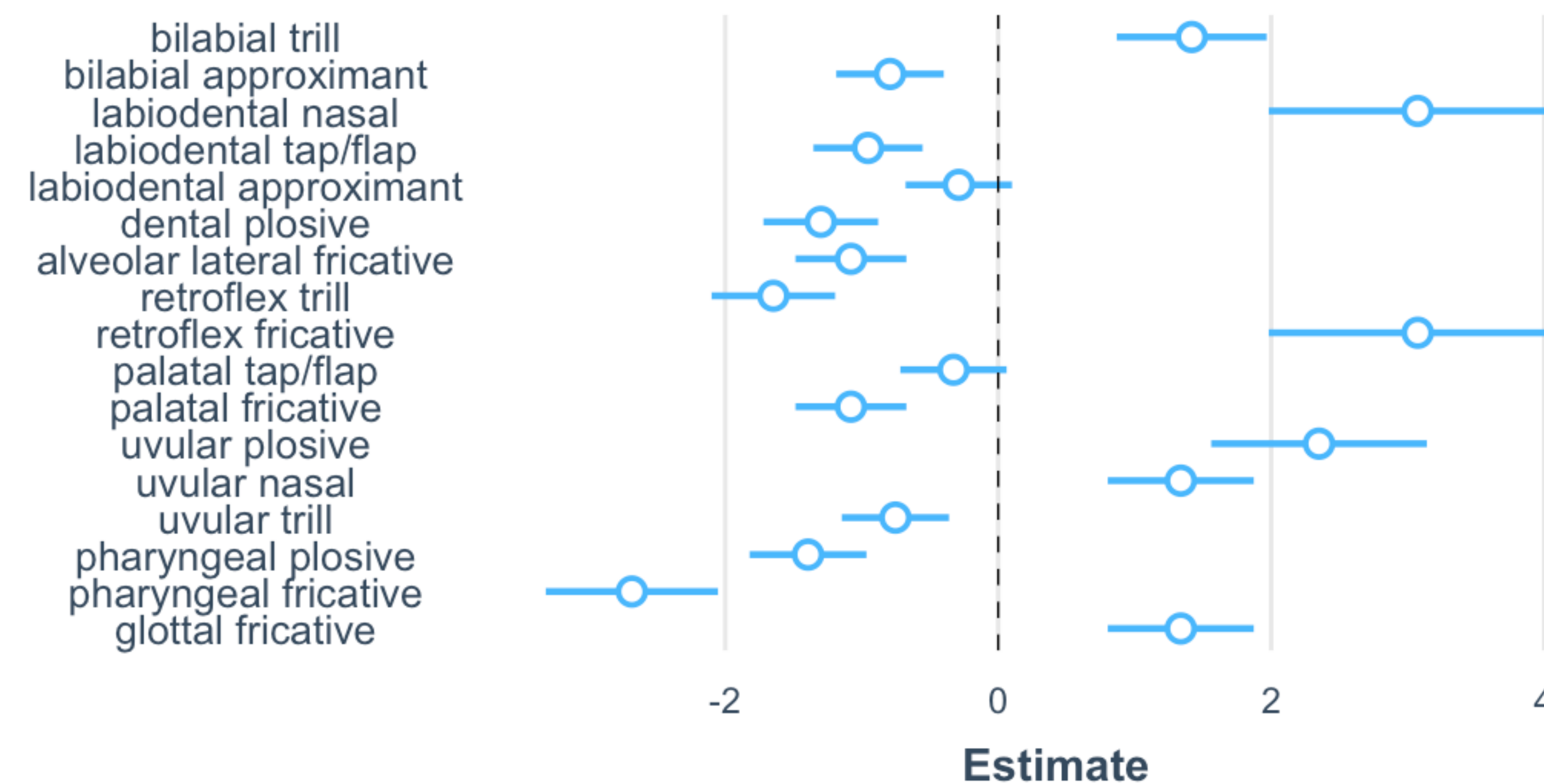


Figure 2: Phase 1 regression results

## Participant Sound Choice by R/U Soundsets (logistic regression, phase 2)

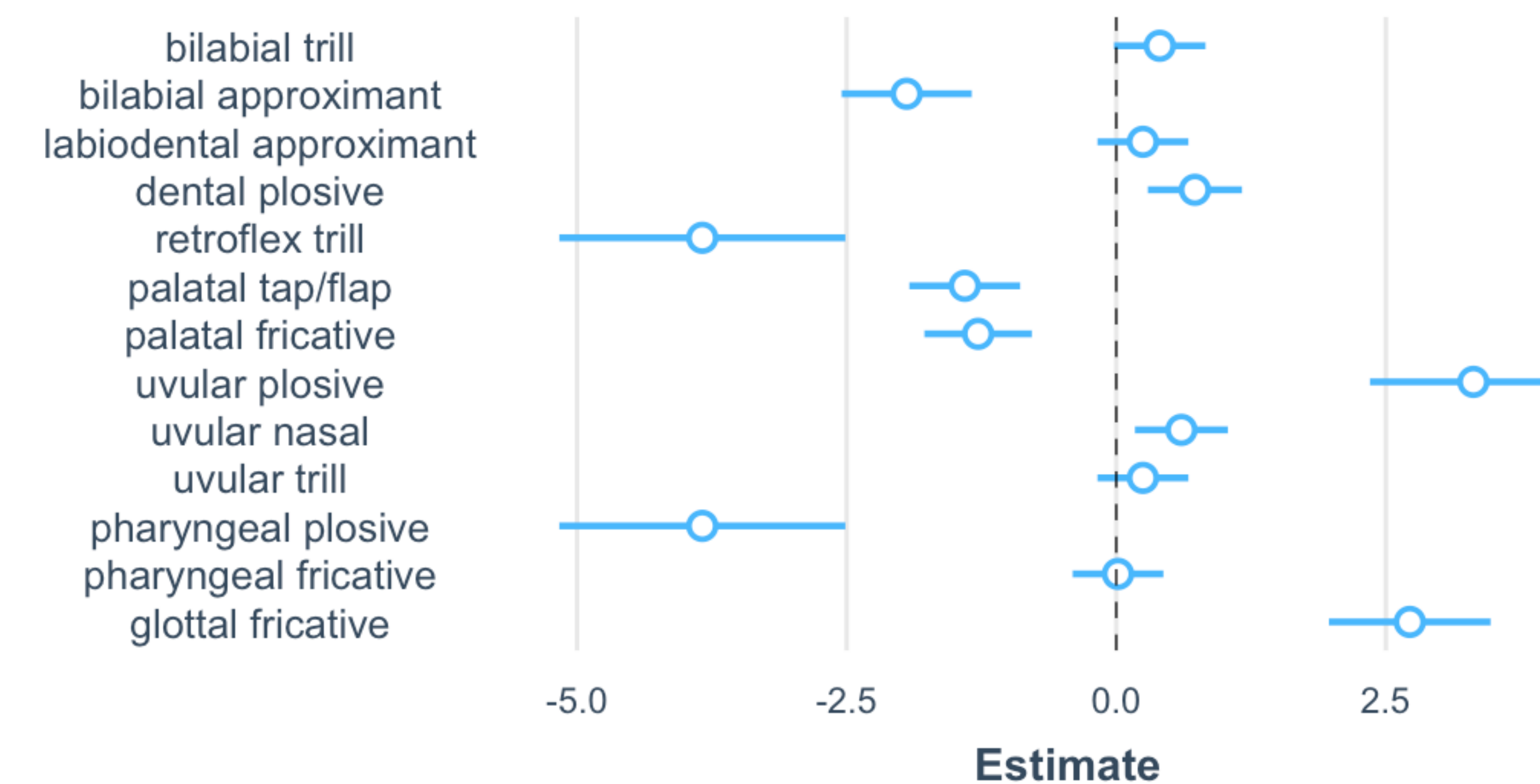


Figure 3: Phase 2 regression results

## Application

Realistically, there would be no constraints for a conlang author when using rare and unattested consonants. However, they would need to consider how sounds contrast against each other to create maximum perceptual distinctiveness.

## Conclusion

While the broadness of this study may be hard to make broadly applicable, it is a promising start into the investigation of rare and unattested consonants. The findings related to dispersion theory also provide the next steps for this research, where particular sound contrasts will be focused on.

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