Selective Auditory Attention in Native and Non-Native Listening

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Background

- Listening to a target sentence is more difficult when there is background noise present.
- This is partly due to **energetic masking (EM).**
- **EM**: Target speech is compromised due to the target and background noise containing energy in the same frequency bands at the same time[1].
- **Spatial release from EM**: Spatially separating the target and background from the same location (collocated) to one sound in each ear (dichotic) reduces EM, making it easier to hear the target.[2]

Collocated*:** ***Dichotic:

- EM impacts a non-native language (L2) more than a native language (L1).[3]
- It is unclear how **spatial release from EM impacts L1 and L2 listening in a bilingual listening environment** (L1 and L2 present).

Research Question

Does spatial release from EM affect listening to L1 and L2 differently in a bilingual listening environment?

Hypotheses:

1) Poorer performance when attending L2 compared to L1.
2) Increased performance for dichotic stimuli compared to collocated stimuli (benefit of spatial release from EM).
3) Spatial release from EM will benefit L2 more than L1.

Methods

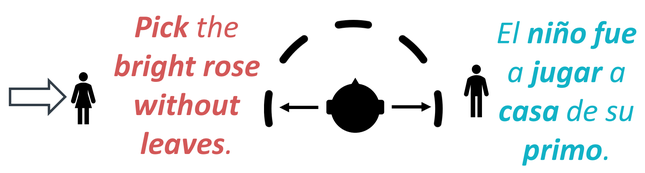
Participants:
- 100 Spanish-English bilinguals (mean age: 25, SD: 3.4 years).
- Spanish: all acquired from birth; mean proficiency (LexTALE-Esp[4]): 92.33%.
- English: mean age of acquisition: 5.75 years; mean proficiency (LexTALE[5]): 80.49%.
- Recruited from Prolific[6], tested on Gorilla[7].

Design:
- DV: Listening accuracy, proportion of keywords correctly transcribed.
- IV1: Attended language (L1-Spanish or L2-English).
- IV2: Spatial separation (Dichotic or Collocated).

Materials and Task:
- Pairs of semantically meaningful sentences: One L1-Spanish (Sharvard[8]), one L2-English (IEEE[9]). One female, one male.
- Each pair presented as either collocated or dichotic.
- Participants told which voice to attend before presentation of each sentence pair.

***Collocated*:**

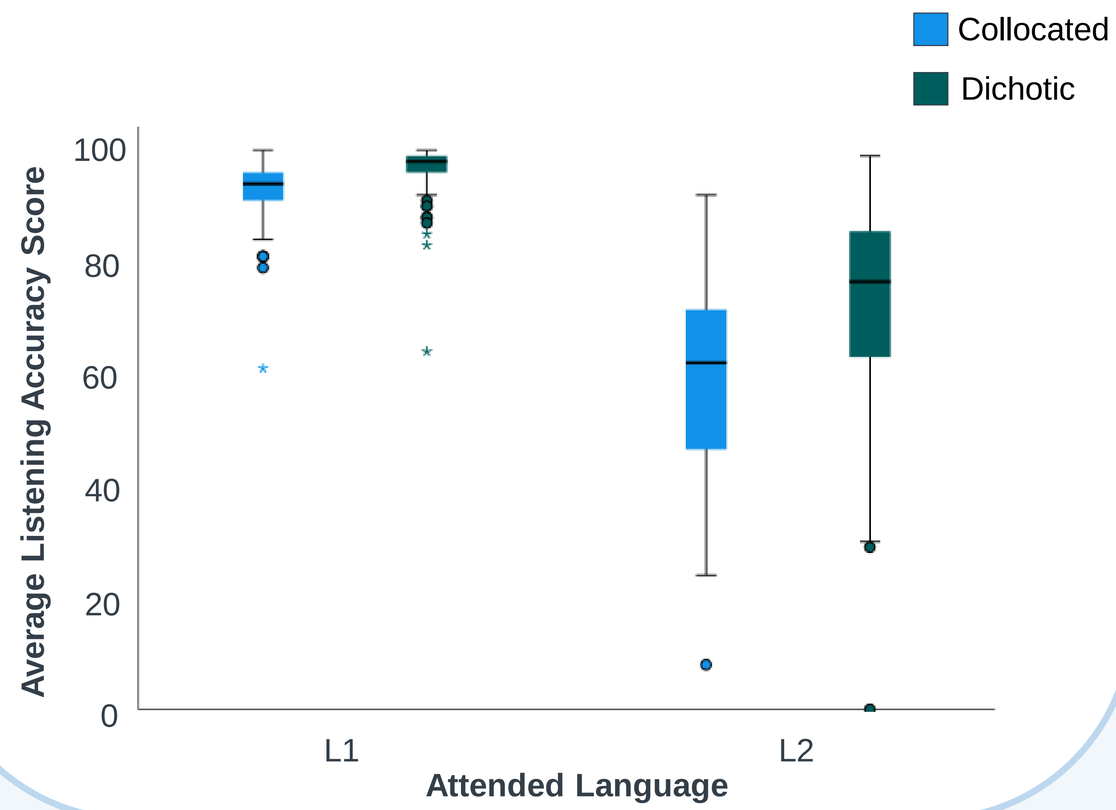
Dichotic:



Results

Generalised Linear Mixed Model:
- Fixed Effects: spatial separation*attended language.
- Random Effects: Items and subjects intercepts. Spatial separation*attended language included as by-subject random slopes.

- **Attended Language**: L2-English listening accuracy poorer than L1-Spanish ($p < .001$).
- **Spatial Separation**: Dichotic listening accuracy better than collocated ($p < .001$).
- **Interaction**: No statistically significant interaction between spatial separation and attended language ($p = .306$).



Conclusion

Effect of Language:
- Listening accuracy is poorer in L2 than L1, supporting previous literature[3].

Effect of Spatial Separation:
- Spatial release from EM benefits listening accuracy for both L1 and L2.

Interaction:
- Does not support Hypothesis 3: *Suggests that spatial release from EM does not impact L1 and L2 differently.*
- May be due to near-ceiling performance when attending L1.

When listening to either L1 or L2 in a bilingual listening environment, bilinguals can benefit from spatially separating auditory inputs.

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