Mapping French Verbal Inflection from Event-Related Potentials: The Time-Course Processing



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Introduction

Word recognition and production is mediated by morphological processing. Verbs are decomposed in stem and inflectional suffixes for lexical access and morphosyntactic feature activation (Halle & Marantz, 1994). However, it is not clear if complex words are early or late decomposed and which units are represented in the mental lexicon.

jouait 'he played'

Questions

How complex words are represented in the mental lexicon?





Inflected words are early or late decomposed for word recognition?

Are there differences between present and past tenses? And between singular and plural agreements?

When discrete morphemes are processed?

Method

Investigate the morphological decomposition and the inflectional suffix time-course processing in present and past tenses, and in singular and plural agreements, based on RT, accuracy, and ERP.

Participants: 16 (8 males), mean age 23.44, right-hand, French as L1, BAC+1. **Procedure:** visual lexical decision task on French inflected verbs. **Stimuli:** 20 verbs per condition, 160 experimental stimuli. **Variables:** DV_1 :RT, DV_2 : ACC, DV_3 : ERPs; IV_1 : tense, IV_2 : agreement. **EEG:** 64 channels actiCAP; BrainSystems; mastoid REF; <5KΩ; SH: 1KHz.

Agreement/Tense Present

Past (Imp.)

2sg: Tu 'You _{sg} '	parle-s	parl-ai-s
3sg: Il 'He'	parle-ø	parl-ai-t
1pl: Nous 'We'	parl-ons	parl-i-ons
2pl: Vous 'You _{pl} '	parl-ez	parl-i-ez

Behavioral Results RT vs. Tense RT vs. Number 1400 1400 RT(ms) 1000 RT(ms) 1000 800 800 600 600 400 8 pres past sa Tense Number RT vs. Tense and Numbe Tense vs. Number Accuracy 800 prespast pres past

- **Tense:** Significant difference in N400; significant difference in P600
- **Agreement:** Small clusters significantly different
- Present tense have larger frontal negativity and larger right positivity
- Agreement seems to be reflected in early phase of P600

Discussion

All French verbs might be decomposed in stem and inflectional suffixes for lexical access (Estivalet; Meunier, 2015). Our results confirmed N400 differences between present and past tenses, but no ERP differences between singular and plural agreements. P600 might reflect later form reanalysis.

Suffix

Th



- **Tense:** Significant difference only in singular forms; **Agreement:** Significant difference only in present forms.
- Longer RTs in past tense than present tense; Longer RTs in singular agreement than plural agreement (Estivalet; Meunier, submitted).
- ACC results support and confirm the RT results.

Tense F(1,150) = 0.209, p = 0.648; Agreement F(1,150) = 12.641, p < 0.001; T x Agr F(1,150) = 18.319, p < 0.001.

Answers

- \checkmark Lexical knowledge is represented in the mental lexicon as atomic morpheme-based hierarchical structures.
- ✓ Complex words are early pre-lexically decomposed for lexical access and word recognition.
- \checkmark There are differences in tense, but not in agreement processing.
- ✓ Tense is early processed (N400) and agreement later verified (P600)

-e(-)	1			
-ai-		past		
-i-		past	pl	
-S			sg	1/(2)
-t			sg	3
-ons			pl	1
-ez			pl	2

PE

NB

Overall, our results suggest a full-decomposition model (Lavric; Elchlepp; & Rastle, 2012) where complex words are early decomposed in stem and inflectional suffixes, then the morphosyntactic features are activated, and later the word is recombined and verified (Halle & Marantz, 1994).

References

Estivalet, G. L.; & Meunier, F. E. (2015). Frontiers in Human Neuroscience, 9. Estivalet, G. L.; & Meunier, F. E. (submitted). Springer Plus. Halle, M.; & Marantz, A. (1994). MIT Working Papers in Linguistics, 21, 275–288. Lavric, A.; Elchlepp, H.; & Rastle, K. (2012). Journal of Experimental Psychology, 38(4), 811–816.