

# “Deafness” to Lexical Pitch Accents: The Case of Non-Native Listeners



Dušan Nikolić  
PhD candidate in Linguistics,  
School of Languages, Linguistics, Literatures and Cultures



# Stress "deafness"

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- ['mipa] vs. [mi'pa] - French listeners have difficulty **processing** the difference because they lack the representations of stress in their language (Dupoux et al. 2001).
- This processing difficulty has been termed **stress "deafness"**, and the effect is triggered with the task that consist of the added **phonetic variability** and **memory load** (Dupoux et al. 2001).
- Phonetic variability - multiple talkers
- Memory load - multiple sequences of stimuli
- "Deafness" to stress contrasts has been observed cross-linguistically, with Persian, Finnish, and Hungarian speakers (Peperkamp & Dupoux 2002, Rahmani et al. 2015).



# Research Question

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- Previous research focuses mainly on “deafness” to stress contrasts, but “deafness” has not been explored with yet another word-prosodic category - **lexical pitch accent**.
  - Is there “deafness” to lexical pitch accents?  

  - Are English speakers “deaf” to Serbian lexical pitch accents?



# Hypothesis

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- Serbian is a **lexical pitch accent** language. Serbian lexical pitch accents consist of the combination of **duration and pitch**.
  - [sèdi] = 'to sit'
  - [sédi] = 'grey hair'
- English is a **stress-accented** language.
  - PERmit (noun) vs. perMIT (verb)
- **H**: Since English speakers do not have any representations of lexical pitch accents, they should be "deaf" to Serbian lexical pitch accents.

# Methods

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- Participants:
  - 10 Serbian speakers
  - 18 English (Canadian) speakers
- Stimuli:
  - 4 non-words produced by a Serbian trained linguist
  - ❖ There was *no* phonetic variability

# Stimuli

Non-words	Lexical pitch accent	Contrast
[níve] [nîve]	Long rising Long falling	Pitch
[màvi] [mävì]	Short rising Short falling	
[rúva] [rùva]	Long rising Short rising	Duration
[bûmi] [bÛmi]	Long falling Short falling	



# Sequence Recall Task

## 1. Training Phase

Non-words	Keyboard Key	Lexical pitch accent	Contrast
 [màvi]	 <b>[A]</b>	Short rising	Pitch
 [mävı]	 <b>[L]</b>	Short falling	



# Sequence Recall Task

## 1. Training Phase

3 Non-words	Keyboard Key
 [màvi]	 [A]
 [màvi]	 [L]
 [màvi]	 [A]

4 Non-words	Keyboard Key
[màvi]	 [A]
[màvi]	 [L]
[màvi]	 [L]
[màvi]	 [A]

- They could practice as many times as they wanted.



# Sequence Recall Task

## 2. Testing Phase

4 Non-words	Keyboard Key
[màvi]	 <b>[A]</b>
[mävì]	 <b>[L]</b>
[mävì]	 <b>[L]</b>
[màvi]	 <b>[A]</b>

5 Non-words	Keyboard Key
[màvi]	 <b>[A]</b>
[mävì]	 <b>[L]</b>
[mävì]	 <b>[L]</b>
[màvi]	 <b>[A]</b>
[mävì]	 <b>[A]</b>

6 Non-words	Keyboard Key
[màvi]	 <b>[A]</b>
[mävì]	 <b>[L]</b>
[mävì]	 <b>[L]</b>
[màvi]	 <b>[A]</b>
[màvi]	 <b>[A]</b>
[mävì]	 <b>[L]</b>

- They heard the stimuli only once.



# Sequence Recall Task

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- Sequences of 6 non-words present **greater memory load**.
  - Sequence 4 
  - Sequence 6 
  - ~~Phonetic variability~~
  - Memory load 
- If there are any processing difficulties, they should occur when the memory load is added.

- For data analysis, a logistic regression model is run using the lrm package (Levshina 2015) in RStudio.
- English and Serbian speakers **do not** significantly differ in their performance [ $\beta = -0.1$ ,  $SE = 0.4$ ,  $z = -0.2$ ,  $p = 0.82$ ].

Are English speakers “deaf” to Serbian lexical pitch accents?

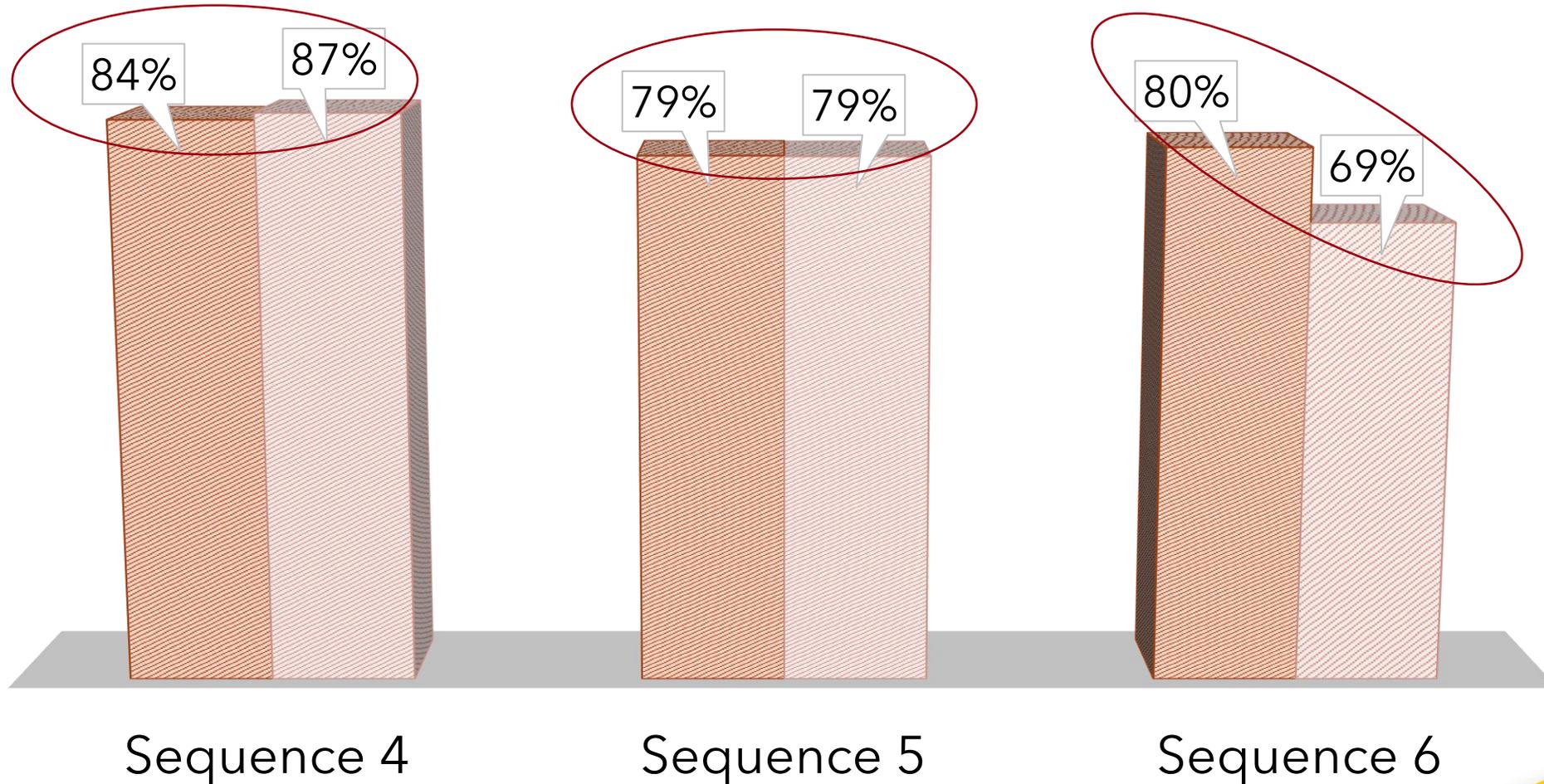
- English speakers are **not “deaf”** to Serbian lexical pitch accents.
- This absence of “deafness” could be because the contrasts between lexical pitch accents are quite perceptually salient.

# Results

&

# Discussion

■ Serbian ■ English



# Results

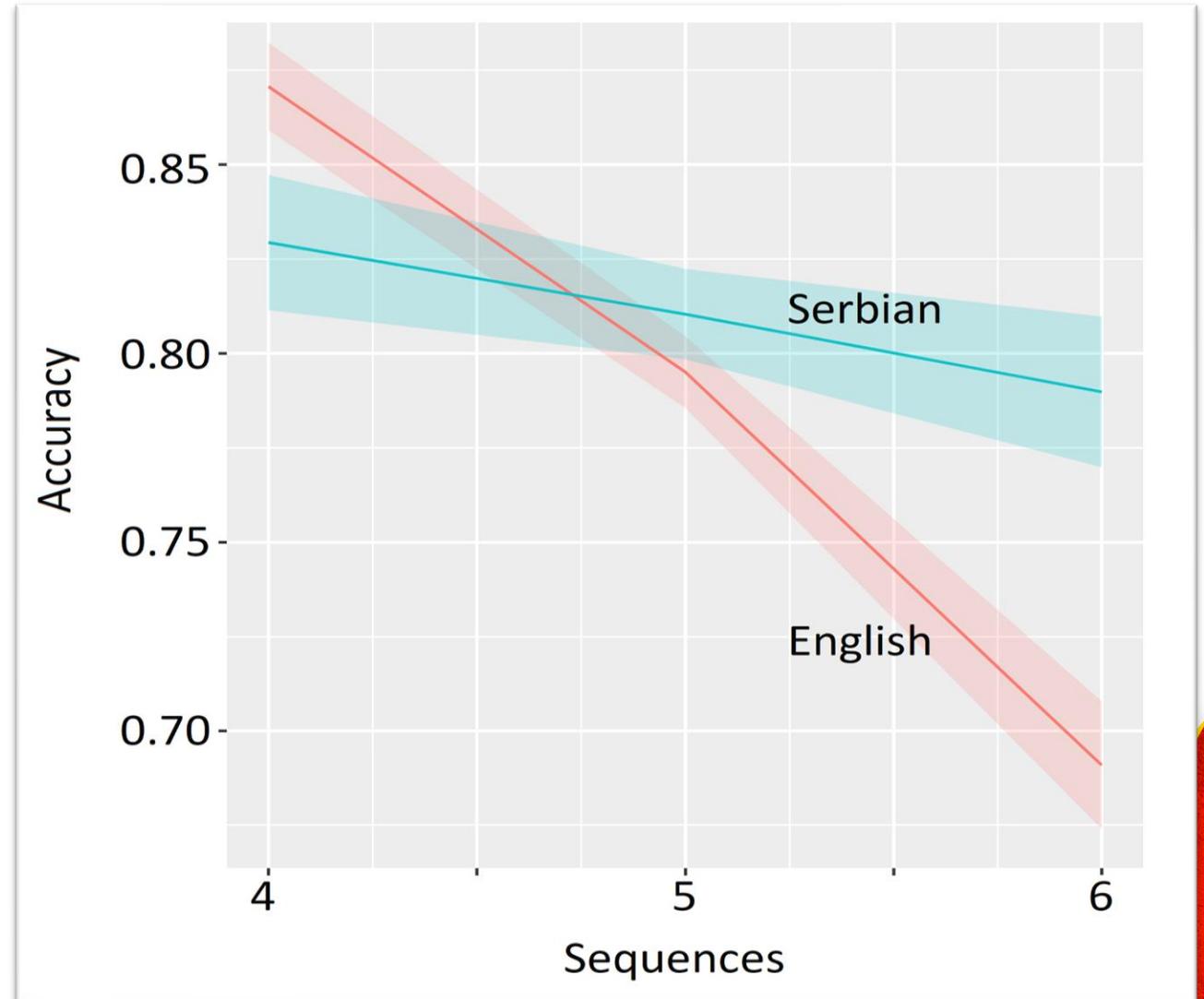
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# Discussion



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- The model showed a significant interaction of Sequence 6 and Language Group [ $\beta = -2.1$ ,  $SE = 0.74$ ,  $z = -2.87$ ,  $p = 0.004$ ].
- Serbian speakers significantly **outperformed** English speakers on the sequences of 6 non-words.



- English speakers exhibit **slight processing difficulties** because their performance drops with the sequence of 6 non-words, with greater memory load.
- Caveat: English speakers still performed well above the chance level.
- Aligns with Dupoux et. al's (2001) study, which states that the memory load alone cannot trigger the stress "deafness" effect.
- Memory load alone cannot result in lexical pitch accent "deafness". The absence of the "deafness" effect could also be because there is no phonetic variability.

# Results

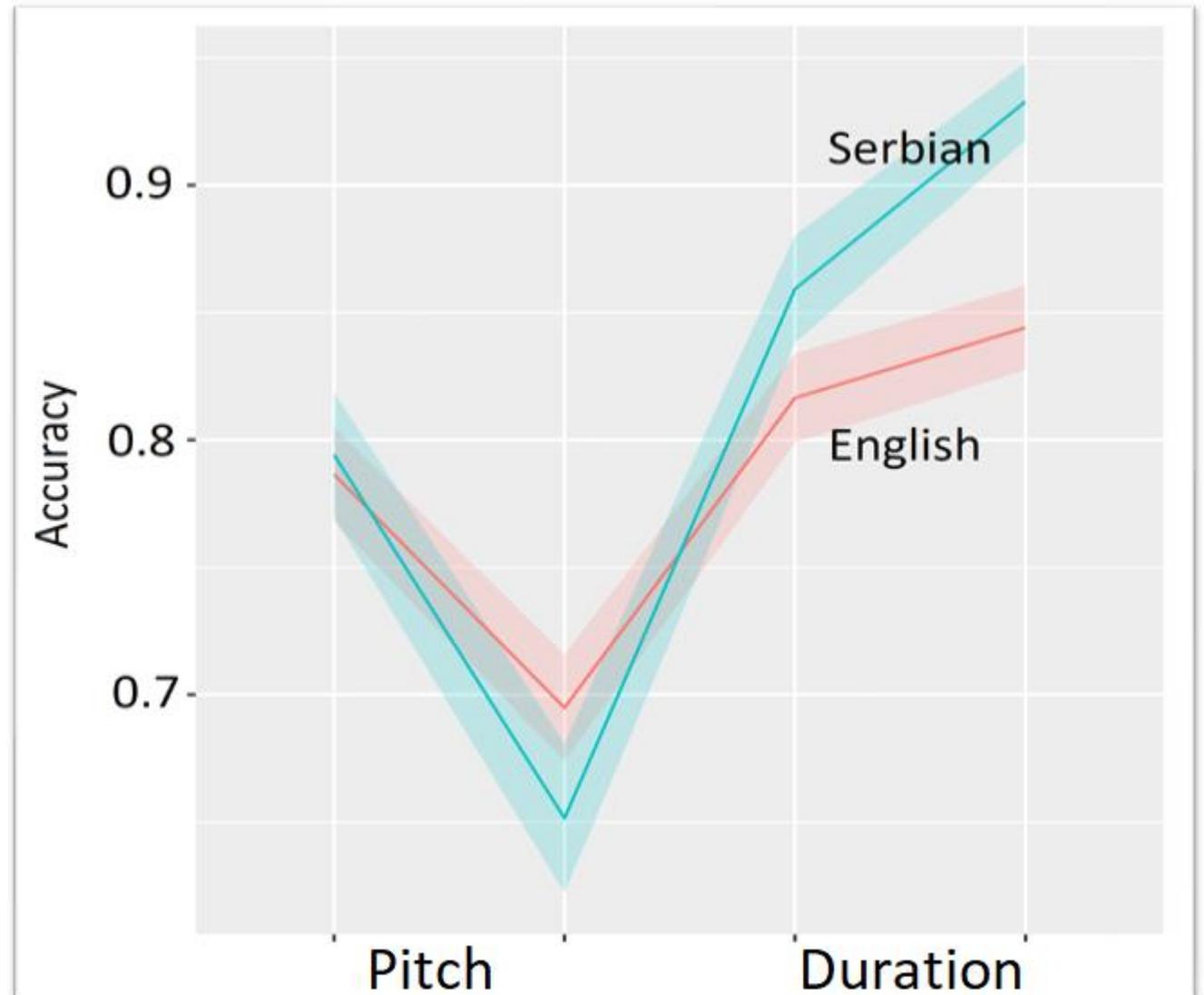
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# Discussion



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- Both groups performed significantly better on **duration** contrast rather than pitch contrasts [ $\beta = 0.4$ ,  $SE = 0.2$ ,  $z = 2.1$ ,  $p = 0.04$ ].



- Both groups more easily recalled **duration contrasts** than pitch contrasts, which could indicate that duration is a more perceptually salient cue than pitch for Serbian lexical pitch accents.
- Studies on the production of the Serbian lexical pitch accents reveal that pitch is equally, if not more, important than duration (Sredojević 2017).
- However, perception studies on Serbian lexical pitch accents are scarce. → **Is duration a more salient cue to Serbian lexical pitch accents than pitch?**



# Conclusion

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- Unlike stress “deafness” studies that reveal the strong “deafness” effect due to processing difficulties, this study demonstrates that listeners exhibit **neither** perceptual nor processing difficulty to lexical pitch accents.
- Would the “deafness” effect be observed with added phonetic variability (as in Dupoux et al. 2001)?
- Does the stress “deafness” effect occur solely as a result of the Sequence Recall Task?

# Thank you very much!

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- [dusannikolic.com](http://dusannikolic.com)
- [dusan.nikolic1@ucalgary.ca](mailto:dusan.nikolic1@ucalgary.ca)
-  [writing\\_finch](https://twitter.com/writing_finch)



# References

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- Dupoux, E., Peperkamp, S., & Sebastián-Gallés, N. (2001). A robust method to study stress “deafness”. *The Journal of the Acoustical Society of America*, 110(3), 1606-1618.
- Dupoux, E., Sebastián-Gallés, N., Navarrete, E., & Peperkamp, S. (2008). Persistent stress ‘deafness’: The case of French learners of Spanish. *Cognition*, 106(2), 682-706.
- Levshina, N. (2014). *Statistics for Linguistics with R. A Practical Introduction*.
- Rahmani, H., Rietveld, T., & Gussenhoven, C. (2015). Stress “deafness” reveals absence of lexical marking of stress or tone in the adult grammar. *PloS one*, 10(12), e0143968.
- Sredojević, D. (2017). How much do phonetic realisations of Serbian accents actually differ from each other in various dialects? *Annual Review of the University of Novi Sad*, 42(1), 323-337.