# PLACING HEADS IN PHRASES:
## WHEN BILINGUAL PARAMETERS CLASH

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## INTRODUCTION

Age of acquisition (AoA), proficiency and linguistic distance are crucial factors in the research of the neural basis of bilingualism [1]. Basque-Spanish bilinguals constitute an ideal population to study the impact of these factors because there are bilinguals of all types along those three dimensions, and because Basque and Spanish resemble each other regarding some grammatical properties while they differ regarding others. Both languages have verb agreement, they have different case systems (ergative-absolutive in Basque; nominative-accusative in Spanish) and opposite values of the head-directionality parameter that determines whether heads are placed at the end of phrases (as Japanese, Subject-Object-Verb type language) or at the beginning of phrases (as English, SVO type).

Zawiszewski et al. (2011) [2] show that highly proficient and early Spanish-Basque bilinguals (AoA=3 y.o.) process verb agreement violations like natives (N400 and P600), whereas the two groups differ when processing ergative case violations (natives showed N400 and P600, non-natives only N400). We aim to further determine the impact of structural distance between native and non-native grammars in bilingual syntactic processing. To this end, we focus on the opposite value of the head-directionality parameter (word order: VO vs. OV) is processed by Spanish-Basque bilinguals.

## METHODS & MATERIALS

We tested how early (AoA = 3 y.o.) and proficient Spanish-Basque bilinguals process canonical (SOV) and non-canonical (OSV) word orders in Basque.

Exp. 1: Self-Paced Reading
Particitpants: n = 21
Exp. 2: Event Related Potentials
Participants: n= 23

### Experiment 1

*SUBJECT-OBJECT-VERB*
**Emakume-ek gizon-ak ikusi dituzte.**
Women-S man-O seen have
'The women saw the man'

*OBJECT-SUBJECT-VERB*
**Gizon-ak emakume-ek ikusi dute.**
Man-? women-S seen have
'The women saw the man'

*FULLY AMBIGUOUS*
**Emakume-ak gizon-ak ikusi ditu.**
Women-Subj man-Obj seen have
'The women saw the man' or 'The men saw the woman'

### Experiment 2

*SUBJECT-OBJECT-VERB*
**Otso-ek ardi-ak jan dituzte.**
Wolves-S Sheep-O eat have
'The wolves eat the sheep(pl.)'

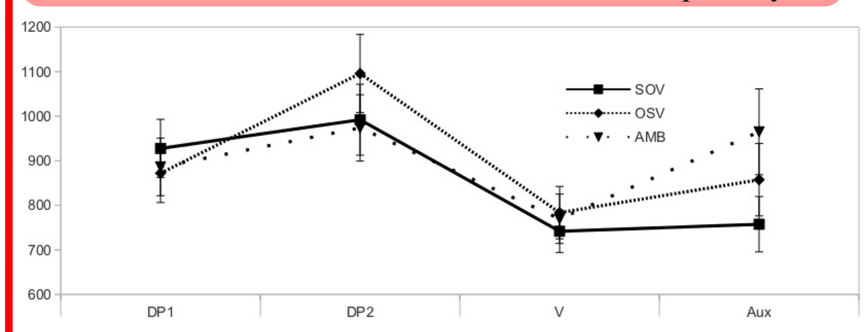
*SUBJECT-OBJECT-VERB*
**Ardi-a otso-ek jan dute.**
Sheep-O wolves-S eat have
'The wolves eat the sheep(sg.)'

*AMBIGUOUS SOV*
**Otso-ak ardi-ak jan ditu.**
Wolf-? Sheep-? eat have
'The wolf eat the sheep(pl.)'

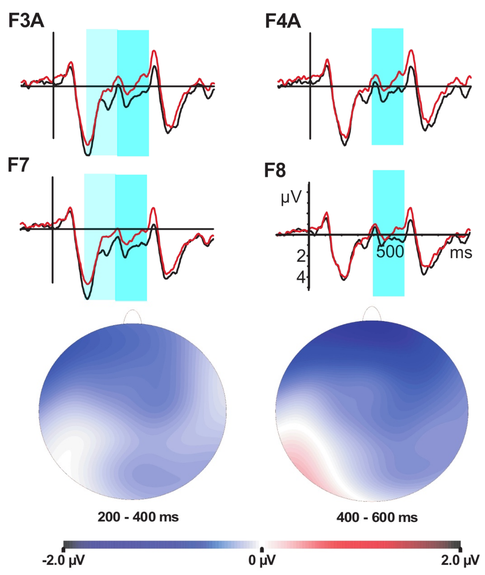
*AMBIGUOUS OSV*
**Ardi-ak otso-ak jan ditu.**
Sheep-? wolves-? eat have
'The wolf eat the sheep(pl.)'

## RESULTS

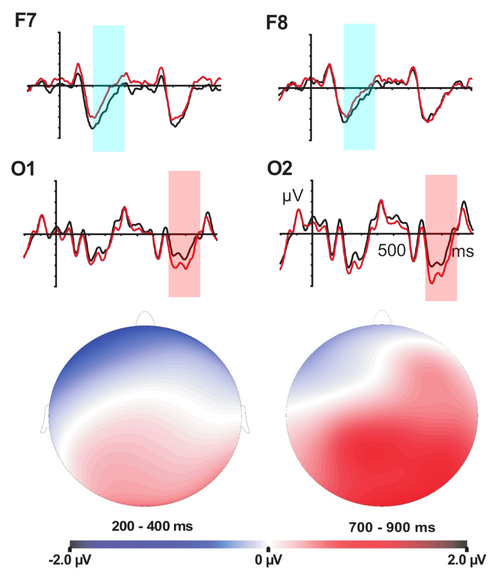
The behavioral results showed that (i) nearly native speakers required longer reading time when encounter S before O, and (ii) the ambiguous sequences are processed as SOV.
ERPs showed anterior negativities at non-canonical DP positions, and a posterior positivity at DP2 position. At verb position late positivities were observed.
Temporarily ambiguous sequences which were disambiguated to non-canonical OSV word order showed frontal positivy.



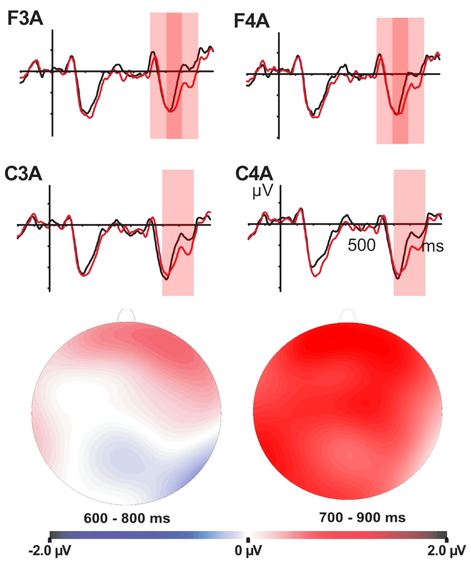

*First DP Position: Sov-Osv*



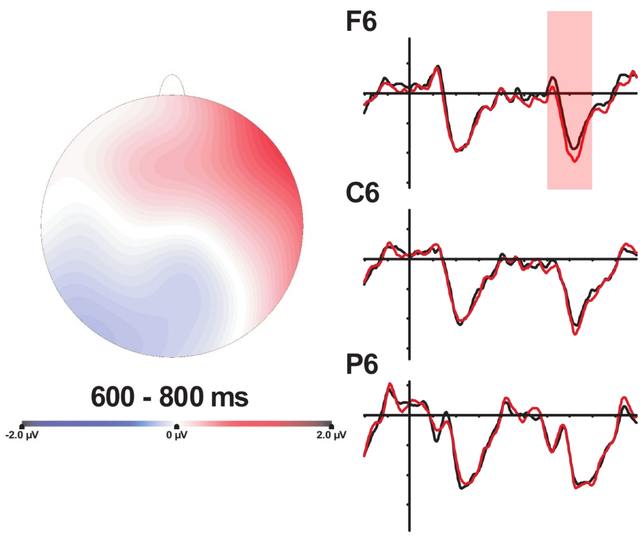

*Second DP Position: sOv-oSv*



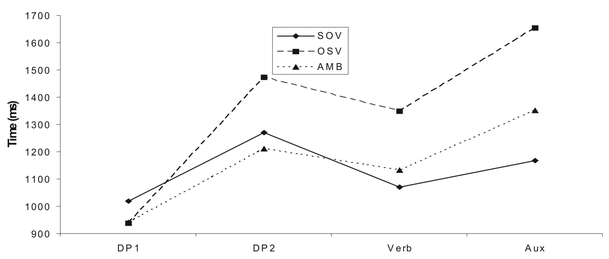

*Verb Position: soV-osV*

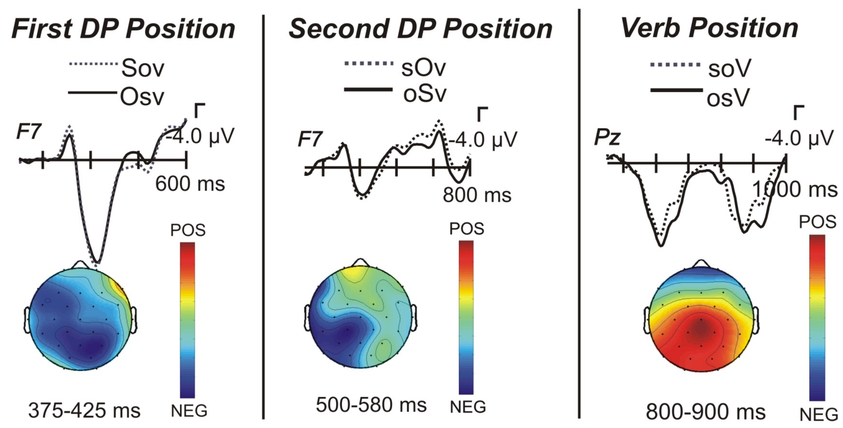


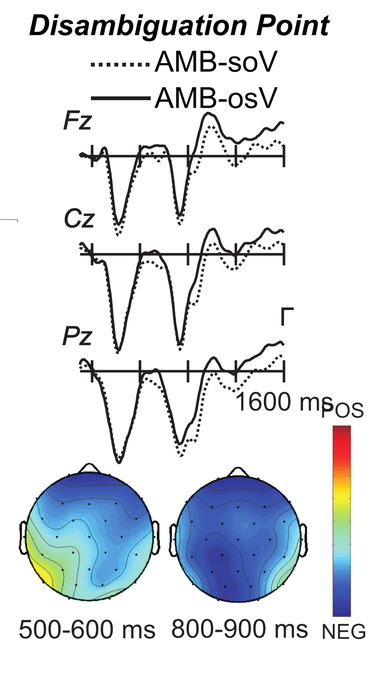

*Ambiguous Conditions: AMB/soV-AMB/osV*




Behavioral and ERP results of Basque native speakers processing canonical and non-canonical word orders [3]




## DISCUSSION

Given the results previously obtained from a variety of studies on non-native processing (e.g. [1]) and some of our own previous research, our working hypothesis was that native/non-native differences would obtain in profienct bilinguals when tested materials involved different parametric specifications for the native and the non-native langauge. In this particular case, since head-directionality parameter that governs word order within the phrase has opposite settings in the native language and in the non-native language, we predicted that detectable differences would emerge in the way in which word order was processed by natives and non-natives.

Our findings indicate that proficient non-native speakers do not employ the same neural resources as natives when processing linguistic phenomena that differ from those in their native language. We found that a clash in the values of the head-parameter in the two languages of the bilingual leads to a distinct word order processing pattern in non-natives as compared to natives.

## Reference

[1] Kotz, S. (2009). A critical review of ERP and fMRI evidence on L2 syntactic processing. *Brain and Language*, 109 Issues 2-3, 68-74.
[2] Zawiszewski, A., Gutierrez, E., Fernández, B., and Laka, I. (2011). Age effects in nonnative language processing. Evidence from event-related potentials. *Bilingualism: Language and Cognition* 14 (03), 400-411.
[3] Erdocia, K., Laka, I., Mestres-Missé, A., and Rodriguez-Fornells, A. (2009). Syntactic complexity and ambiguity resolution in a free word order language: behavioral and electrophsyiological evidences from Basque. *Brain and Language*,109 (1), 1-17.