Exploring the connection between phonetic learning and auditory sensory memory in monolinguals and bilinguals

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Is there a connection between Phonetic and Phonological Learning and auditory sensory memory of monolingual and bilingual speakers?

❖ Emerging areas of research where a consistent bilingual advantage has been identified with young adults include studies on phonetic and phonological learning *(Antoniou et al. 2015, Tremblay & Sabourin 2012, Spinu et al. 2018)*.

❖ We expand on existing work by exploring monolinguals' and bilinguals' ability to learn multiple feature of a naturalistically produced novel accent of English after brief initial exposure. (Spinu et al., 2020)

❖ Learning was more effective in bilinguals compared to monolinguals across the board.

❖ Bilinguals also outperform monolinguals in a digit task, with the response patterns suggesting that both working memory and auditory sensory memory may be enhanced in this group *(Signorelli et al. 2011, Calabrese 2012)*.

Background

Bilingual cognitive differences (especially 'advantages') examined in connection with executive function (Bialystok 2018)

➔ Recent large-scale study has found no evidence for bilingual advantage in executive function *(Dick et al. 2019)*.

What OTHER mechanisms underlie the cognitive differences between these groups, especially the PPL?

➔ ASM: plausible because PPL relies on sensorimotor mechanisms and not strictly on higher level cognitive functions
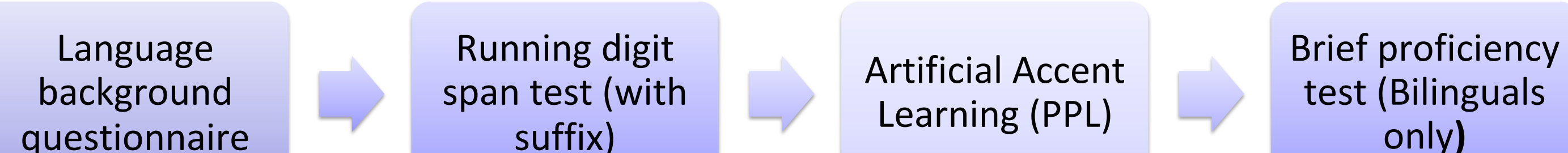
This study: tests correlation between ASM and PPL in mono- and bilinguals using two independent tasks

➔ Plus, replicate two previous studies (Spinu et al. 2020)

Methodology

This is a replication of a larger study *(Spinu et al. 2020)* with fewer participants and online.

Tasks

Language background questionnaire → Running digit span test (with suffix) → Artificial Accent Learning (PPL) → Brief proficiency test (Bilinguals only**)**

Artificial Accent

Created Model Speech, differing in two distinct ways from standard North American English:

➢ **Tapping:** intervocalic /l/ → [ɾ] e.g. 'color' →[kʌɾɚ]

➢ **Diphthongization:** the vowel /ɛ/ → [jɛ] e.g. 'bed' → [bjɛd]

Participants & Procedure

Participants: Undergraduate students at CUNY and Ithaca College.
o 20 monolinguals speakers of English
o 20 early bilinguals

Procedure: Experiment conducted online via Zoom using Google Forms, Pavlovia (PsychoPy) and PsyToolKit.

Preliminary Results

Results analyzed for about half of the participants (9 monolinguals and 8 bilingual speakers).

1. **Running Memory Span Test:**
   ● Bilinguals significantly outperformed monolinguals in response length (mean length 4.24 vs 3.88) for correct answer only.
1. **Artificial Accent Learning (PPL)**
   ● Both groups performed similarly on the diphthongization feature, in both training and testing (no significant differences but slightly higher means for bilinguals).
   ● Bilinguals outperformed monolinguals substantially on the tapping feature, in both training and testing.
   ● Monolinguals didn't show much evidence of learning the tapping pattern (and were only able to imitate it about 25% of the time).
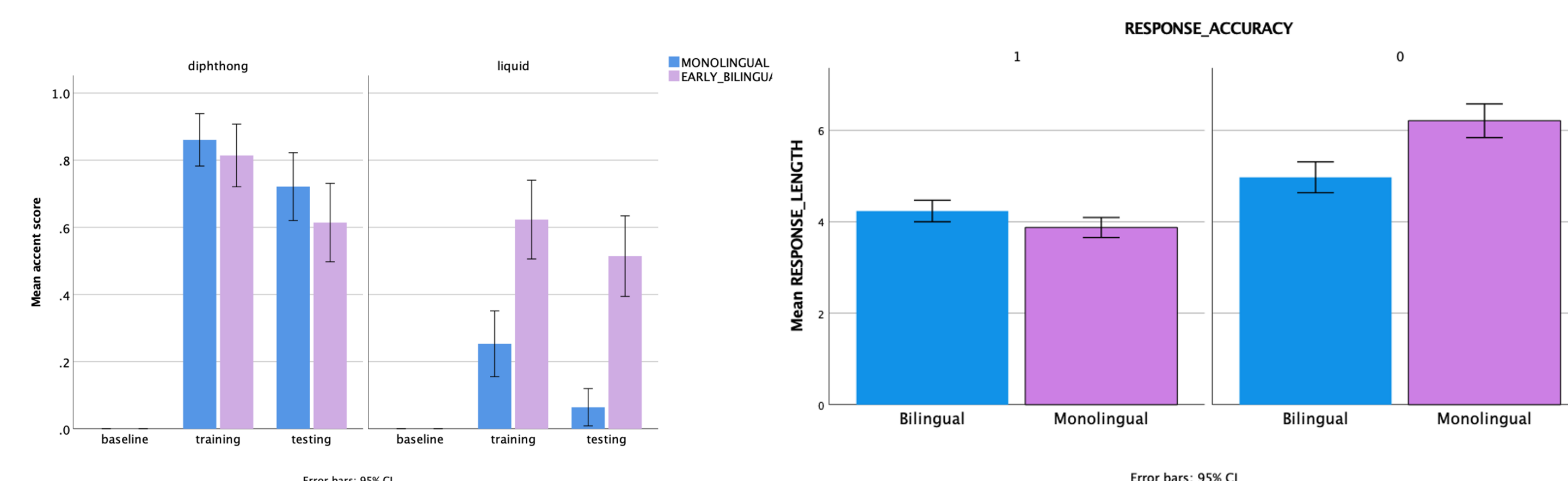
Discussion & Conclusion

Bilingual speakers produced the 2 novel features better than monolingual speakers in both training and testing blocks.

There is a positive correlation between PPL and ASM, found in two independent measure from the same speakers.

Both Bilingual and monolingual speakers learned the diaphanization pattern better than the tapping pattern

Early bilingual speakers' longer ASM helps them imitate novel accents better.

ASM (in addition to other underlying factors) in an integral part in L2 PPL