

Differences in Articulatory Skill Between Monolinguals and Multilinguals of Different Backgrounds: An Acoustic Study of Tongue Twisters



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Introduction

Experimental studies show bilingual advantages in cognitive processing, but only executive function has been thoroughly studied. Recently, **bilinguals have been shown to have enhanced phonetic skill.**

Why Articulatory Skill?

The possibility arises that bilinguals' advantage in phonetic learning may be partially due to **superior motor control.**

Bilingual Advantages:

Linguistic processing- Learning of new accents [6]

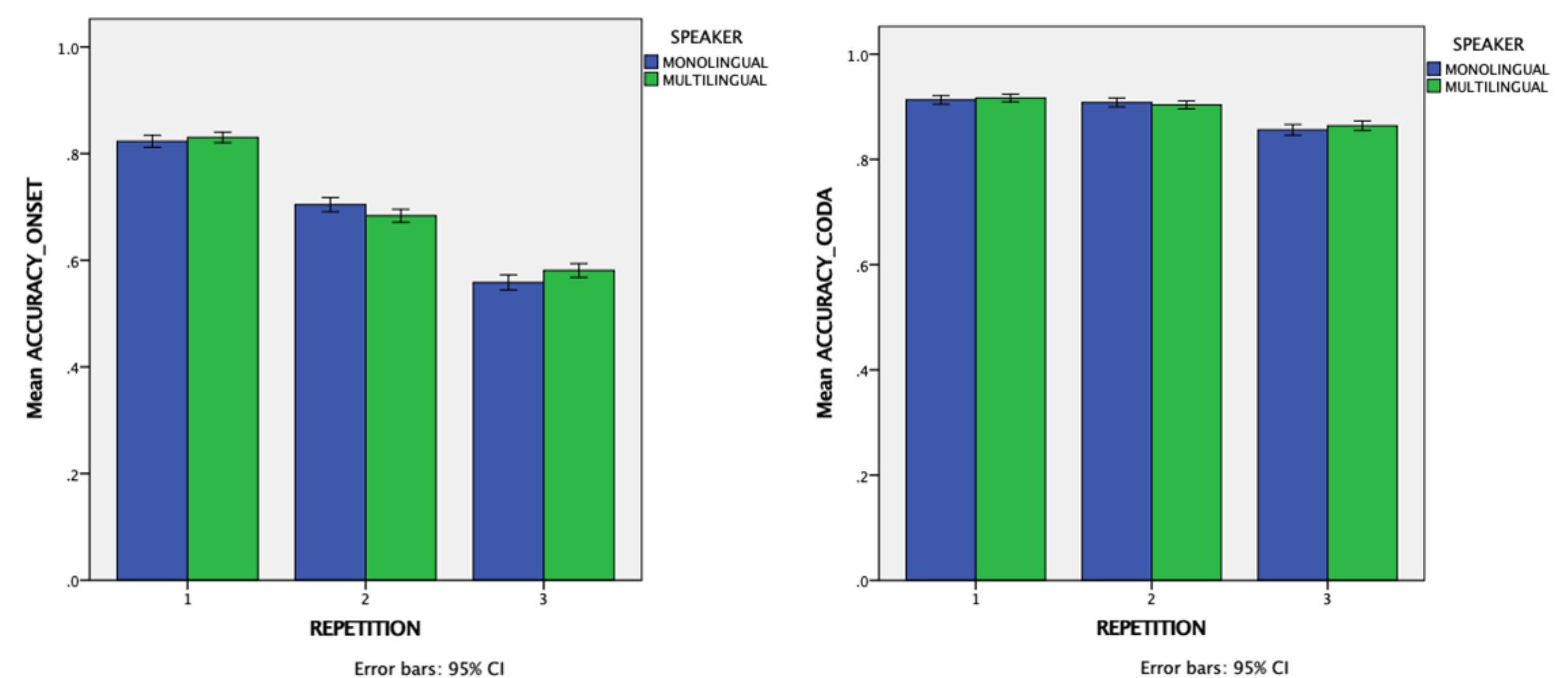
Non-linguistic Cognition- Multitasking [1, 8], Onset & rate of decline in dementia [4]

But bilingual disadvantage in fluency and lexical access (Sandoval et al. 2010)

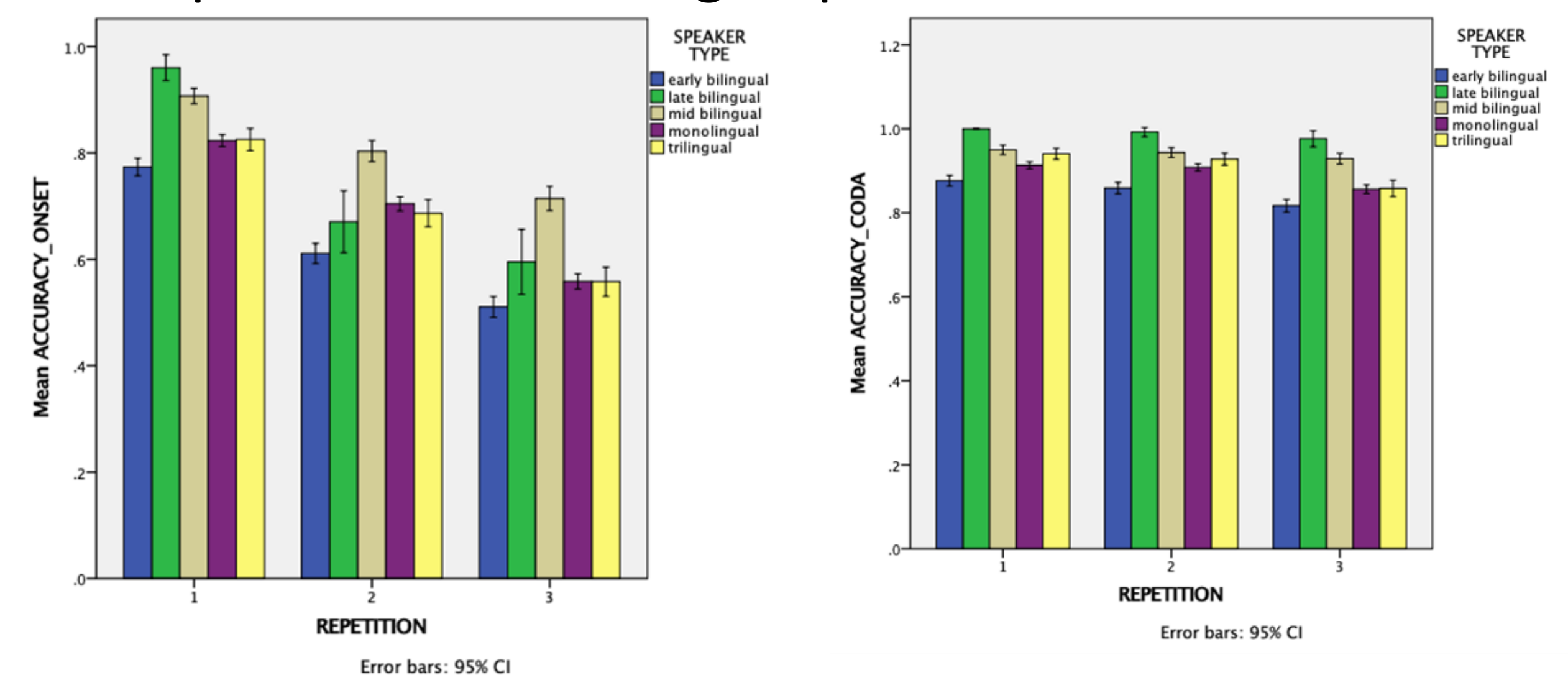
Possible Explanations: ATTENTION, SENSORY MEMORY & ARTICULATORY CONTROL → NEVER EXPLORED

Results

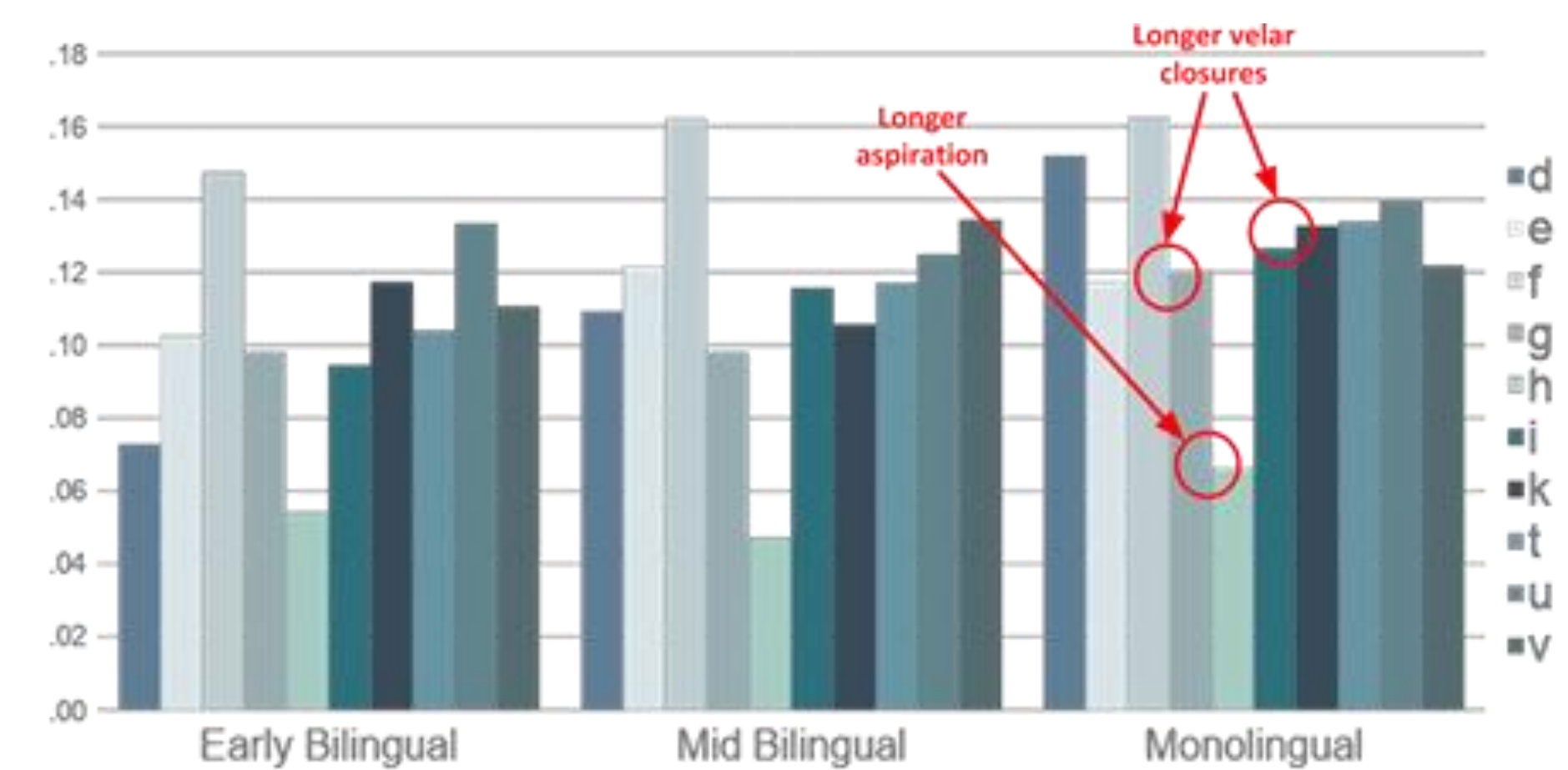
A comparison of monolinguals and multilinguals' accuracy for each repetition, for onset and coda consonants: onset and third repetition most vulnerable, but no advantage observed



A closer look at multilingual type: mid and late bilinguals outperform the other groups



Acoustic Analysis of duration revealed longer velar closures and aspirations for monolinguals



Methodology

Hypothesis: Bilinguals' articulatory skill is superior compared to monolinguals

Participants: 40 undergraduate students:

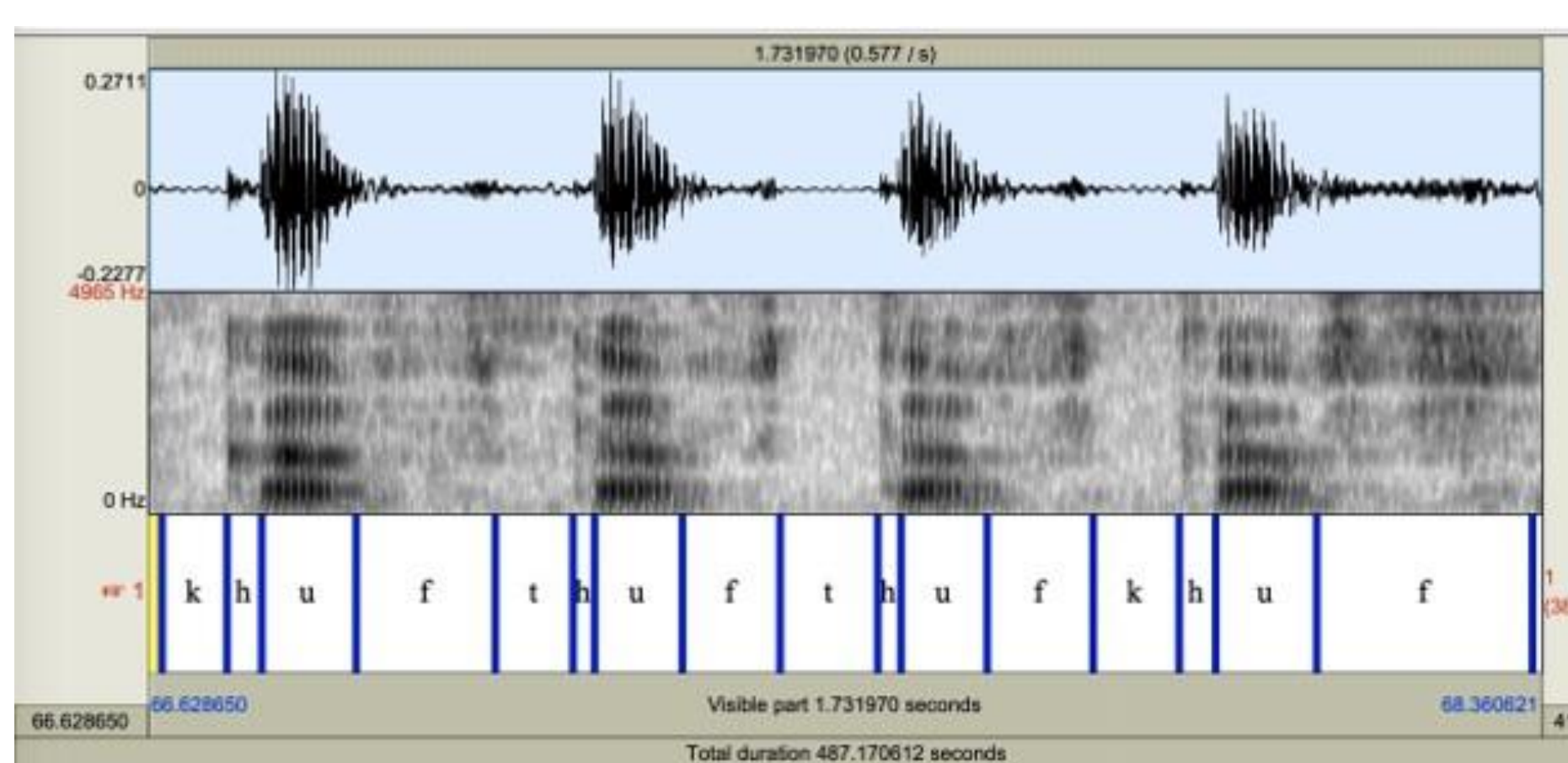
- Monolingual (n=19)
- Bilinguals: (n=16) Early (L2<5 yo), Mid (L2 5-10 yo), late (L2>10 yo)
- Trilingual (n=5): typically, early bilinguals who also learned a third language later in life

Task: Read 64 randomly presented artificially constructed tongue-twisters three times each in quick succession, matching a 150 beats-per-minute metronome rhythm, following Goldrick & Blumstein (2006) and McMillan & Corley (2010). Stimuli i.e., kef gef gef kef

Analysis

Categorical Rating: Listen to each repetition to determine if onset (kef) and coda (kef) consonants were produced correctly.

Manual alignments of different segments to obtain duration (current study) and other types of acoustic information (upcoming)



Summary & Conclusion

We found no significant differences between monolinguals and multilinguals overall. But differences did emerge when we considered the specific type of multilingual (early, mid, late bilingual and trilingual), with mid and late bilinguals showing evidence in support of a bilingual advantage in terms of articulatory skill.

Preliminary findings for duration: Longer aspiration and longer velar stop closures in monolinguals. Since velar stops = onsets, this suggests monolinguals needed more time to plan the execution of their syllables (but why only velars? Markedness considerations?)

Both quantitative scores and qualitative ratings are needed for the full picture.

Future Work: Continue to explore this topic using proficiency testing (for a fine-grained account of bilingual experience), fMRI technology (for precise articulation data) and language-specific linguistic content in order to understand the roles of both phonetic similarity L1-L2-L3 and universal difficulty of the segments learned (Antoniou et al. 2015, Kopeckova 2016).

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