

# Number attraction effects on object-clitic agreement in Spanish: Evidence from native and non-native speakers



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## Introduction

According to Ullman's Declarative/Procedural model [1], high-proficiency non-natives rely on the same grammatical/procedural mechanisms as those that underlie L1 grammar. High-proficiency non-native speakers process some aspects of syntax in a native-like way despite late L2 learning onset and L1 vs. L2 differences [2] [3]. We use number attraction effects (e.g. the keySG to the cabinetsPL is / \*are) to investigate how high-proficiency non-native speakers process agreement structures in complex and error-prone environments. We explored the time course of number attraction errors during Spanish object-clitic pronoun agreement processing in native and non-native speakers.

## Predictions

**Natives:** Number attraction errors are expected to reduce the main grammatical effects (smaller negative and/or positive components in sentences containing a number mismatching local noun compared to a number matching one [4][5]).

**Non-natives:** Given high-proficiency and early L2-AoA, similar grammatical and attraction effects as those of natives expected. However, despite high-proficiency, different ERP patterns (i.e., smaller components) can be predicted due to non-nativeness (later AoA than natives).

## Methods and materials

**Participants:** 46 native Spanish and 32 highly proficient non-native Spanish bilinguals

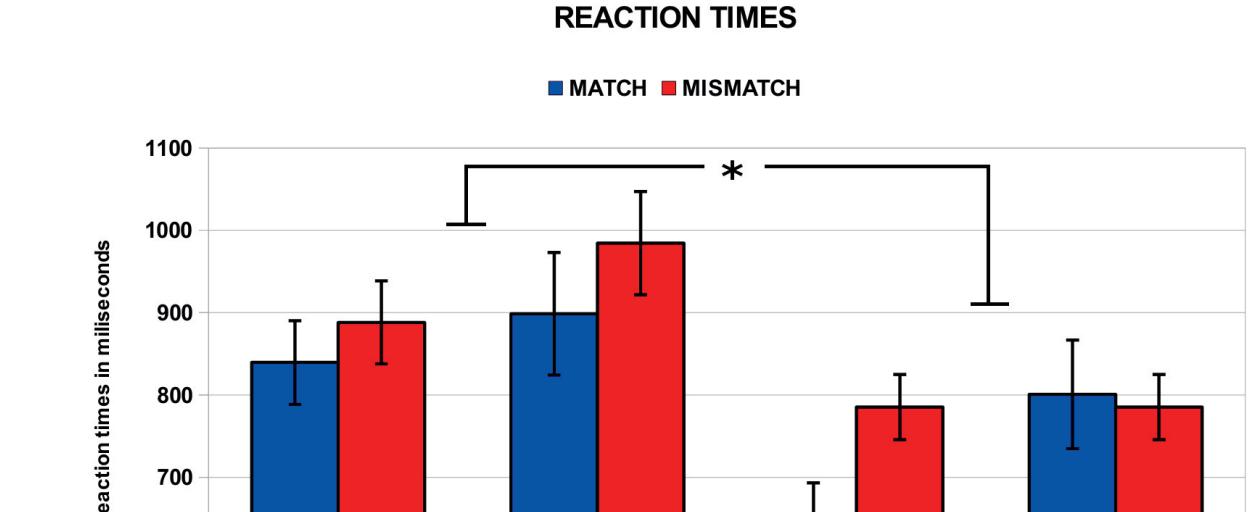
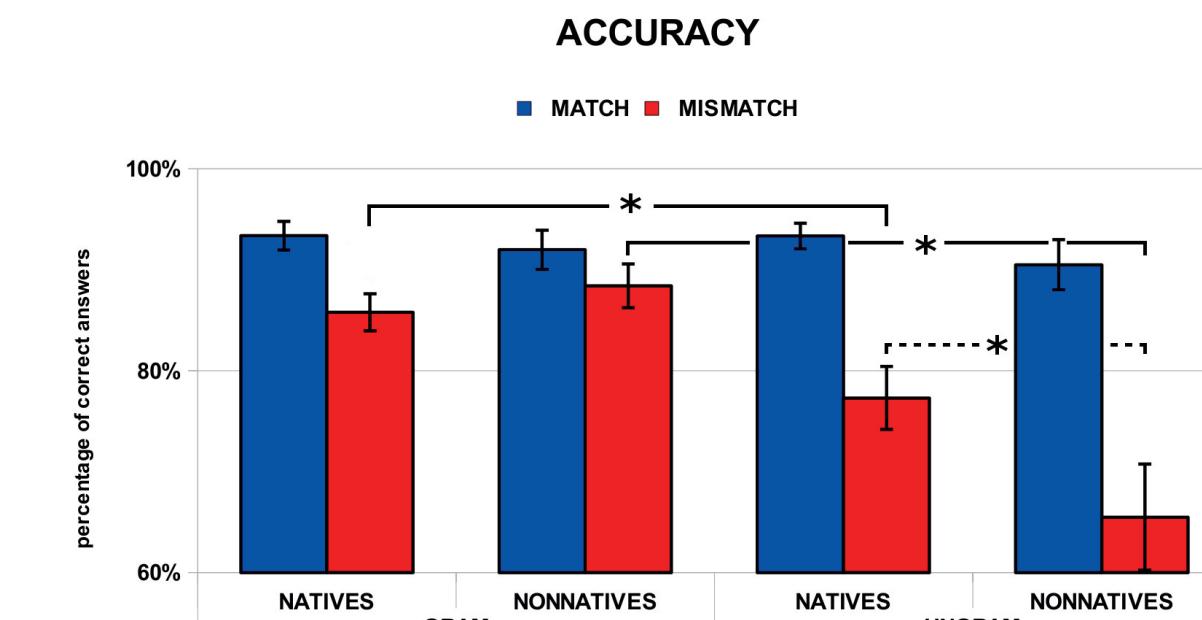
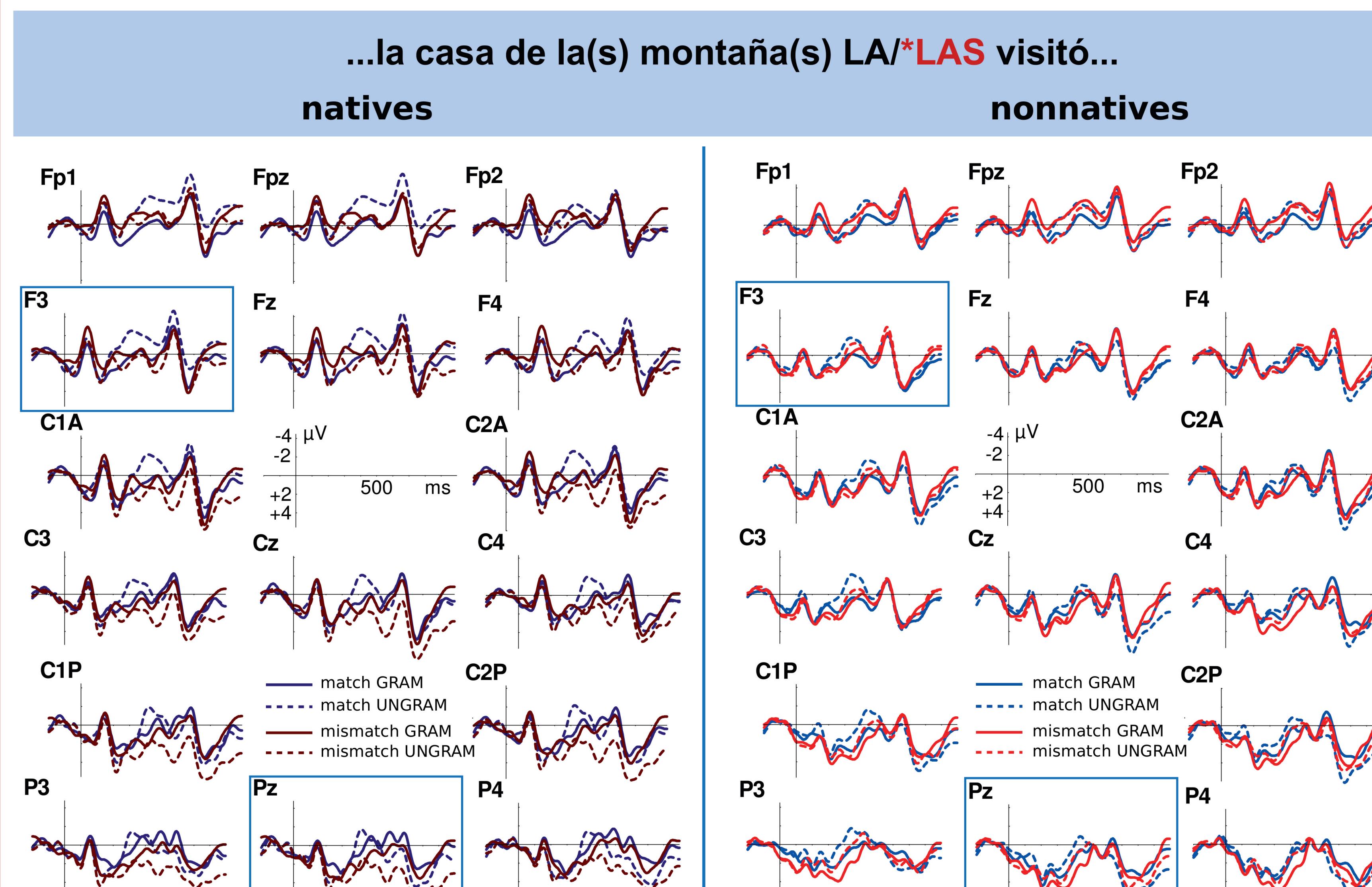
**Task:** Grammaticality judgment task

**Procedure:** 48 experimental sentences (12 per condition) + 120 filler sentences presented word-by-word (350 ms, ISI = 250 ms)

**Data analysis:** ERPs (32 electrodes, Electrocap, sampling rate 250 Hz, impedance below 5 kOhm, BrainRecorder)

MATCH CONDITION (SG-SG)			
(1a)	La pastora dijo que la casa <sub>SG</sub> de la montaña <sub>SG</sub> la <sub>SG</sub>	visitó en invierno.	GRAM
(1b)	La pastora dijo que la casa <sub>SG</sub> de la montaña <sub>SG</sub> *las <sub>PL</sub>	visitó en invierno.	UNGR
the sheperdess said that the house in the mountain, (she) it/*them visited in winter.			
MISMATCH CONDITION (SG-PL)			
(2a)	La pastora dijo que la casa <sub>SG</sub> de las montañas <sub>PL</sub> la <sub>SG</sub>	visitó en invierno.	GRAM
(2b)	La pastora dijo que la casa <sub>SG</sub> de las montañas <sub>PL</sub> *las <sub>PL</sub>	visitó en invierno.	UNGR
the sheperdess said that the house in the mountains, (she) it/*them visited in winter.			
Meaning: <i>The sheperdess said that the house in the mountain(s), she visited it /*them in winter.</i>			

## Results

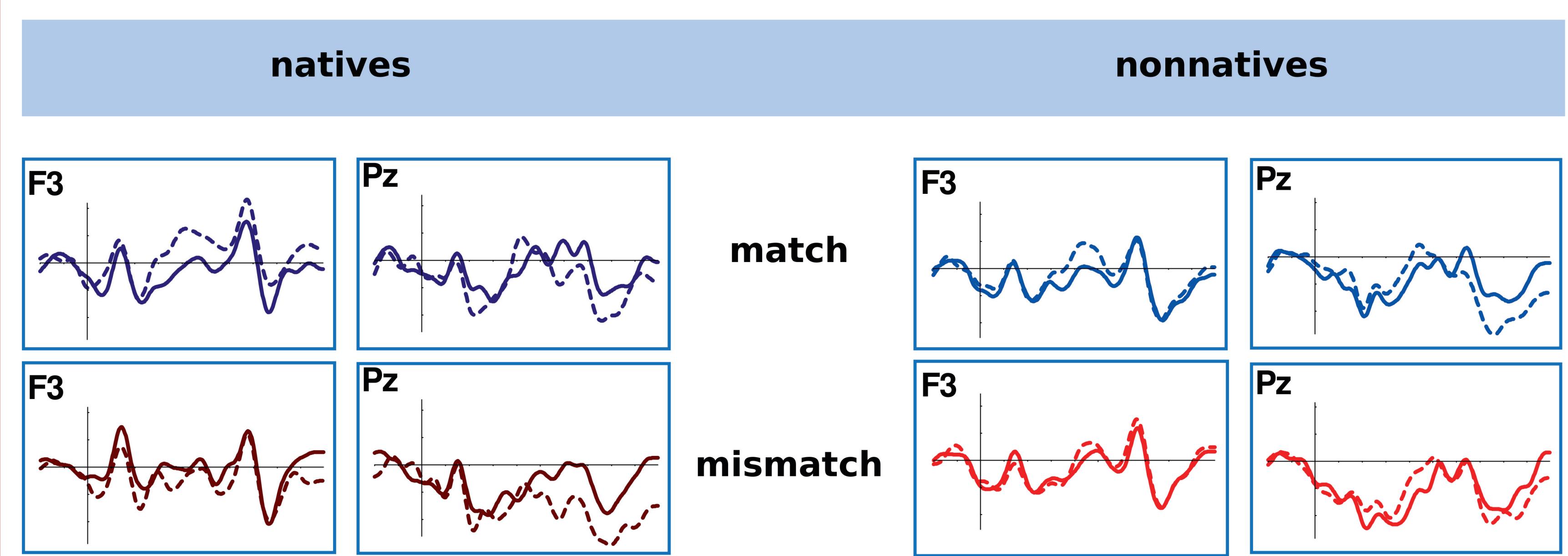


### Behavioral results:

- All participants were significantly slower and less accurate in the mismatch conditions as compared to the match conditions.
- Natives and non-natives showed similar accuracy levels in all number matching conditions (93% vs. 92%).
- In ungrammatical conditions, non-natives showed significantly larger attraction effects in accuracy than natives (match-mismatch difference in non-natives: 25% vs. natives: 16%).

### ERP results:

- Different grammatical effect patterns in natives and non-natives.
- Natives showed a fronto-central negativity followed by a P600 in the match condition and only a P600 component in mismatch condition
- Non-natives showed only a broad negativity but no P600 in the number match condition, and no effect in the mismatch condition.



## Discussion & Conclusions

Data from native speakers reveal behavioural and electrophysiological responses for object-clitic pronoun agreement (negativity + P600) similar to those found in subject-verb agreement [4] [5].

Also, in native speakers, attraction effects showed to have a deep impact on early (considered automatic) stages of agreement computation (as revealed by the presence of negativity in match conditions and its absence in mismatch conditions), but none on later comprehension processes (P600 unaffected).

However, **high-proficiency non-natives were more prone to attraction errors than native speakers** as shown by larger attraction effects in accuracy, and absence of either negativity or P600 components in mismatch conditions. **These findings reveal that non-natives' syntactic processing is weaker than the one of natives regardless their high L2 proficiency level.**

## References

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