Effects of Bilingualism on Auditory Lexical Decision Tasks

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Introduction

- Bilinguals respond differently to comprehension tasks than monolinguals
- Simultaneous activation of multiple languages can result in differences between the responses of bilingual and monolingual participants [1]
  - Longer reaction times for bilinguals may reflect an increase in the processing time required to search through the different lexicons ─ the mental dictionary for each language

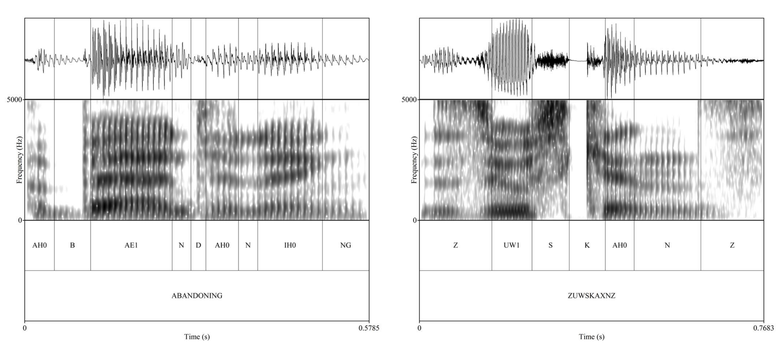
Research Questions

- If English is my second language do I recognize words differently than a monolingual?
- What role does the degree of bilingualism, including proficiency and age of acquisition, play in the comprehension of a second language? [2]

Method

- Auditory lexical decision: participants decide if they hear real words or non-words
- Data from Massive Auditory Lexical Decision database [3]
  - 487,956 auditory lexical decision responses from 26,793 words and 9592 non-words
  - Participants completed questionnaire indicating proficiency and knowledge of other languages before experiment
  - In total, 68 different native language combinations
- Analysis performed using linear mixed-effects regression

Spectograph alignments of the word ABANDONING and the pseudoword ZUWSKAXNZ



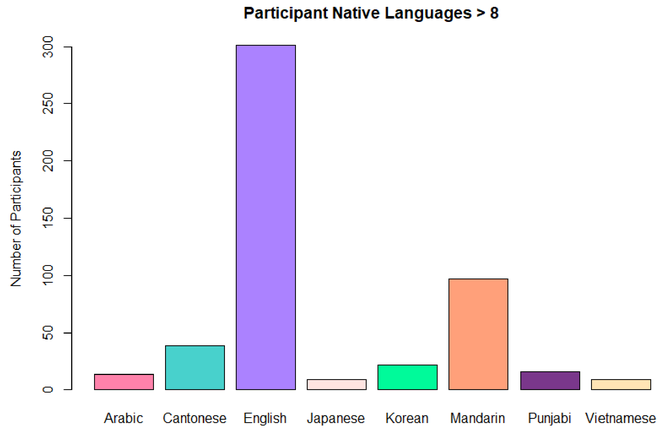


Fig. 1: Distribution of native languages with greater than 8 speakers

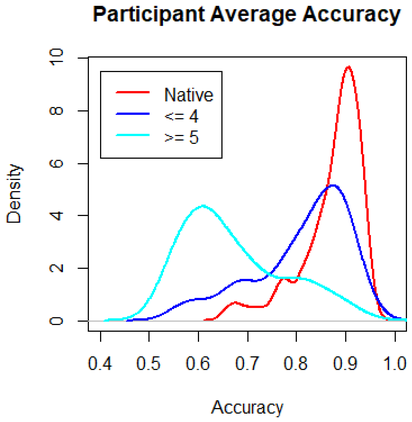


Fig. 2: Distribution of average accuracy rate of participants

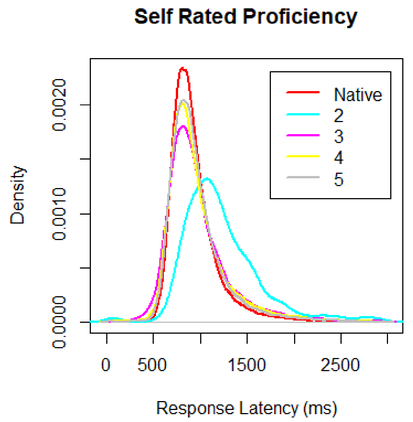


Fig. 3: Distribution of average reaction time compared to average self-rated proficiency in English

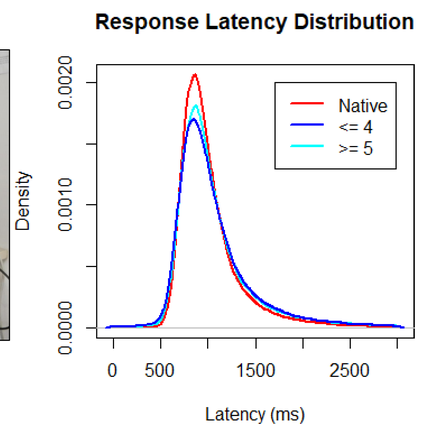


Fig. 4: Distribution of average reaction time when accounting for age of acquisition

Results

Figure 2

- Native speakers do better than bilinguals all around, but clear separation of bilinguals when accounting for age of acquisition
- Bilinguals who learned English after 5, presumably through formal education, show a marked reduction in accuracy
- Early bilinguals also have lower accuracy than native speakers, although at very similar rates

Figure 3

- Shift to the right represents a delay in response latency, associated with a lower self-rated proficiency in the language

Figure 4

- There is no statistical difference between the groups

Discussion

- Bilinguals do not do as well as native speakers, even when they learned English at an early age
- Age of acquisition can predict accuracy to a large extent; coordinate and late bilinguals have much lower average accuracy than native or early bilingual English speakers
- As the self-rated proficiency decreases, reaction time increases, indicating an increase in processing time to accurately respond to the stimulus
- Difference between reaction times for native speakers and bilinguals is very small; no statistically significant difference at all, suggesting that age of acquisition has no effect
  - This contradicts previous research, as slower reaction times are expected given relative lack of familiarity with a second language [4]

References:
[1] Dijkstra, T., & Van Heuven, W. J. (2002). The architecture of the bilingual word recognition system: From identification to decision. Bilingualism: Language and cognition, 5(3), 175-197.
[2] Perani, D., Paulesu, E., Galles, N. S., Dupoux, E., Dehaene, S., Bettinardi, V., ... & Mehler, J. (1998). The bilingual brain. Proficiency and age of acquisition of the second language. Brain: a journal of neurology, 121(10), 1841-1852.
[3] Tucker, B. V., Brenner, D., Danielson, D. K., Kelley, M. C., Nenadić, F., & Sims, M. (2018). The Massive Auditory Lexical Decision (MALD) database. Behavior research methods, 1-18.
[4] Soares, C., & Grosjean, F. (1984). Bilinguals in a monolingual and a bilingual speech mode: The effect on lexical access. Memory & Cognition, 12(4), 380-386.

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