WORD ORDER AMBIGUITIES IN BASQUE

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Word Order & Ambiguities

Two experiments manipulating word order (SOV vs. OSV) and ambiguities.

First: *Self Paced Reading*:

Canonical Word Order faster to process

Canonical Word Order easier to process

Second *Event Related Potentials*:

Syntactic Complexity of Derived Word Order (LAN & P600)

Semantic Disambiguation (N400)

Language Processing

- Comprehending language structures on-line from the left to the right, people start comprehending before whole surface structure be cought (Phillips 1996, Gibson 1998).

- For final verb languages, *parser* starts contructing VP before the verb is processed (Yamashita, 1997).

Language Processing

- *Syntactic Prediction Locality Theory* (Gibson, 1998)

  Memory Cost

  Integration Cost

- *Self Paced Reading*: Reaction time

Experiment I: Subject vs. object preference parsing in OSV sentences

Objective: The aim was to prove that derived word order sentences would be slower in reading than canonical word order sentences and would produce more errors in the comprehension task.

Method: *Participants*: 23 native basque speakers (13 women), plus 10 removed because of error rates. Age rate 25 (SD ± 5).

Experiment I: Subject vs. object preference parsing in OSV sentences

Method: *Materials:* 32 sentences in 2 lists
(16 SOV/16 OSV) + 32 fillers (same for the two lists)

(1)a. Emakumeak gizona ikusi du

woman erg.sg(sj) man abs.sg (obj) verb

'*the woman has seen the man*'

(1)b. Gizona emakumeak ikusi du

man abs.sg (obj) woman erg.sg (sj) verb

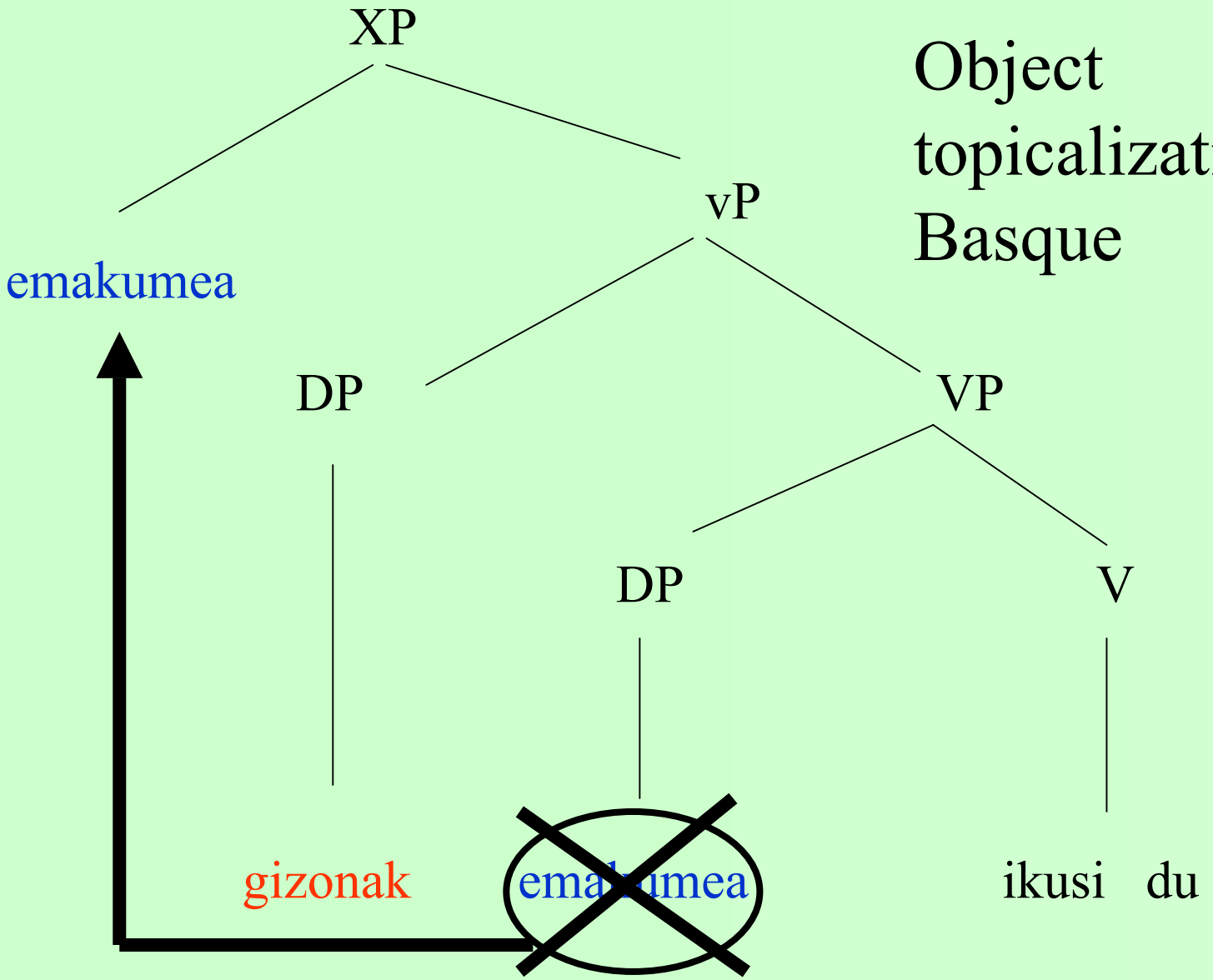
'*the woman has seen the man*'

Experiment I: Subject vs. object preference parsing in OSV sentences

<u>Method:</u> *<u>Materials:</u>* **Comprehension task**

(2) “egia al da emakume batek gizon bat ikusi duela?”
‘is it true that a woman has seen a man?’

Object topicalization in Basque



Experiment I: Subject vs. object preference parsing in OSV sentences

Method: *Recording*

The EXPE program recorded the reaction times and the answers:

(i) the required time for read each word of sentence,

(ii) the required time for read and answer the question,

(iii) whether they answer correctly or not.

Experiment I: Subject vs. object preference parsing in OSV sentences

Method: *Recording*

So, for object-first sentences it was expected

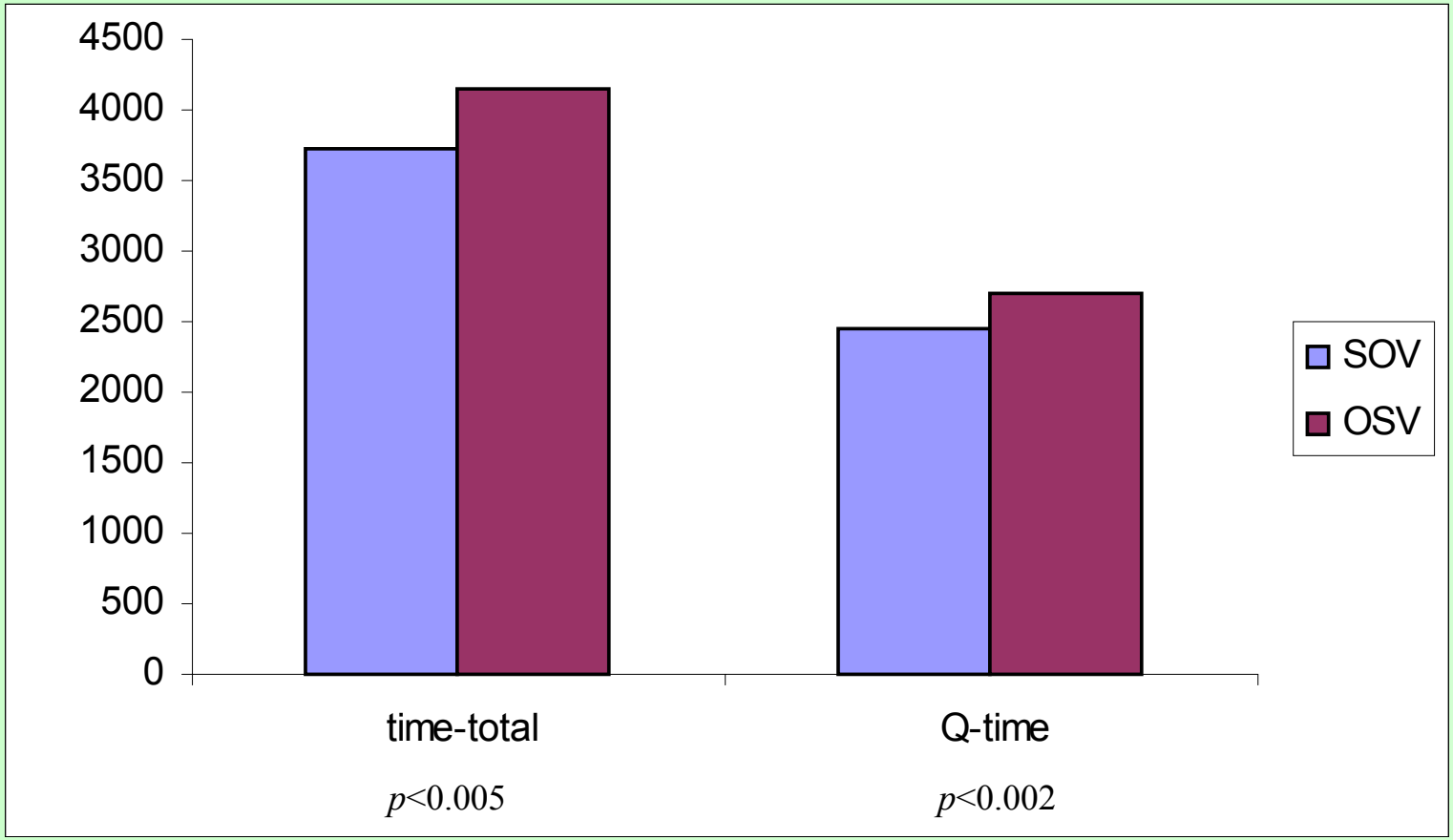
(i) more time to read,

(ii) more time to answer the questions,

(iii) more errors.

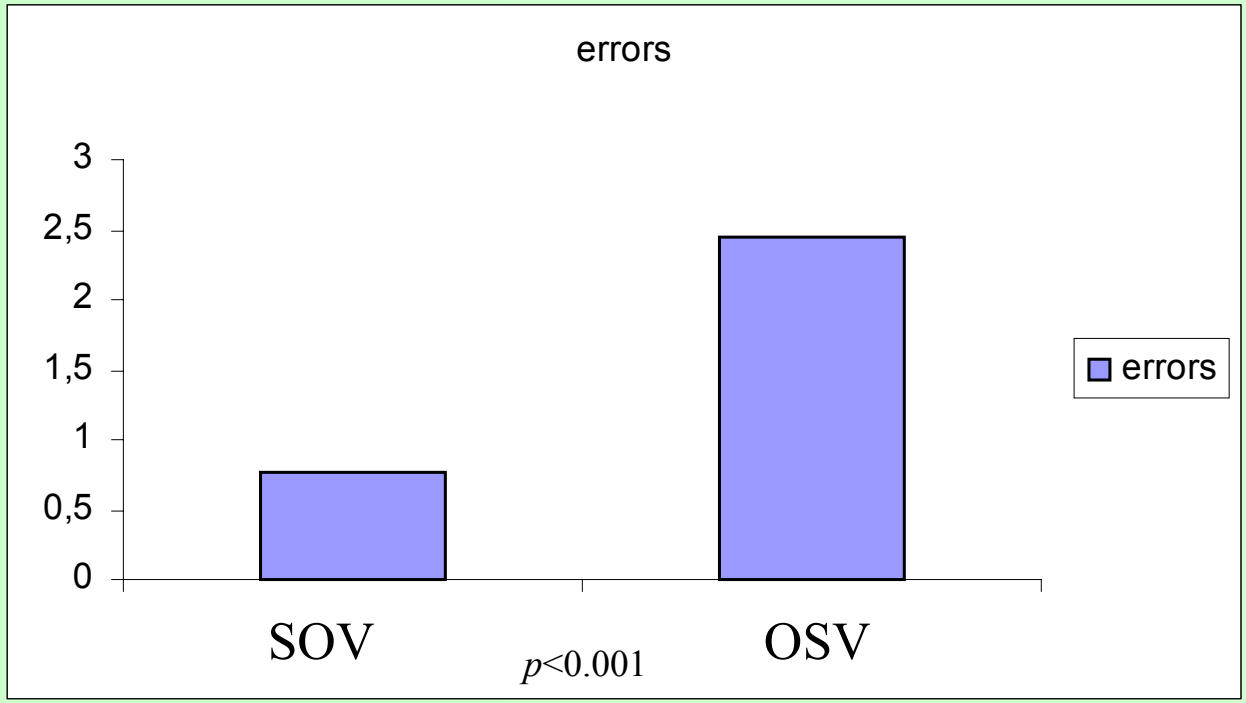
Experiment I: Subject vs. object preference parsing in OSV sentences

Results: Reading times and Question times



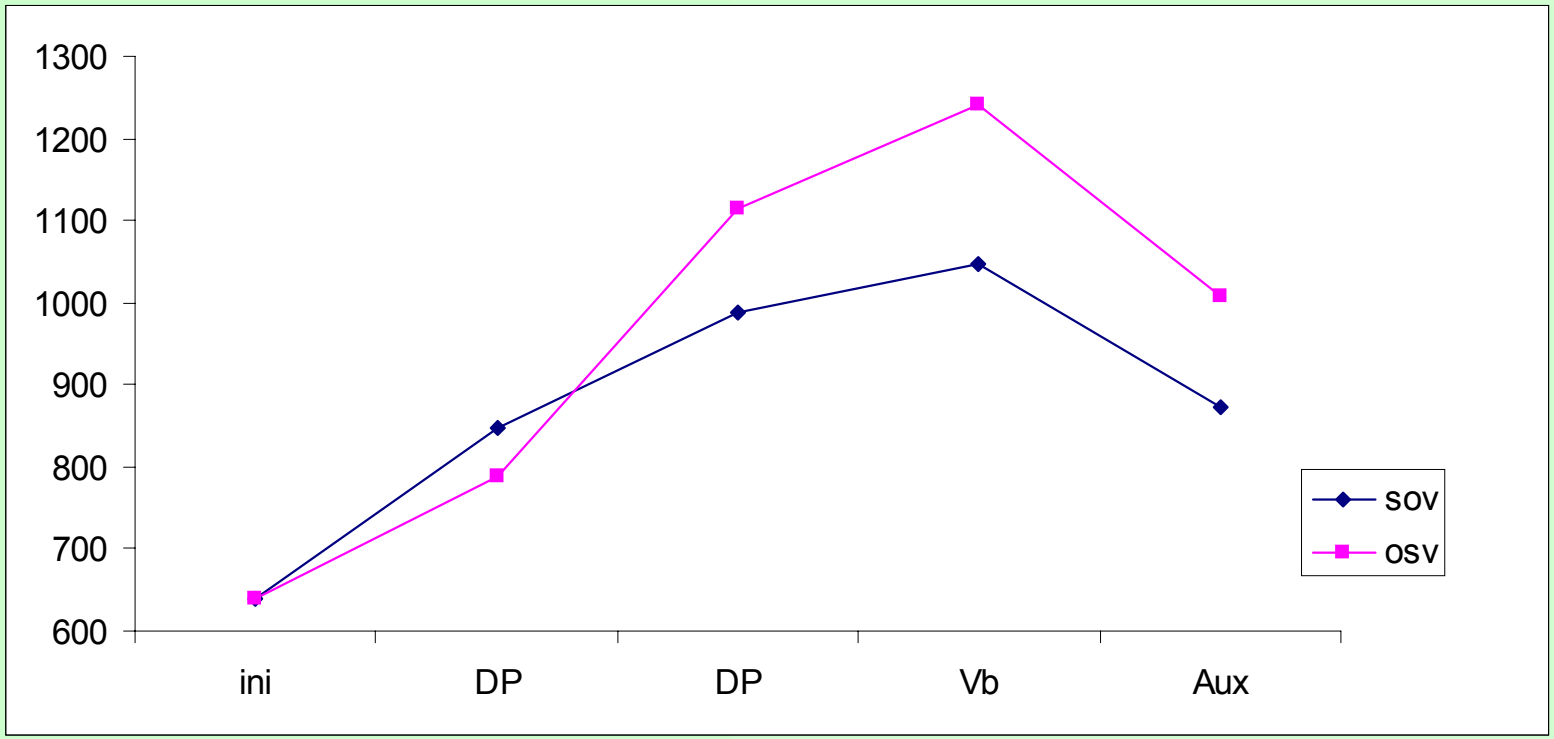
Experiment I: Subject vs. object preference parsing in OSV sentences

Results: Accuracy of comprehension task



Experiment I: Subject vs. object preference parsing in OSV sentences

Results: Word by word

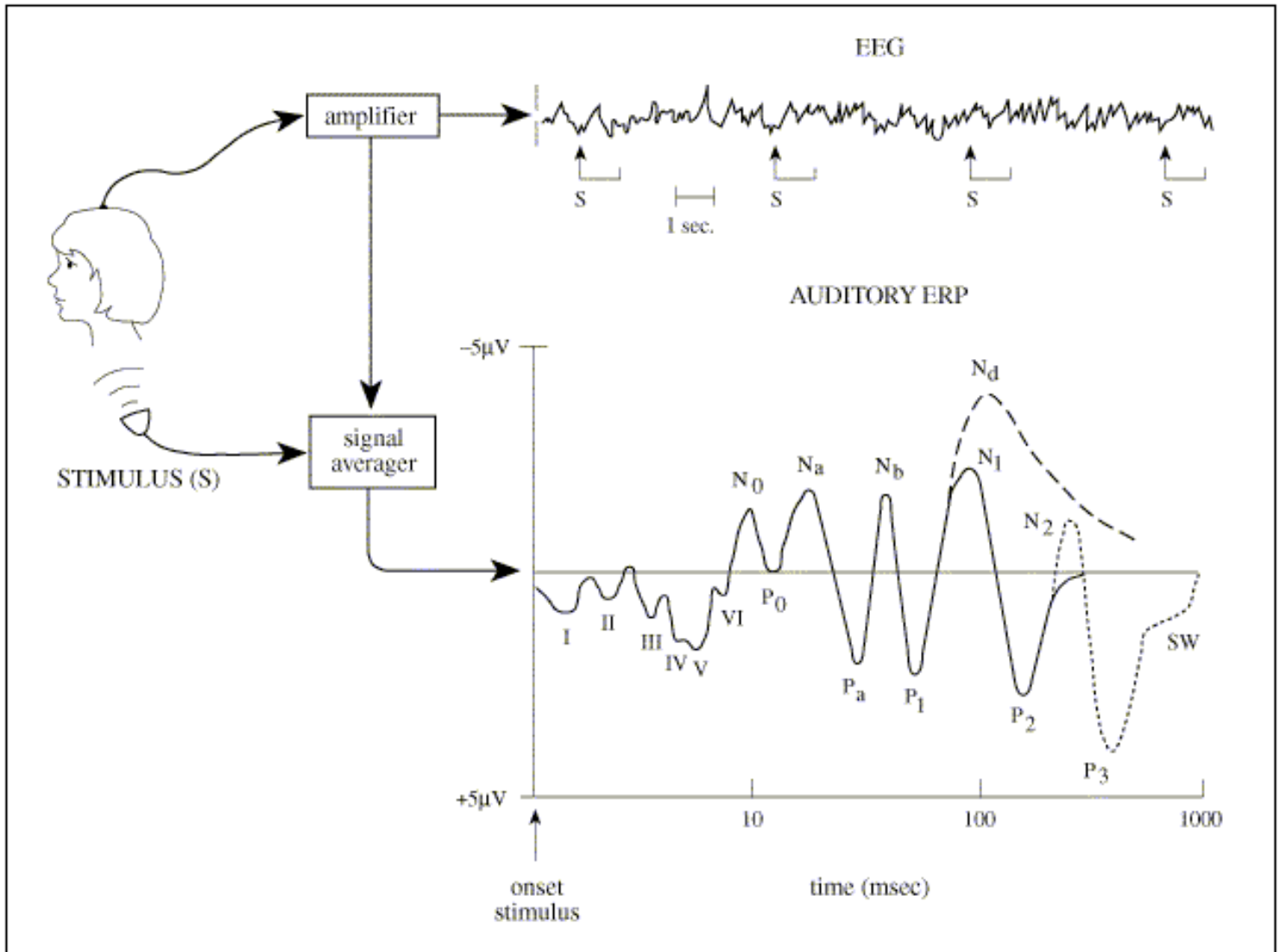


Experiment I: Subject vs. object preference parsing in OSV sentences

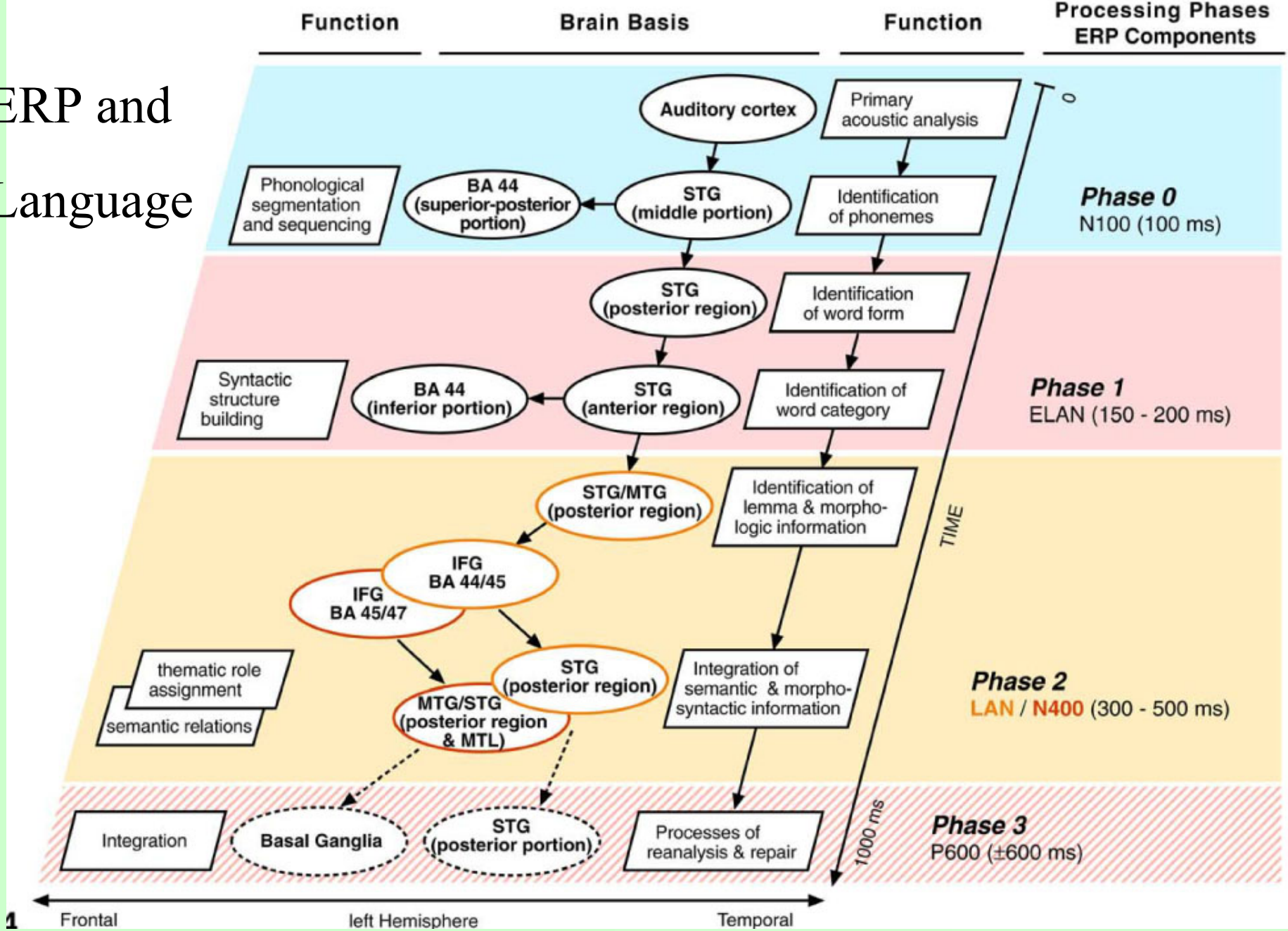
Conlcusions:

- SOV is faster than OSV
- OSV sentences are harder to understand
- Absolutive is faster than Ergative

Experiment II: Processing Ambiguous Sentences and Word Order Differences, ERP study



ERP and Language



Friederici & Kotz, 2003

ERP and Language

ELAN (*Early Left Anterior Negativity*):

120-220 ms. post-stimulus

Word form identification, word category, violations of phrase structure, and close class words (Friedici et al., 1993; Neville et al., 1991).

If a linguistic event is low frequency but correct, this component don't appear (Hahne & Friederici, 1999).

ERP and Language

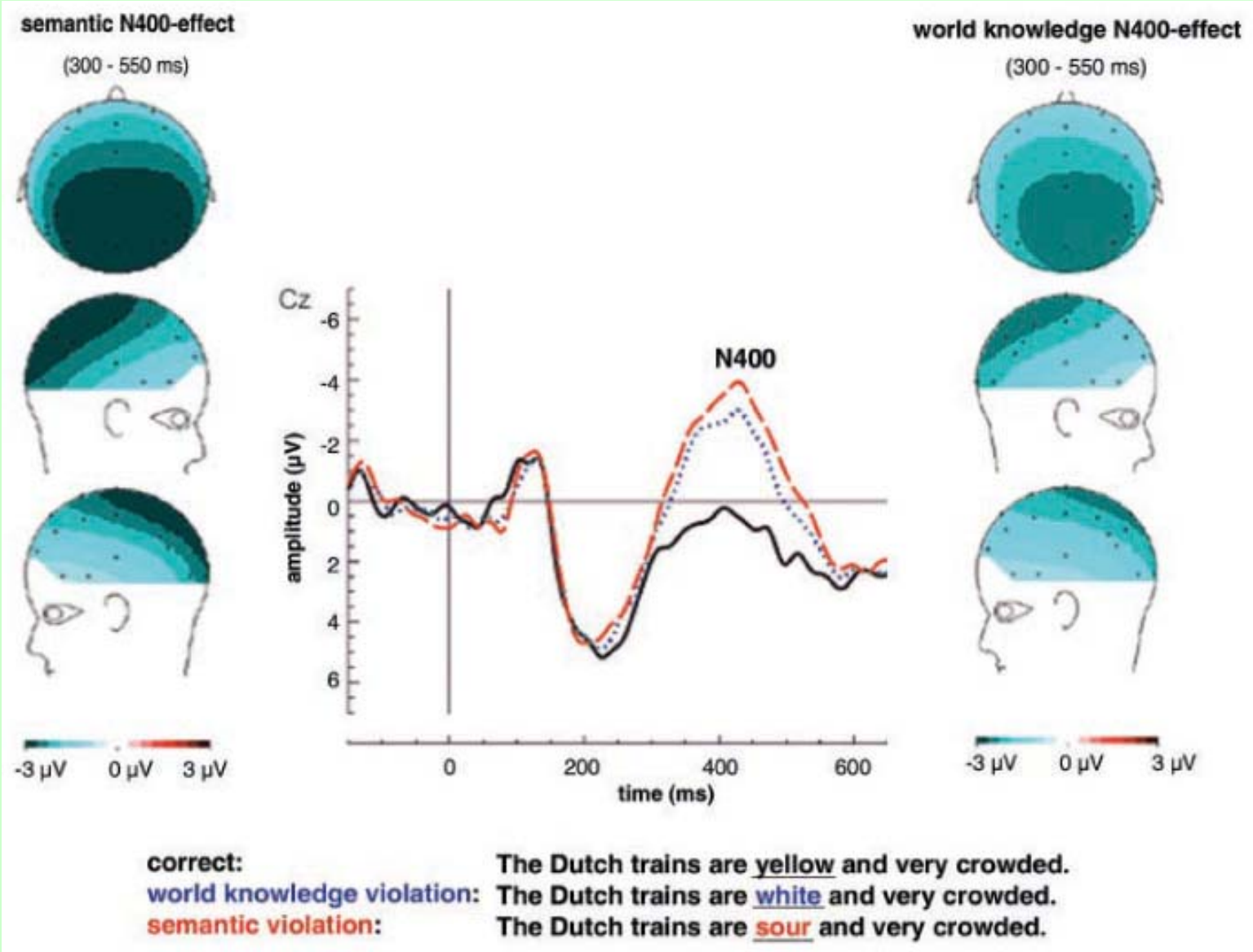
N400

Negative polarity, around 400 ms. after stimulus onset.

Semantically anomalous words

Semantic violations and world knowledge violations

N400



Haagort et al., 2004

ERP and Language

LAN (*Left Anterior Negativity*)

300-500 ms. post-stimulus, left hemisphere distribution

Agreement violations,

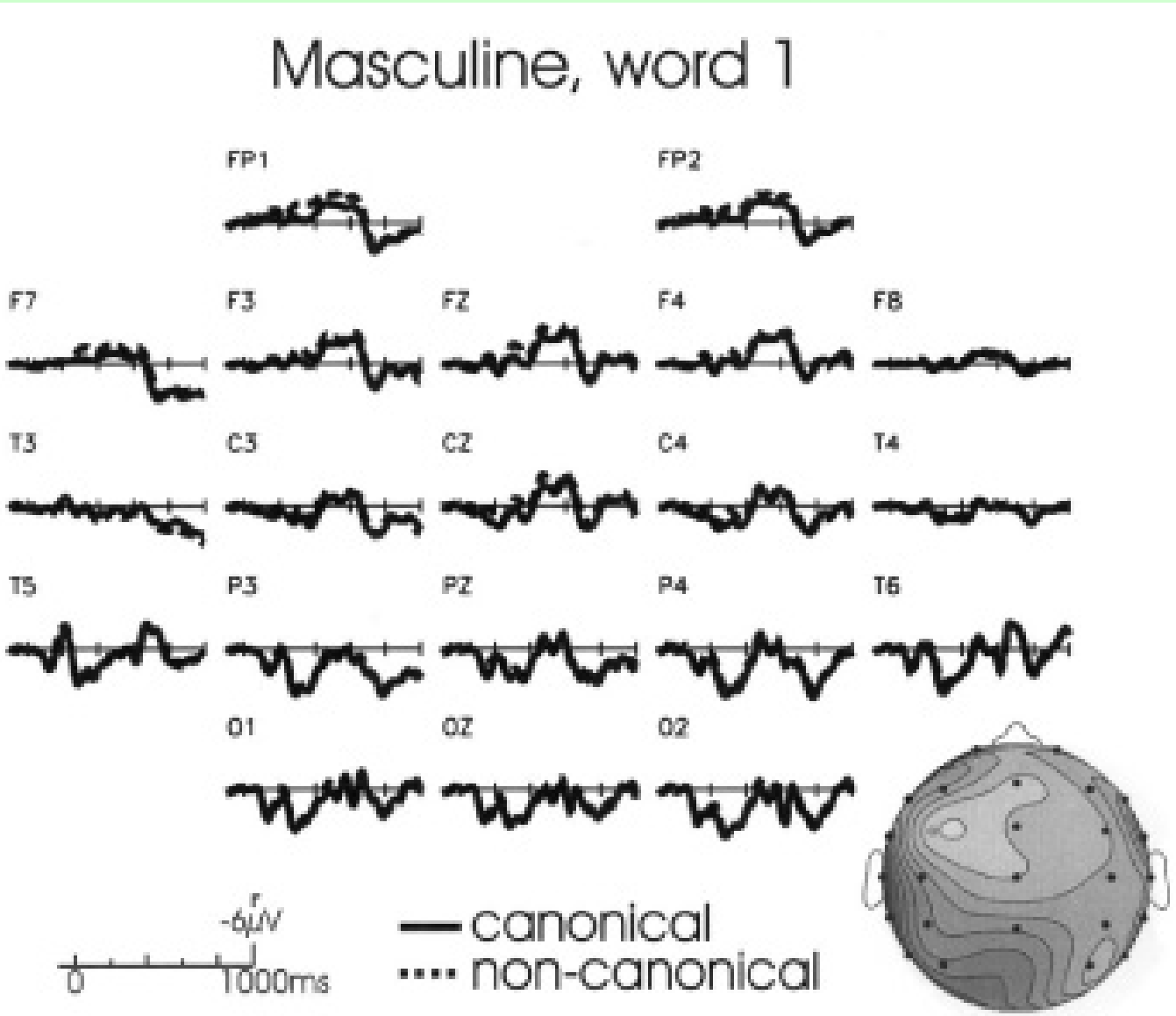
WH- raising

Topicalizated complements

To store a moved element and to recover it in gap position from the working memory increase the LAN effects (Felser et al., 2003).

GERMAN DETERMINERS: DER vs DEN

LAN



Matzke et al., 2002

ERP and Language

P600/*Syntactic Positive Shift* (SPS)

Reparation of syntactic violations

Syntactic complexity

Reanalisys of syntacticaly ambiguous sentences

P600/SPS

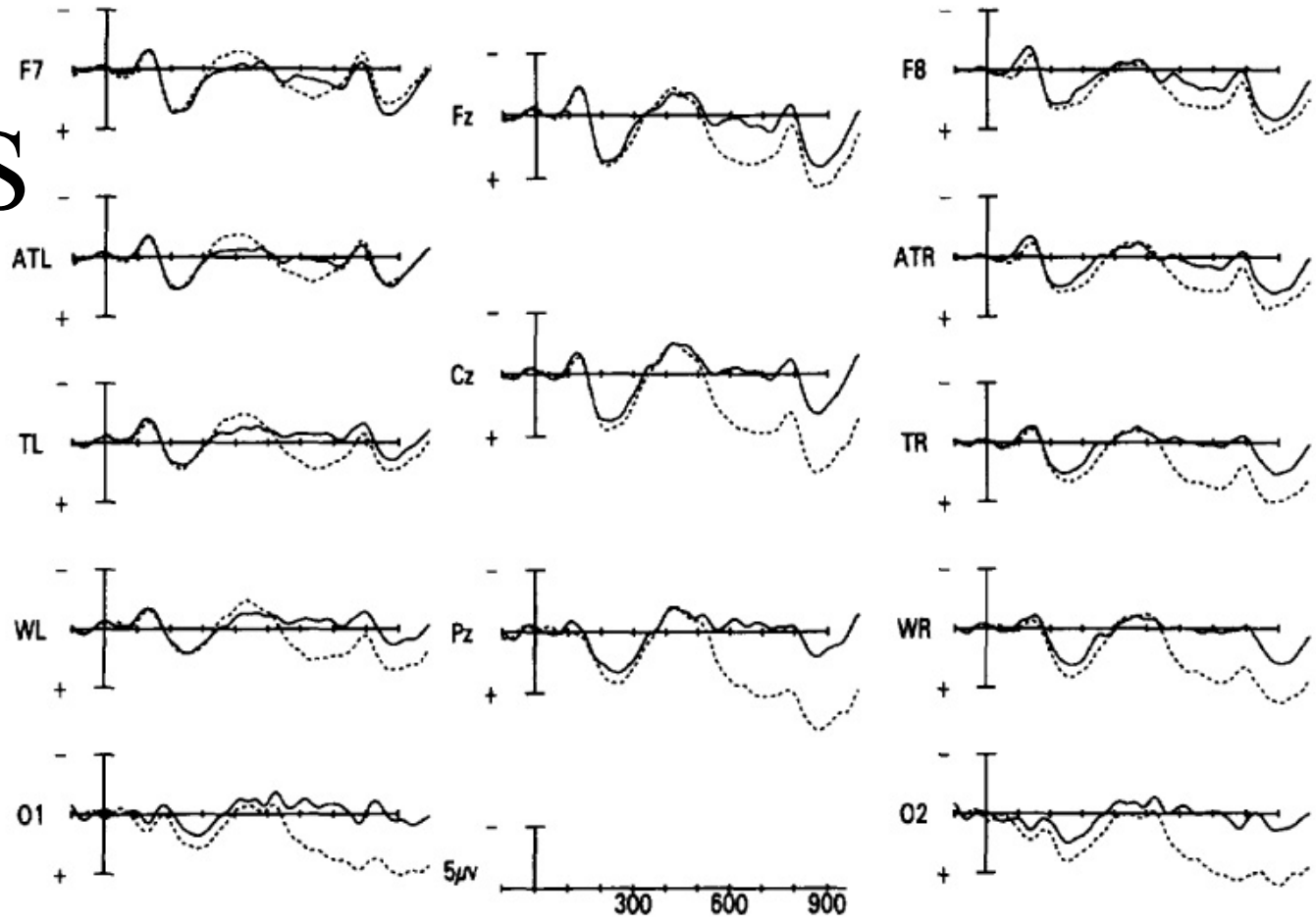


FIG. 1. Grand average ERPs recorded over three midline and 10 lateral sites to subject–verb number violations and controls. Onset of the critical words in non-violating (solid line) and agreement-violating (dashed line) conditions is indicated by the vertical bar. Each hash mark represents 100 ms. Positive voltage is plotted down.

Osterhout & Mobley, 1995

Experiment II: Processing Ambiguous Sentences and Word Order Differences, ERP study

Objective

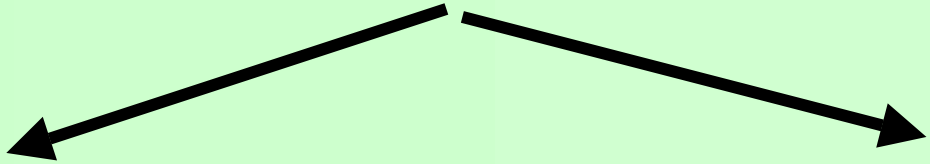
(i) Differences of subject-first *versus* object-first sentences' parsing, showing the working memorys cost in derived word orders

(ii) Disambiguoation cost

(iii) Compared anbiguous sentences with non-anbiguous sentences.

AMBIGUITY IN BASQUE

EMAKUME-AK



SUBJECT
TRANSITIVE
SINGULAR
AGENT

OBJECT
TRANSITIVE
PLURAL
PATIENT

Emakume-ak gizon-ak ikusi ditu

Woman erg.sg/abs.pl. *man* abs.pl./erg.sg *see* *has*

'the woman has seen the men' or 'the man has seen the women'

Experiment II: Processing Ambiguous Sentences and Word Order Differences, ERP study

Method: *Materials* 240 sentences with 4 conditions

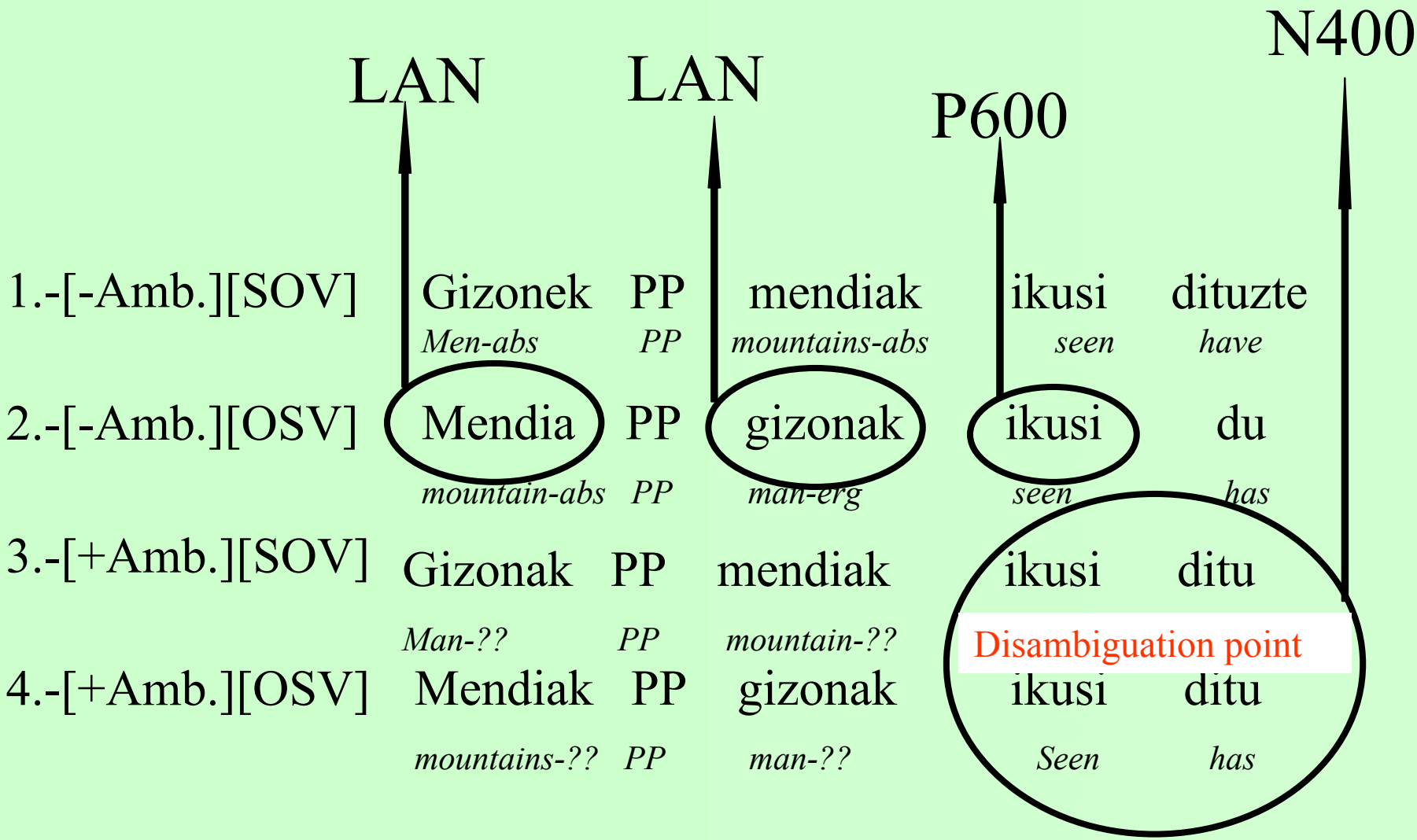
[-Amb.] [SOV]	Gizonek	PP	mendiak	ikusi	dituzte
	Men-erg	*PP*	*mountains-abs*	*seen*	*have*
[-Amb.] [OSV]	Mendia	PP	gizonak	ikusi	du
	mountain-abs	*PP*	*man-erg*	*seen*	*has*
[+Amb.] [SOV]	Gizonak	PP	mendiak	ikusi	ditu
	Man-??	*PP*	*mountain-??*	Disambiguation point	
[+Amb.] [OSV]	Mendiak	PP	gizonak	ikusi	ditu
	mountains-??	*PP*	*man-??*	*Seen*	*has*

Experiment II: Method

Participants: Twenty-four neurologically healthy native speakers of Basque (mean age 26 ± 4.7 (SD) years; 8 males, all right handed)

Design: Each ERP session lasted about 45-50 minutes. After each block of 8 sentences, subjects were required to answer one simple questions pertaining to the critical sentences read before.

Experiment II: Expected



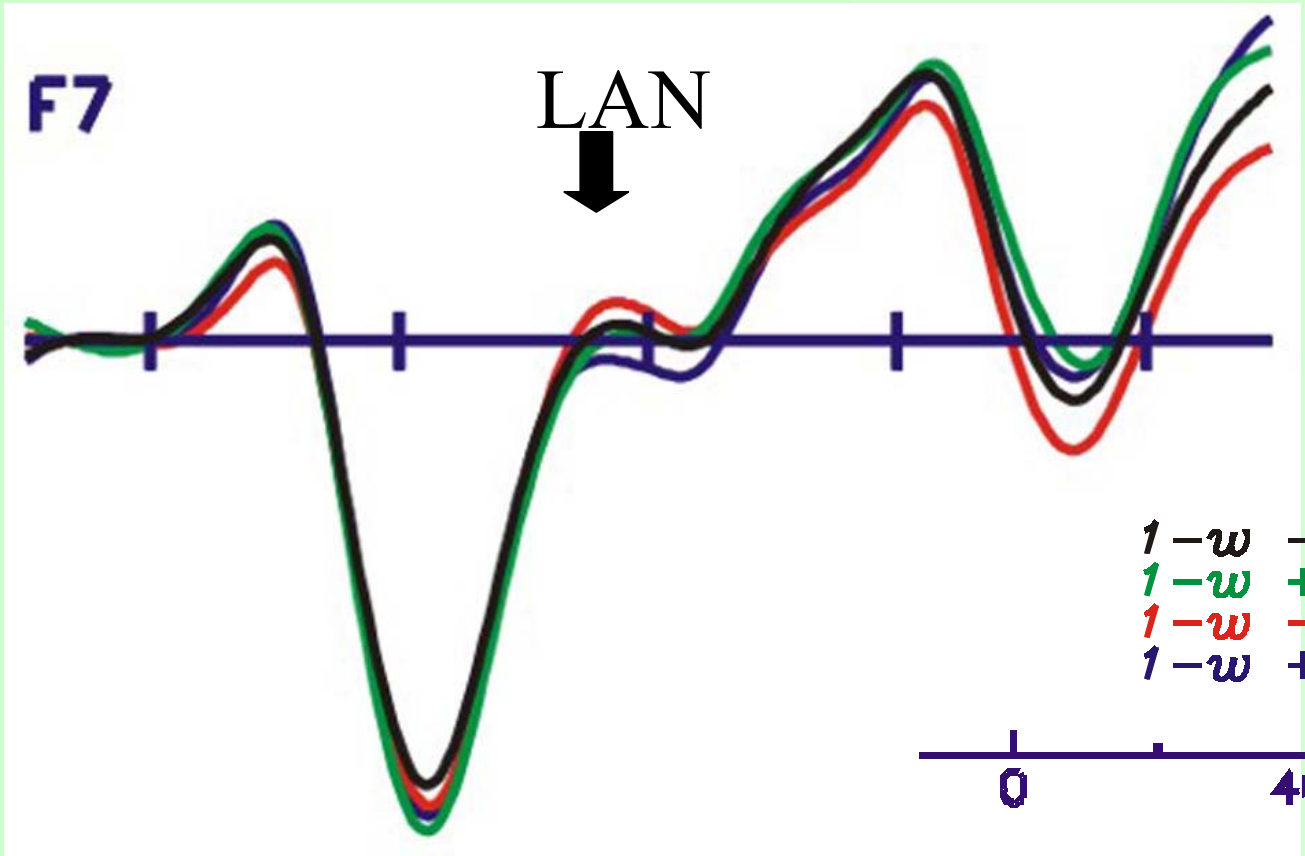
Experiment II: Results

Correcteness of comprehension task: % 91 (SD ± 7.8)

Omnibus ANOVA

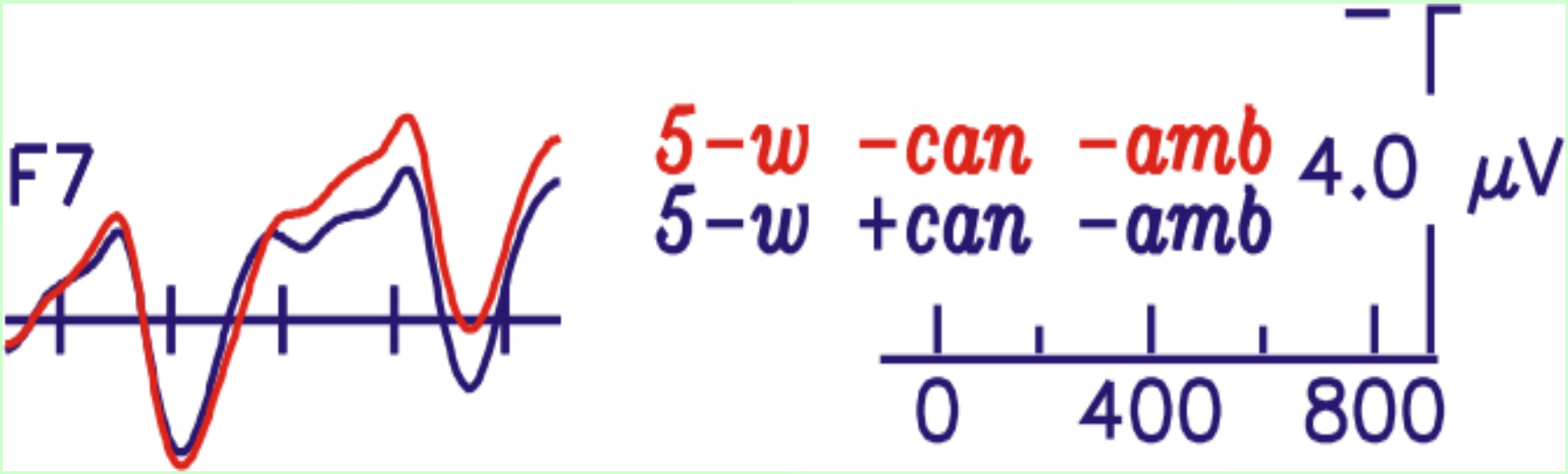
McCarthy-Wood Correction		1st Word 300-500ms		6th Word 700-900ms		7th Word 300-500ms		7th Word 700-900ms	
	DF	F =	*p*(HF)	F =	*p*(HF)	F =	*p*(HF)	F =	*p*(HF)
Parasag.									
ST	3, 69							7,83	0,001
ST x AP	12, 276			2,18	0,0131			3,75	0,0001
ST x H x AP									
Temporal									
ST	3, 69							11,07	0,0001
ST x AP	6, 138			3,63	0,0023	2,37	0,0329		
ST x H x AP	6, 138	2,34	0,0347						

Word 1 (first complement: subject vs. object)



Non-ambiguous conditions: *Left Anterior Negativity*	Ambiguous conditions: Nothing

Word 5 (second complement: Subject vs. Object)

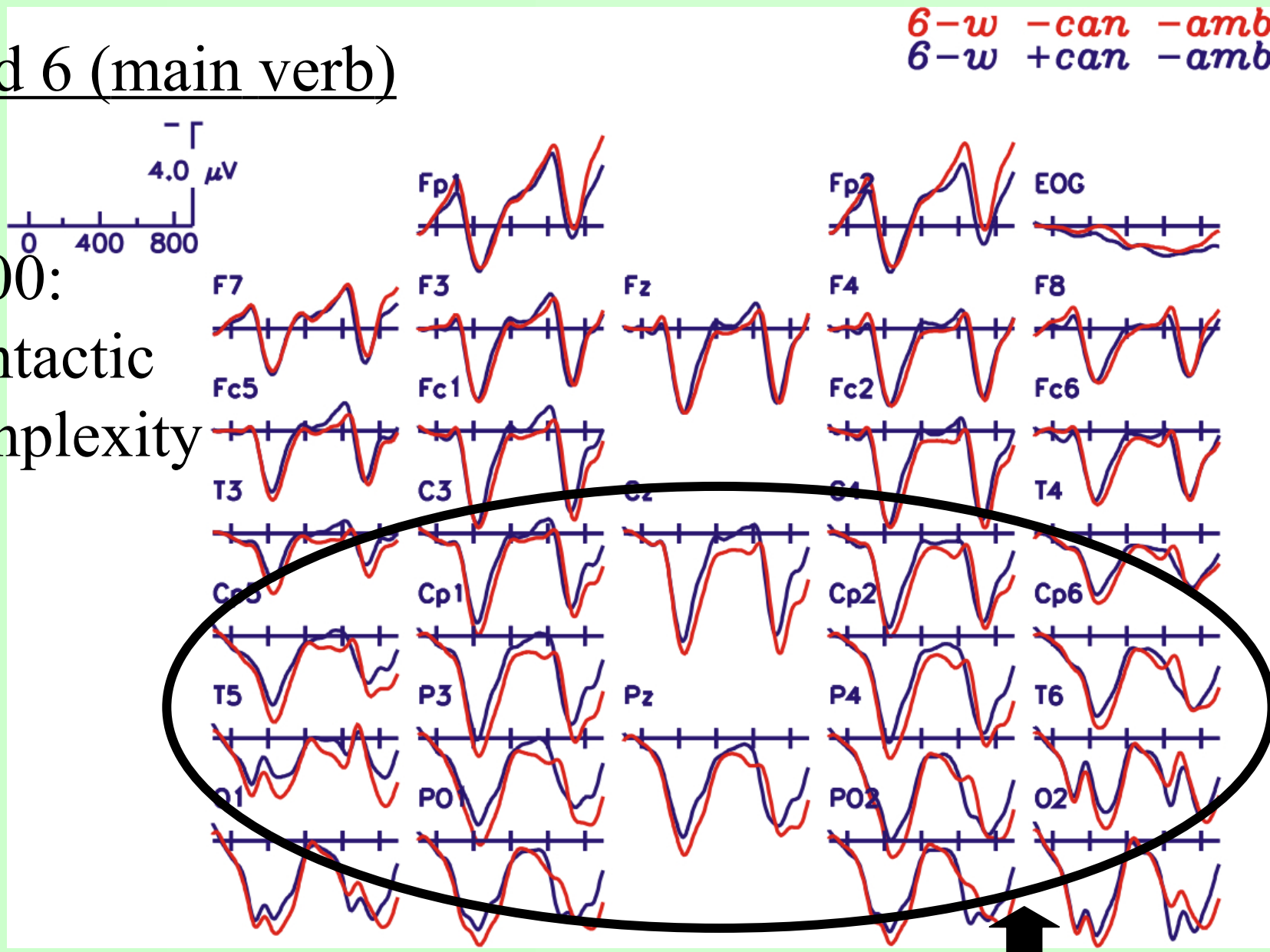


For non-anbiguous conditions: LAN

Nothing for ambiguous conditions

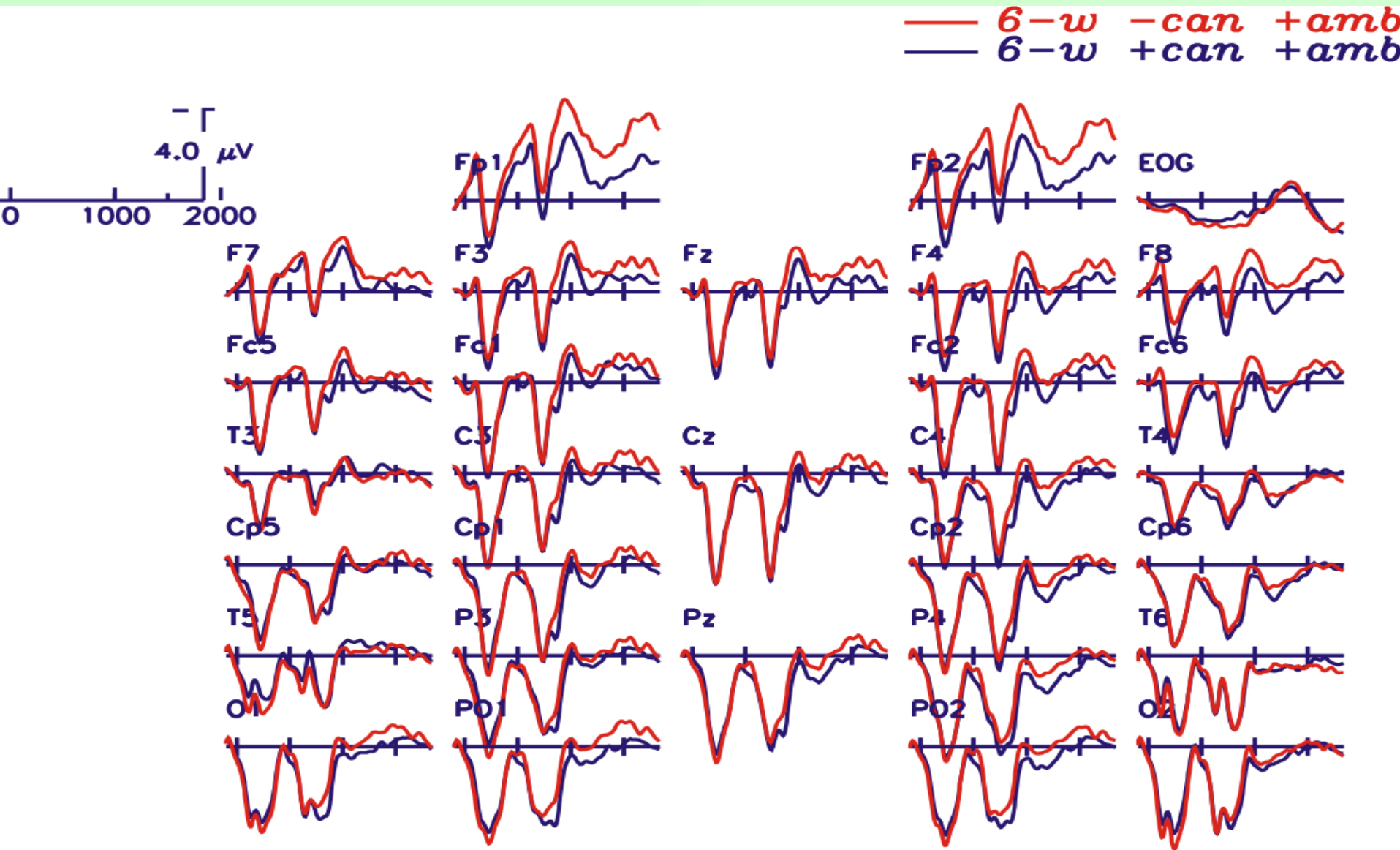
Word 6 (main verb)

P600: Syntactic Conplexity



P600

Disambiguation point (main verb + auxiliary)



Thank You
Moltes Gracies
Merci
Eskerrik Asko