ERP EVIDENCES OF SYNTACTIC CATEGORY FAST PROCESSING

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Is a word inherently linked to its syntactical category? If so, what about ambiguous words (as in $\text{dream}_{N/V}$), do they have a default category? Recent studies showed that adults recruit different brain areas when processing nouns and verbs: while regions close to the visual cortex are involved in object referent processing (i.e. nouns), pre-frontal regions next to the motor cortex are activated when decoding action referents (i.e. verbs), however there is no existing data on how adults process ambiguous words (Shapiro and Caramazza, 2003). The main goal of this study is to determine whether the syntactical features of words are accessed during on-line word recognition and to determine how ambiguous words impact the speech system processing.

We collected EEG measure while 13 Italian adults listen five CVCV words, four (all nouns or all verbs) precursors, preceded the test stimuli. This fifth test word could either match the category of its precursors (Same condition) or belonged to an unambiguous different category (Different condition) or be an ambiguous word that can be analyzed as a noun or a verb (Ambiguous condition, see table table 1). Previous work using this paradigm reported a Mismatch Negativity (MMN) – a component reflecting an automatic detection of perceptual change (Näätänen et al., 2012; Pulvermüller et al., 2008).

	Precursor1	Precursor2	Precursor3	Precursor4	Critical	Category
Context Noun	la bocca	la casa	la torta	la pancia	la mela →	Noun
					la vedi →	Verb
					la cura →	Ambiguous
Context Verb	la bagna	la stira	la varia	la guarda	la mela →	Noun
					la vedi →	Verb
					la cura →	Ambiguous

Table 1: TABLE CONDITION. *Tree different critical words were used by category. Each words composing the context were different and semi-randomly picked among 5 words (5 nouns and 5 verbs).*

Comparing the Different/Same conditions, we extracted a time/channels of interest presenting a central negative component elicited 200ms after the offset of the critical stimulus ($t(1,12)=3.61$ $p< 0.01$ see plot of this effect on figure 1 left). This cluster (in the 200-350ms time window and recorded by the central electrodes) was used in a variance analysis, with Context (noun/verb) and Condition (noun/verb/ambiguous) as within factors. This analysis revealed a significant Context x Condition interaction ($F(1,12)=5.557$ $p=0.01$, see figure 1 right).

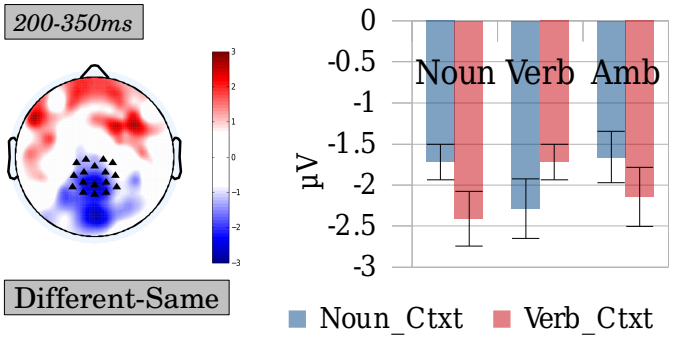

Figure 1: *Right part: Statistical maps of the significant differences for each electrode between the condition Different Vs Same during the 200-350ms time window. Left part: bar plot of the average data recorded for each context and for each category of critical stimulus.*

The category of the critical words was processed differently by adults depending on the context of presentation. Moreover, the ambiguous words tend to behave as nouns, presenting no modification of activity in the Noun-context but with a more negative activity when presented after verb. This should be confirmed with more subjects, but suggest that ambiguous words have a default noun category. Overall the latency of these effects show that the integration of a word goes along with the access to its category.

References

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