AZBIO Sentence Accuracy For English as a Second Language Adults in Quiet and Background Noise

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Introduction

How I got involved

- Diversity at Andrews
- Personal background
- Curiosity
Auditory figure ground: the ability to isolate one meaningful auditory signal from other signals
Auditory memory: ability to process auditory information and recall what was heard

AZBIO sentences - high context and low context
Sentence lists developed to isolate hearing ability by removing language as a factor.

- Please pass the salt
- Have a nice lunch
- Nothing tastes sweeter than self discipline
- The camel is not the most comfortable animal on which to ride
**Age of acquisition**

- Age at which a language is learned

**Background noise**

- +10 signal to noise ratio
  - Speech at 50 dB HL, noise at 40 dB HL

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**Decibel (dB) Range Chart**

- 0dB: Threshold of human hearing
- 10dB: Breathing
- 20dB: Whisper, Light snoring
- 30dB: Quiet room
- 40dB: Moderate snoring
- 50dB: Conversation
- 60dB: Busy street, Alarm clock
- 70dB: Hairdryer, Noisy restaurant
- 80dB: Loud radio
- 90dB: Bass drum
- 100dB: Subway train
- 110dB: Industrial noise
- 120dB: Jet Plane take off
- 130dB: Gunshot, Metal concert
Background research

  - Determination of auditory processing ability of ESL students
  - A review of the effects of bilingualism on speech recognition performance
  - Reception thresholds for sentences in quiet and noise for monolingual English and bilingual Mandarin-English listeners
  - Understanding Bilingualism and Its Impact on Speech Audiometry.
Research Questions

1. Is there a significant difference between the ESL participants’ scores in quiet and background noise?
2. Is there a significant difference between the overall scores of the language groups?
3. Does age of acquisition of English impact overall score?
Methods

Participant selection

- Korean, Portuguese, and Spanish speaking undergraduate and graduate students

Data collection

- All participants received a hearing screening and completed speech discrimination testing
- AZBIO sentence tests were conducted at a normal conversation level, were pre-recorded, and used male and female voices
Data analysis

- We used a paired t-test to determine if the mean score in background noise was less than the mean score in quiet.
- We used a one-way ANOVA to determine if there was a difference in mean overall score between the three language groups.
- We used a t-test for independent means to determine the effect of age of acquisition on overall score. (AOA <8 compared to AOA >8)
- All statistical tests were carried out at the $\alpha = 0.05$ level of significance.
Results
When all ESL students’ right and left scores were combined, the mean score in quiet was significantly larger than the mean score in background noise ($t = -1.759$, $p = 0.043$, $n=40$).
When we compared the overall scores of Korean\textsuperscript{a}, Portuguese\textsuperscript{b}, and Spanish\textsuperscript{c} speakers, we found that the mean scores between the three groups were significantly different (F= 4.517, p=0.017, \textsuperscript{a}n=11, \textsuperscript{b}n=14, \textsuperscript{c}n=15).
When we combined all scores for all ESL students and compared the mean score for those of age less than or equal to 8\textsuperscript{d} to that of those greater than 8\textsuperscript{e}, the mean score those in the earlier age group (sample mean = 528.09) was significantly higher than the mean for the older age group (sample mean = 443.50) (t= 3.829, p<0.001, \( {d}n=23, {e}n=17 \)).
Conclusions

Summary

- Primary language may have an affect on the difficulty of competently learning a new language
- Learning a language at a much younger age is beneficial
- Language difference and auditory processing skills affect speech perception in the second language of bilingual adults
  - Results indicate an auditory processing deficit (lower scores in background noise compared to quiet) as well as a language deficit (lower scores in quiet compared to native English speakers)
Clinical implications

- **Cochlear implant candidacy**
  - ESL participants in this study had hearing within normal limits and on average received a score of 86.50% on sentences in quiet and 84.91% in background noise, while the average score for native English speakers was 99% for both quiet and background noise.
  - A person qualifies for a cochlear implant if they score less than 50% on sentence recognition tasks.
  - According to Spahr et al. (2012), the average score of cochlear implant users ranged from 46 to 86 percent.

- **Speech therapy included in ESL training programs**

- **Support for ESL students**
  - Cross-cultural testing materials
  - Facilitation of auditory processing in English for school aged ESL learners
  - Classroom accommodations for college aged ESL students
Suggestions for further research

- Note taking ability of ESL students and classroom accommodations to promote success at the university level
- Include other languages to increase generalizability of results
- Primary language differences and their effect on speech perception of a second language
  - Current study in department using this data
- Inverse study
  - Compare native English speakers who learned a second language to primary speakers of that language
- Age of acquisition
  - Importance of development of underlying auditory skills in a second language


Regal, D., Kim, B., & Neufville C. (2015). Determination of auditory processing ability, specifically tolerance fading memory, among English as a Second Language (ESL) students at the university level, to develop practical and effective strategies to succeed in an English class setting.


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