



# LANGUAGE-DEPENDENCY OF /M/ IN L1 DUTCH AND L2 ENGLISH

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## 1 INTRODUCTION

### Multilingual forensic speaker comparisons

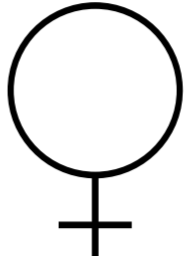


Are there language-independent speech characteristics?

### Bilabial nasal

- **Speaker-specific:** low within- and high between-speaker variation because of rigid nasal cavity [1]
- **Language-specific:** gestural timing, tongue position, lip tension may differ across languages [2]

**Are multilingual speakers consistent in their production of [m] across languages?**

## 2 METHOD

**Speakers** N = 53   L1  L2 **M**<sub>age</sub> 18.4 (0.8)

### Recordings

- D-LUCEA database [3]
- Semi-spontaneous informal monologues (2 minutes)



### Hand-segmented tokens

	# Dutch	English	Total	Range
Total	1,681	1,291	2,927	
By-speaker mean	32	24	56	29 – 90

### Measurements


- CoG (Hz), SD (Hz), N1-N4 (Hz), iMax (dB)

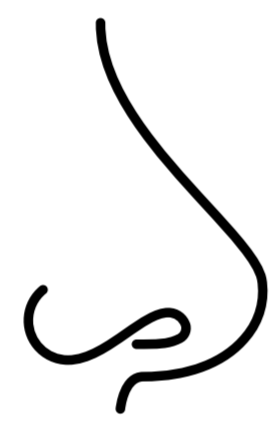
### Linear mixed-effects models



- Fixed factor Language: Dutch (L1), English (L2)
- Random slopes (Language | Speaker)

## 3 RESULTS

**Language:** Only significant for N2

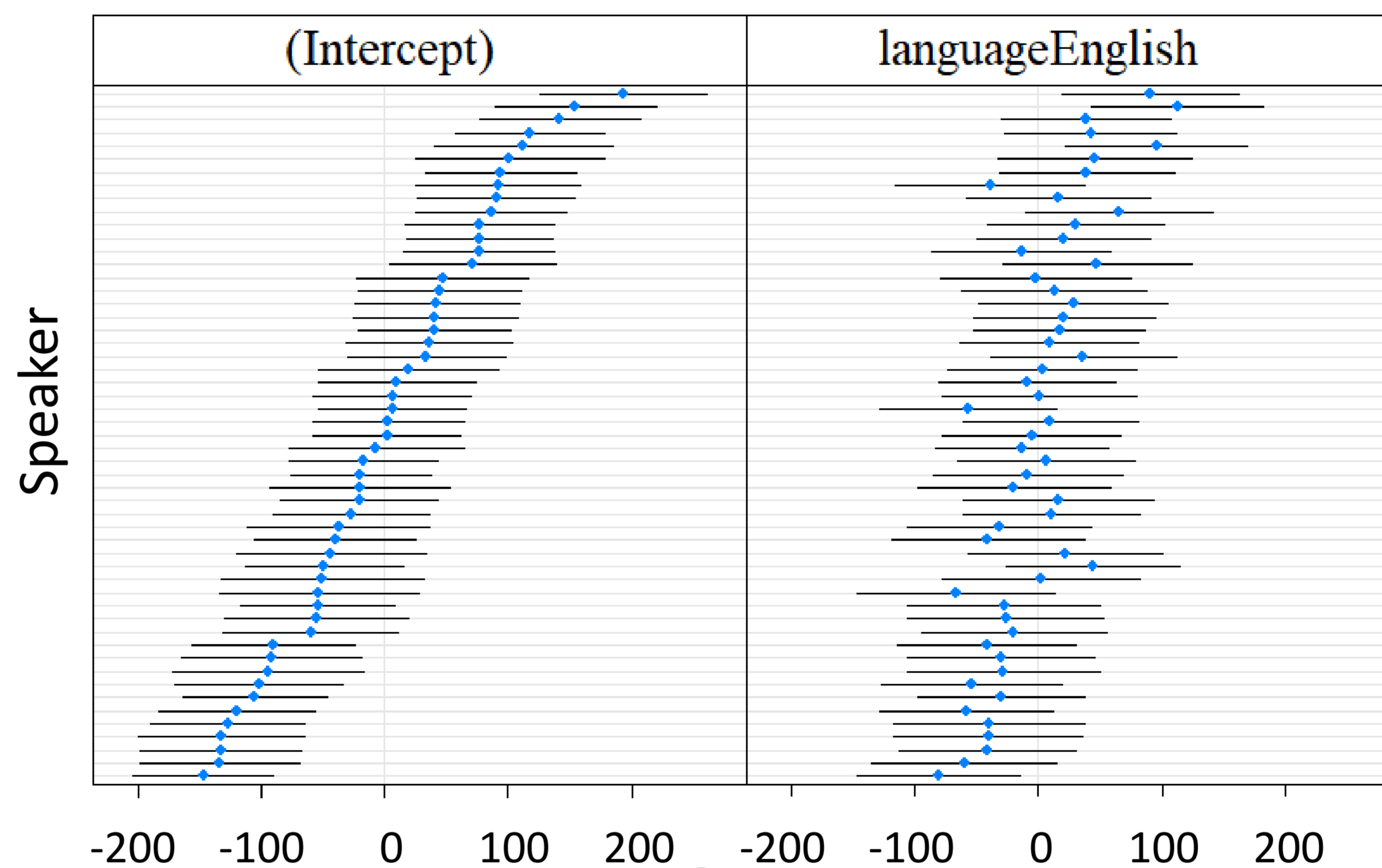
Model N2	Est.	SE
Intercept	1,335	19
	+31	10



Mean (SD)		
CoG (Hz)	278 (50)	277 (47)
SD (Hz)	315 (166)	307 (166)
N1 (Hz)	321 (60)	322 (55)
N2 (Hz)	<b>1,144 (272)</b>	<b>1,177 (303)</b>
N3 (Hz)	2,063 (378)	2,080 (368)
N4 (Hz)	2,733 (332)	2,741 (325)
iMax (dB)	68 (6)	68 (6)

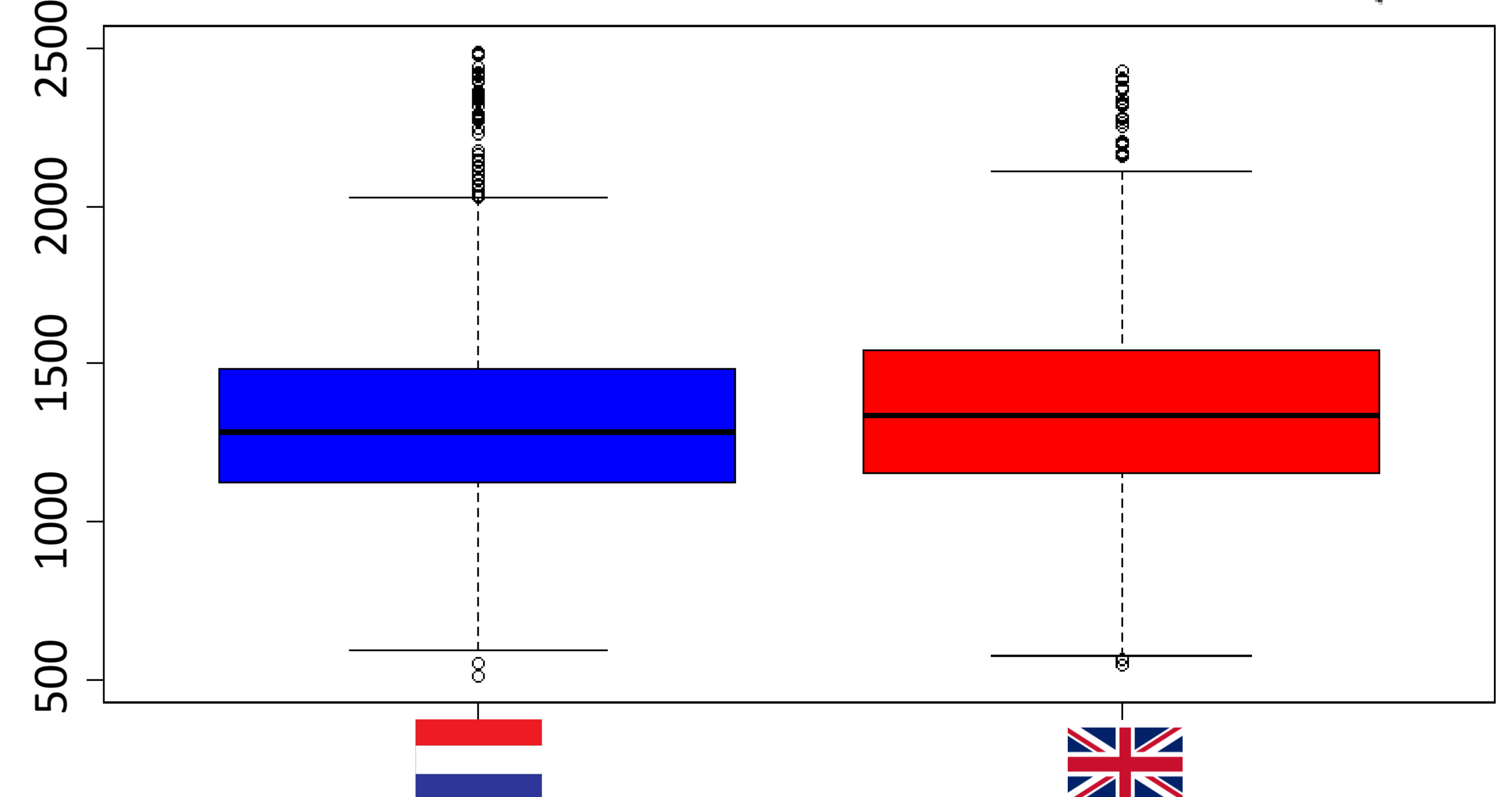
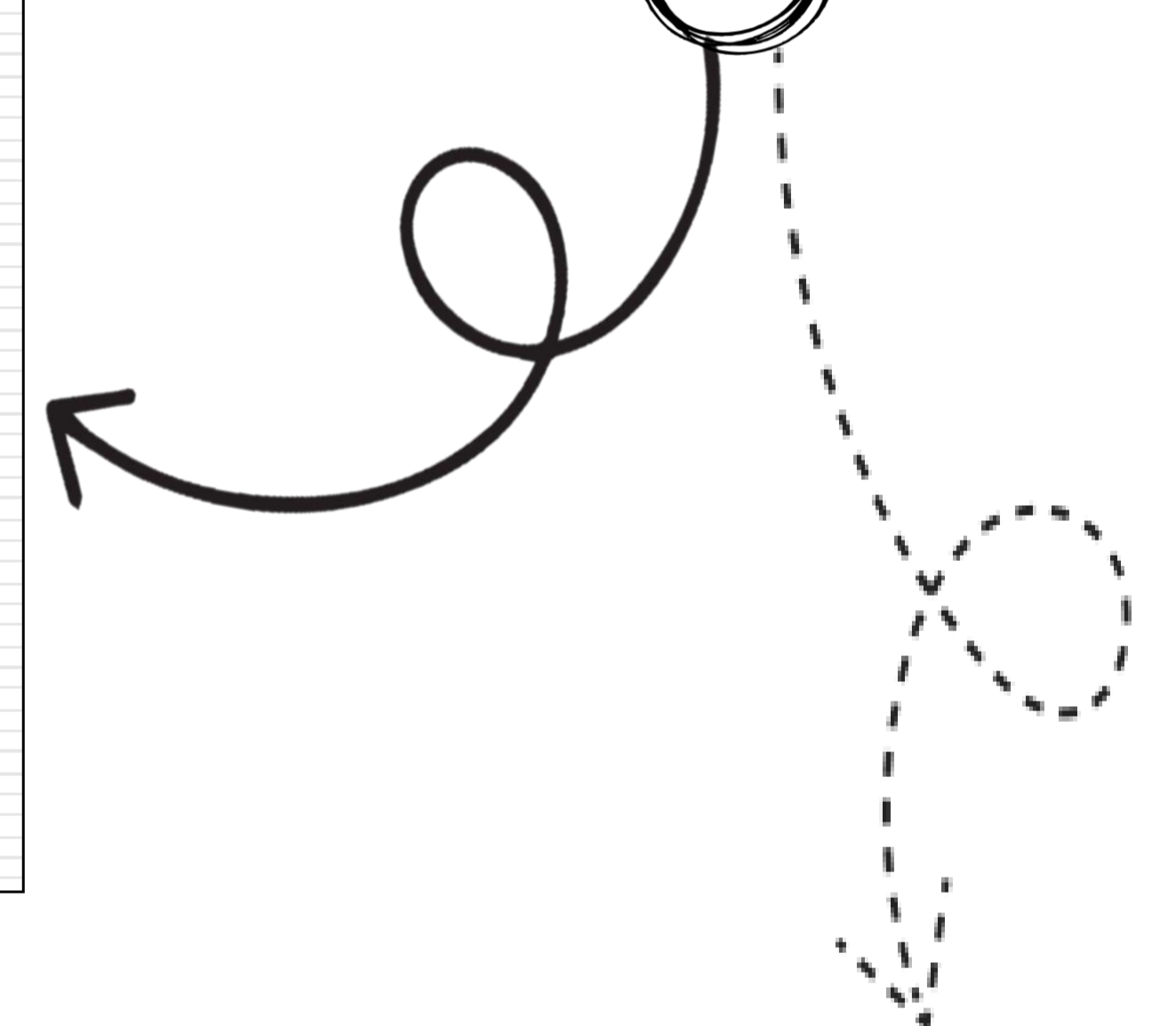


**Variation within and between speakers:**  
By-speaker SDs smaller than SDs across speakers



**Random slopes** for

- CoG
- SD
- iMax
- **N2**



## 4 CONCLUSION

### Language-independent?

- [m] seems to be largely language-independent
- It may be language-dependent for some speakers
- The question remains how it can contribute to multilingual forensic speaker comparisons

## 5 FUTURE WORK

- **Phonetic context:** Can phonetic context explain the subtle cross-linguistic differences?
- **Speaker-specificity:** How speaker-specific is /m/ in the L1 and in the L2?
- **Strength of evidence:** How well can we discriminate speakers based on /m/ in a cross-linguistic context?

## REFERENCES

[1] Rose, P. (2002). Forensic speaker identification. In: J. Robertson (Ed.), *Taylor & Francis Forensic Science Series*. London: Taylor & Francis (pp. 125-173). [2] Stevens, K. N. (1998). *Acoustic phonetics*. Cambridge: The MIT Press. Chapter 9.1 (pp. 487-512). [3] Orr, R., & Quené, H. (2017). D-LUCEA: Curation of the UCU Accent Project data. In J. Odiijk & A. van Hesse (Eds.), *CLARIN in the Low Countries*, Berkeley: Ubiquity Press (pp. 177-190).

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**Acknowledgements** This research is funded by an NWO VIDI grant (276-75-010) to dr. Willemijn Heeren.