

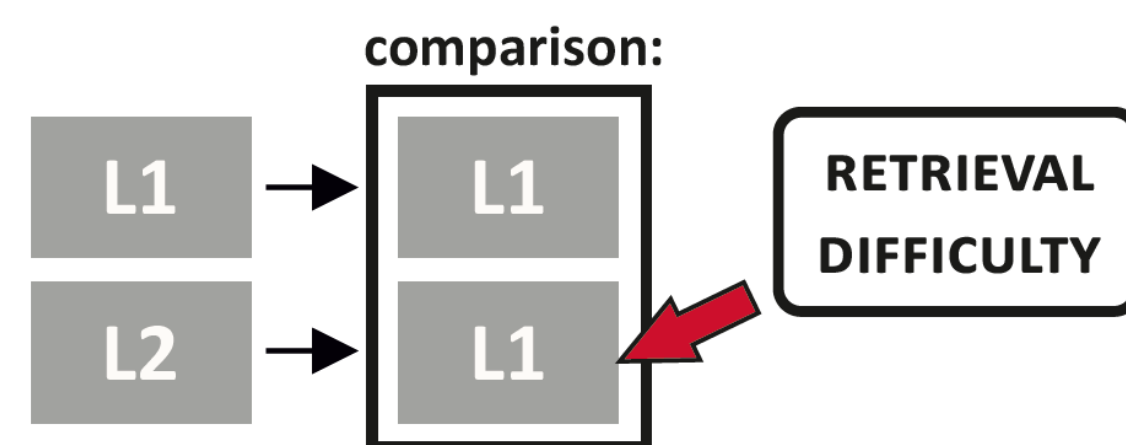
# The origin of the second language after-effect in bilingual language production: and ERP investigation.

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## Background

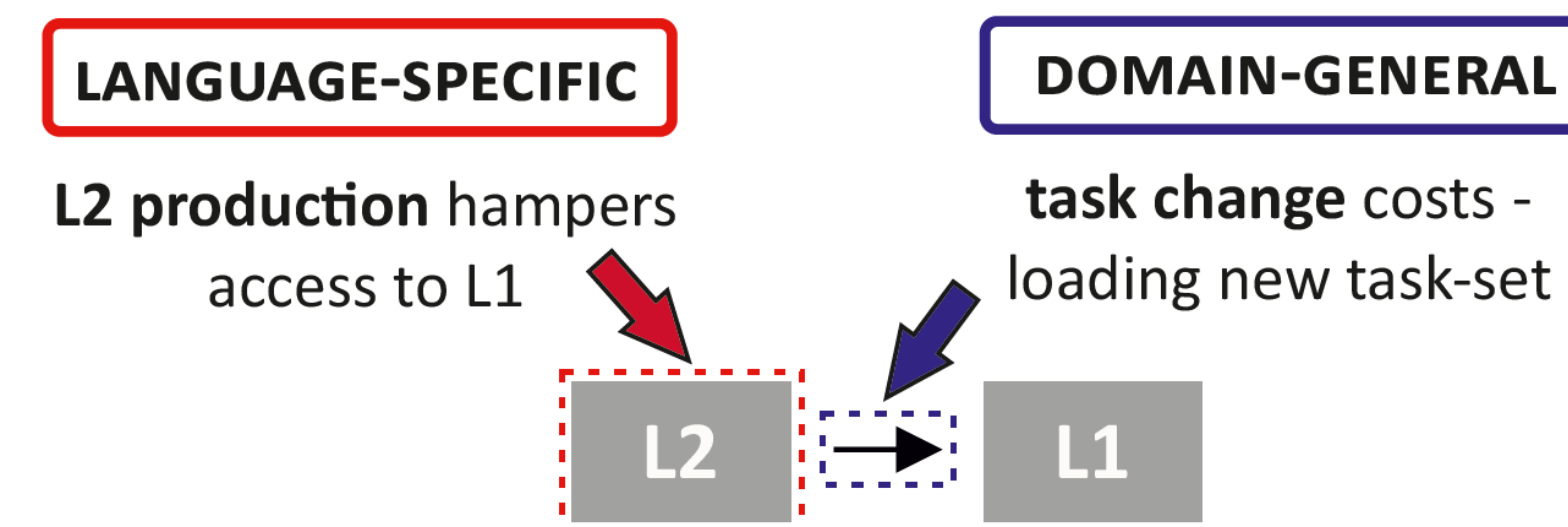
- Speaking in L1 after using L2 results in a word-retrieval difficulty → **L2 after-effect** [1,2]



- L2 after-effect** can be observed:
  - **behaviourally**: longer naming latencies (RTs)
  - **in ERPs**: modulation of components sensitive to word-retrieval difficulty (**N300** [1], **P2** [2])

## Research question

### WHAT IS THE SOURCE OF WORD-RETRIEVAL DIFFICULTY DRIVING THE L2 AFTER-EFFECT?

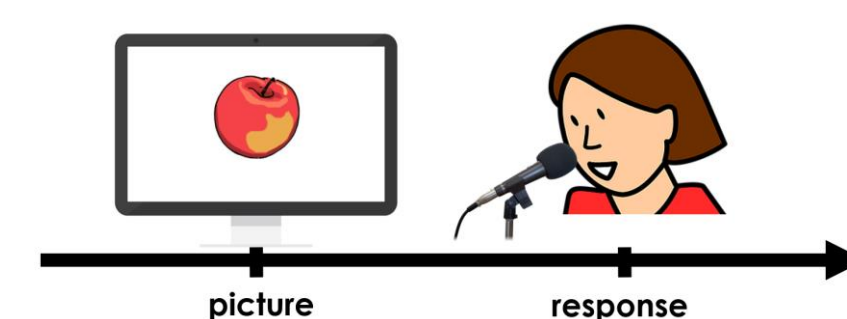


Is the word-retrieval difficulty driven by **previous exposure To L2** or is it also influenced by the mere **change of task**?

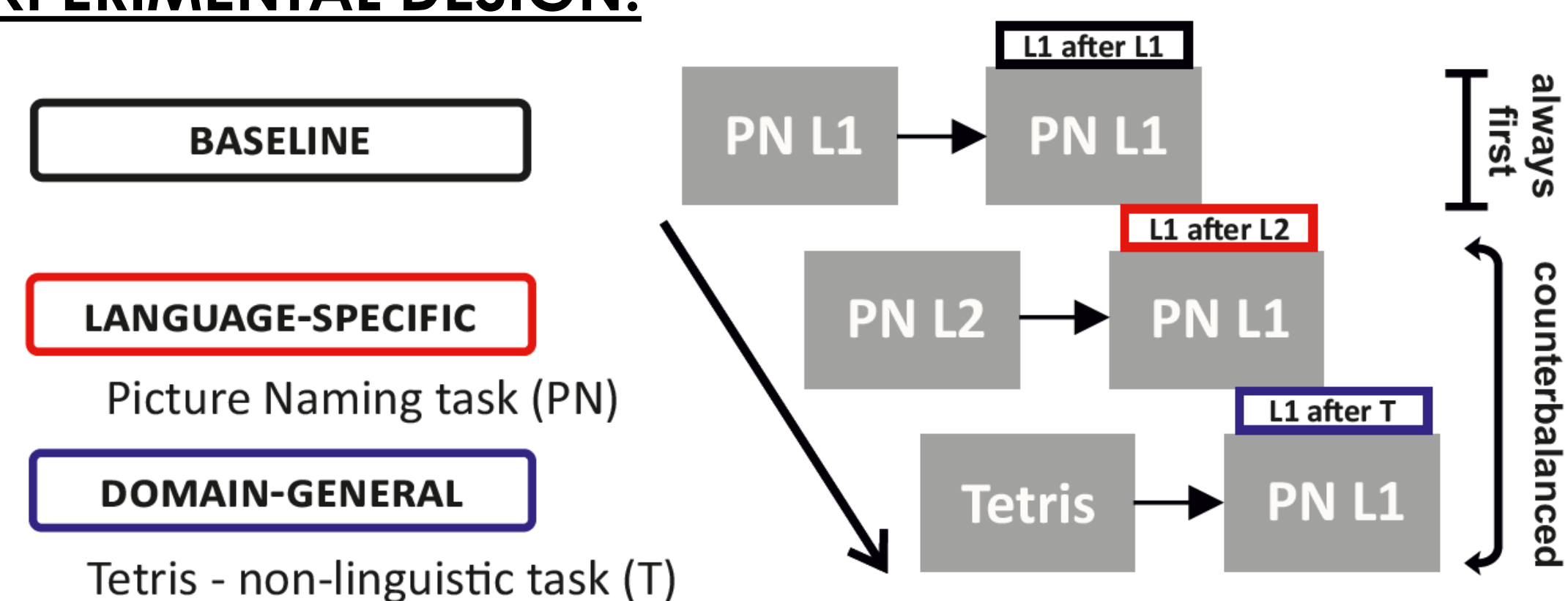
## Method

**PARTICIPANTS:** 33 Polish (L1) – English (L2) unbalanced bilinguals

**CRITICAL TASK:** blocked Picture Naming



### EXPERIMENTAL DESIGN:



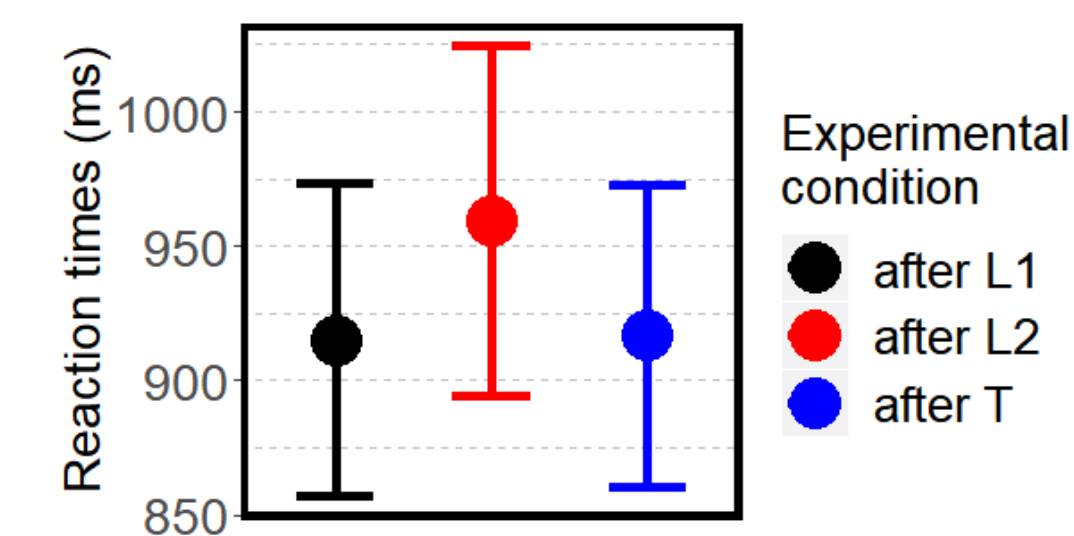
### Acknowledgements:

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## Results

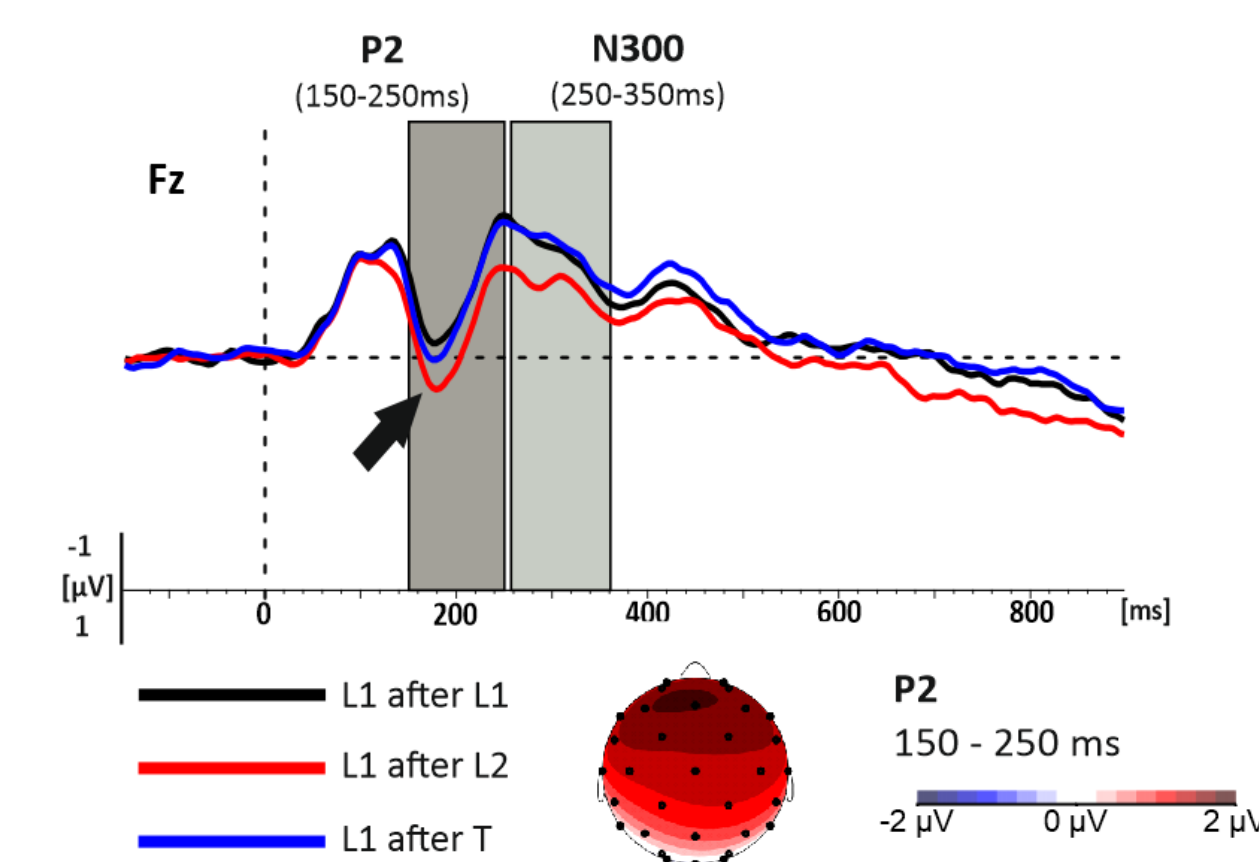
### Current study:

#### BEHAVIOURAL RESULTS:



- No** slow-down of naming **after L2**
- No** slow-down of naming **after NLT**
- Significant effect of **trial number**: systematic rise of naming latencies throughout the experiment

#### ELECTROPHYSIOLOGICAL RESULTS:



What drives the effect in **P2 time-window**?

- **Lexical access difficulty** [2, 3]
- unexpected given the studies showing the effect in **N300** time-window [1]
- Effect of **trial number**?

### Exploration of the results: what modulates the P2 amplitude?

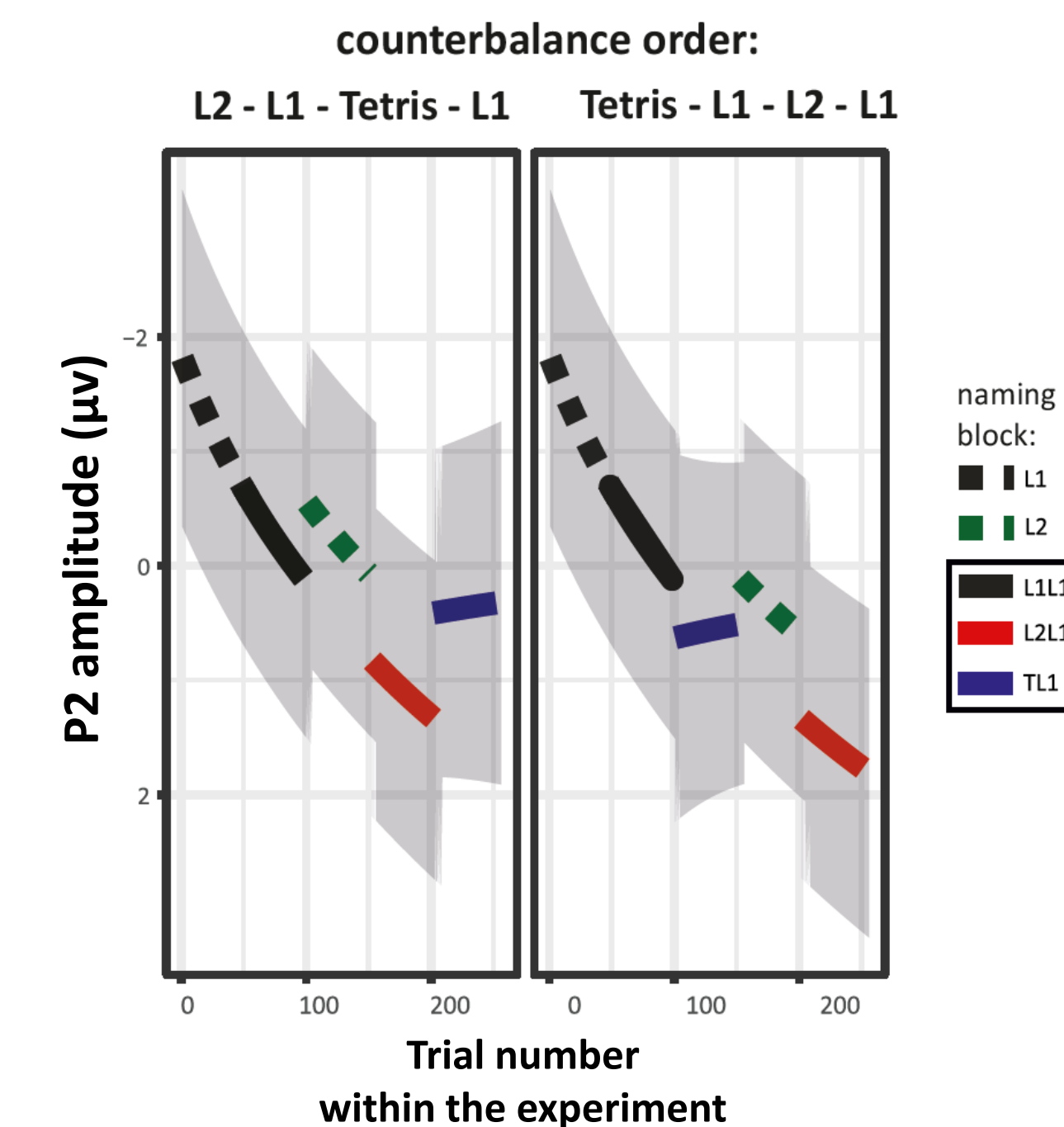
Given the lack of the **L2 after-effect** nor **task-change costs** on and the **significant trial effect** on the behavioural level it is unclear what drives the modulation observed in ERPs. The **outstanding questions** are:

How does the **trial number** modulate the **P2 amplitude**?

What is the **neurophysiological signature** of the **L2 after-effect**?

#### Exploratory analysis: trial effect

Comparison of **L1 after L2** and **L1 after T** against **L1 after L1** (baseline) **can be confounded by the trial number** since the baseline block was **always completed first** within the experiment.



- trial-base increase** of the P2 amplitude
- for L2**: overall - smaller amplitude of the P2 compared to L1
- disruption** of trial-base increase of the P2 amplitude in **L1 naming after Tetris**

#### Follow-up experiment: L2 after-effect in ERPs

- L2 after-effect** and **trial-base effect** impossible to disentangle at ERP level – **both modulate P2 amplitude**
- Modulation in P2 time-window linger over N300 time-window – **unclear which one reflects the word-retrieval difficulty**

#### FOLLOW-UP EXPERIMENT:

what is the ERP component related to L2 after-effect?

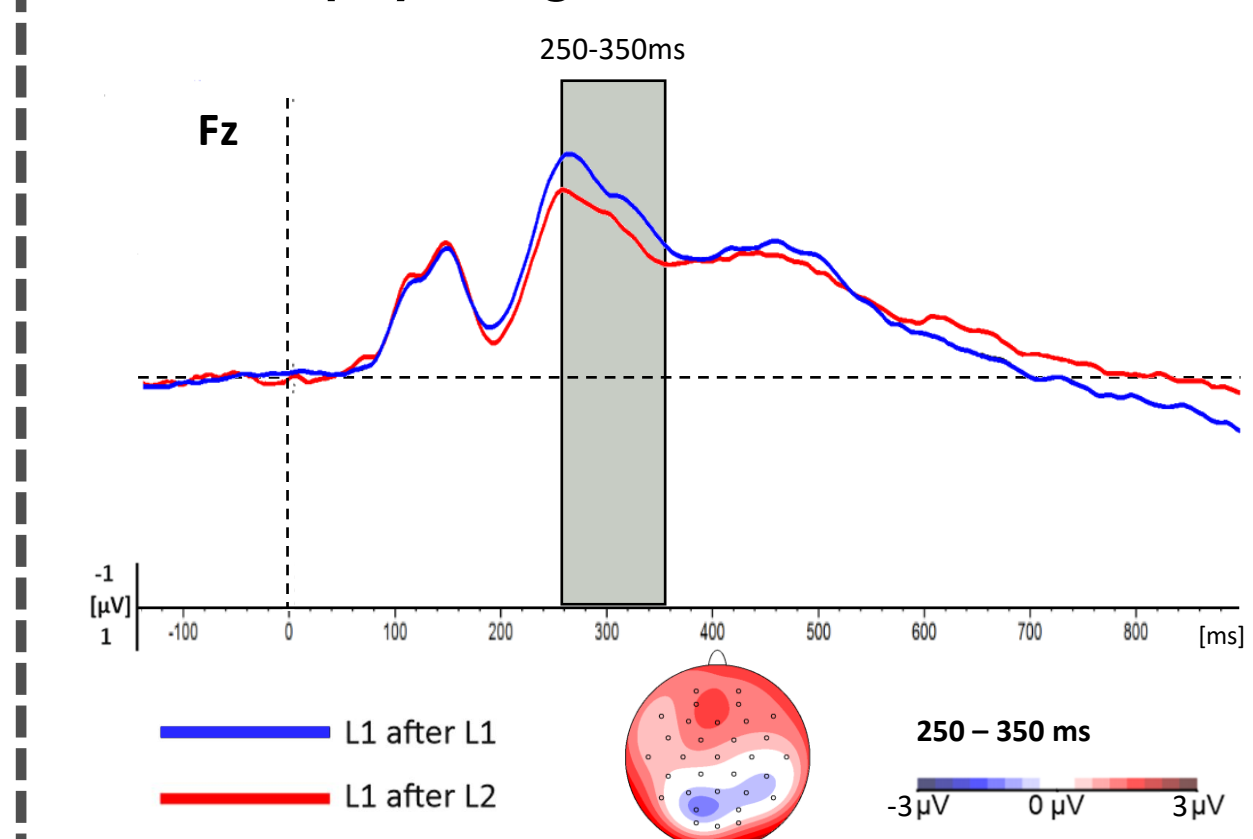
#### METHOD:

- Participants:** 29 Polish-English unbalanced bilinguals
- Task:** blocked Picture Naming completed over **2 sessions**

#### RESULTS:

- Behavioural:**
  - significant slow-down of **L1 naming after L2**
  - no** effect of **trial number**

#### Electrophysiological:



Significant effect of the **preceding language**:

- Enhanced positivity in 250-350ms time-window for **L1 after L2**
- Insensitive to **trial number**

? Inconsistent with previous study reporting a **negativity** in **N300** time-window [2]

## Summary and outstanding questions

#### BEHAVIOURAL RESULTS:

- It is unclear if L2 after-effect is driven by **language-specific** or **domain-general** mechanism
- Trial-base increase of **RTs** can obliterate the **L2 after-effect**: splitting the experiment into **separate sessions**
  - Trial-effects might reflect the uncontrolled semantic interference, which also affects the **P2** amplitude [3]

#### ELECTROPHYSIOLOGICAL RESULTS:

- Early processes in Picture Naming are strongly affected by **trial-based** effects:
  - Cumulative semantic interference?
  - Training?
- The **L2 after-effect** is accompanied by enhanced **positivity** in **250-350ms** time-window:
  - Discrepancy between the results of different ERP studies

## References

- Wodniecka, Z., Szewczyk, J., Kałamała, P., Mandera, P., & Durlík, J. (2020). When a second language hits a native language. What ERPs (do and do not) tell us about language retrieval difficulty in bilingual language production. *Neuropsychologia*, 107390.
- Branzi, F. M., Martin, C. D., Abutalebi, J., & Costa, A. (2014). The after-effects of bilingual language production. *Neuropsychologia*, 52, 102-116.
- Costa, A., Strijkers, K., Martin, C., & Thierry, G. (2009). The time course of word retrieval revealed by event-related brain potentials during overt speech. *Proceedings of the National Academy of Sciences*, 106(50), 21442-21446.