

Introduction

Key findings in morphological processing

Early stages:

1. Evidence for ‘automatic’ stripping of affixes regardless of overall meaning (Rastle et al., 2004):

- **CORNER** primes *corn*:
the suffix *-er* is stripped
- **BROTHER** does **not** prime *broth*:
-el is not recognised as a suffix

2. Evidence for ‘automatic’ stripping also seen for pseudowords regardless of combinatorial constraints (Longtin & Meunier, 2005 for French):

- ***RAPIDIFIER** primes *rapide*
- ***SPORTATION** primes *sport*

Later stages:

Morphological decomposition is more constrained in both real words and pseudowords.

1. In real words, the combination of stem and affix needs to be semantically transparent (cf. Marslen-Wilson et al., 1994):

- **GOVERNMENT** primes *govern*:
the suffix *-ment* contributes to the overall meaning
- **APARTMENT** does **not** prime *apart*:
-ment is not recognised as a suffix in *apartment*

2. Pseudowords need a viable stem-affix combination to be decomposed:

- ***RAPIDIFIER** primes *rapide (A)*:
-ifier attaches to adjectival bases and is stripped
- ***SPORTATION** does **not** prime *sport (N)*:
-ation does not attach to nouns and is not stripped

Crucially, the focus of this line of research has been mainly on single-affixed forms.

Recent findings, however, show additional support for the role of combinatorial constraints as internal levels of complexity affect processing in real words (Meinzer et al., 2009; Pliatsikas et al., 2014; Wheeldon et al., 2018).

Words with additional morphological layers (e.g. *eyeing*) lead to increased processing costs.

Pliatsikas et al. (2014):

-ing forms in English **require** a verbal base:

an eye (N) > *to eye (V)* > *eyeing*
to run (V) > *running*

Research Questions

1. To what extent are internal levels of complexity important during **pseudoword** processing?

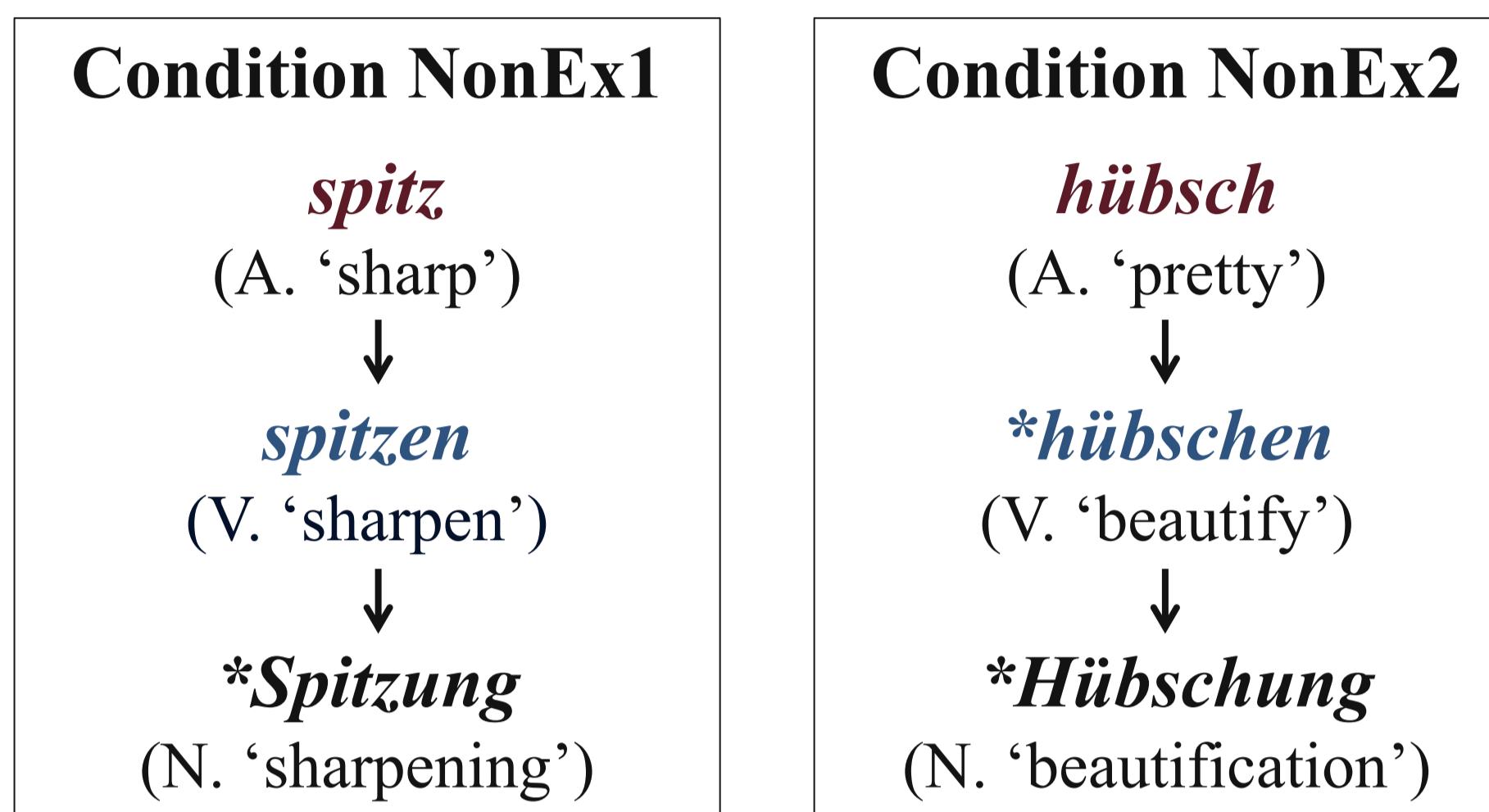
ADJECTIVE > **VERB** > ***NOUN**
ADJECTIVE > ***VERB** > ***NOUN**

2. Does the lexicality of the intermediate position in a sequence of derivations affect processing?

Experimental Design

Stimuli: Three sets of German pseudowords

- Two sets follow a sequence of derivational processes as in **ADJECTIVE > VERB > NOUN**
- The difference between these two sets lies in the lexical status of the verb in the intermediate position:



- The **Control condition** consists of a nonword that is composed of an illegal combination between stem and suffix:

e.g. **Steillein* based on the adjective *steil* (‘steep’) and the suffix *-lein* that requires a nominal, rather than an adjectival base

Participants:

- 21 right-handed native speakers of German
- No language impairments or neurological conditions

Task: Lexical-decision task with cross-modal priming

- Auditory prime (e.g. **Spitzung*) – visual target (e.g. *spitz*)
- 40 items per condition; all targets were also paired with an unrelated control
- ISI = 350 ms; display time = 750 ms

Results (1)

- No priming in the N400 window (350-550 ms after stimulus presentation) is observed in the **Control Condition** (e.g. **Steillein - steil*)
- Both **Condition NonEx1** and **Condition NonEx2** show priming of their embedded target word

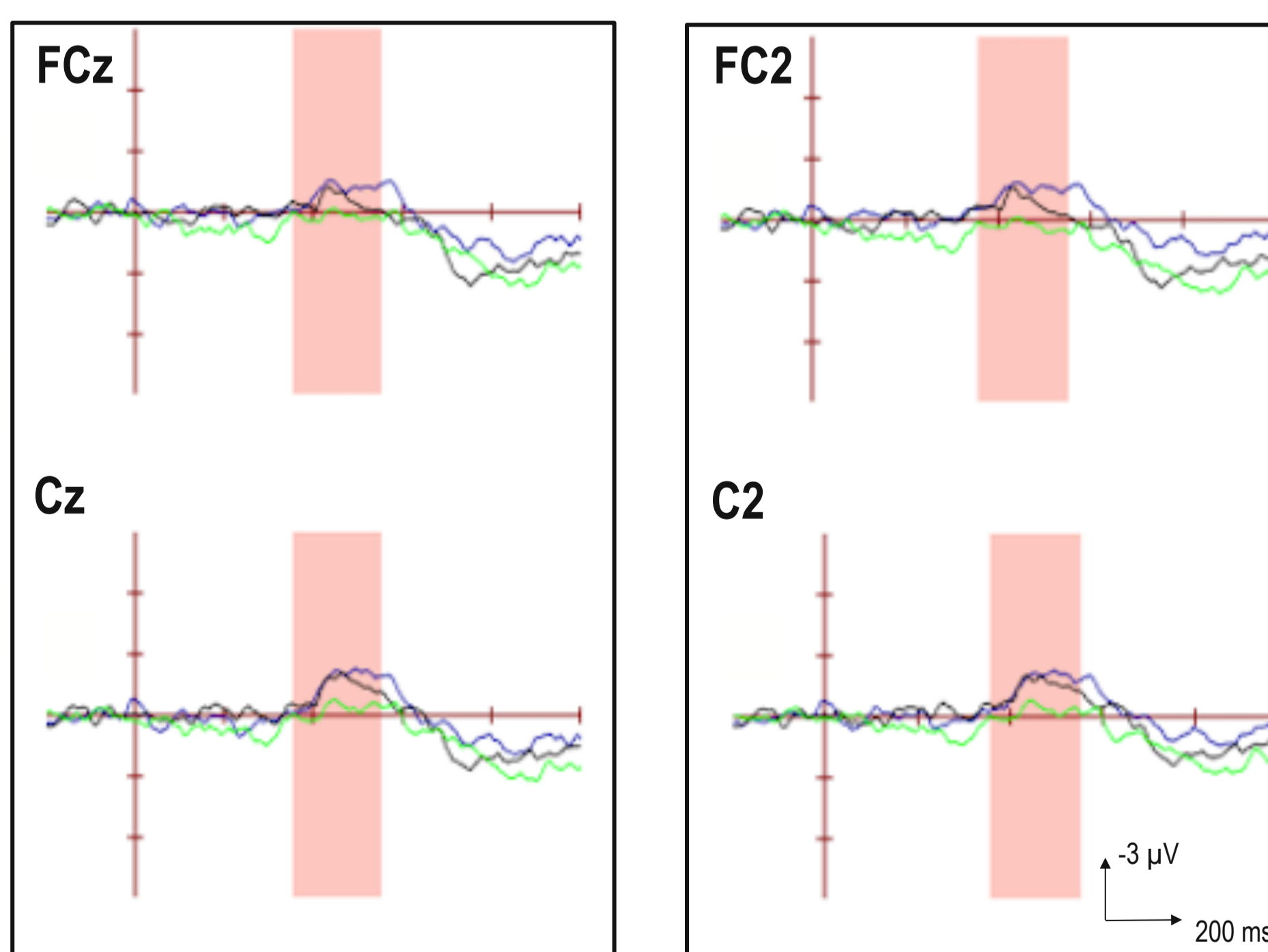


Figure 1 Difference waveforms for all nonword conditions **NonEx1**, **NonEx2** and **Control Condition**

- Priming in **Condition NonEx1** is significantly stronger than in **Condition NonEx2** (Est. = 0.24; SE = 0.08, $t = 3.06$, $p < .01$)

Results (2)

Direct comparison **Spitzung* vs. **Hübschung*

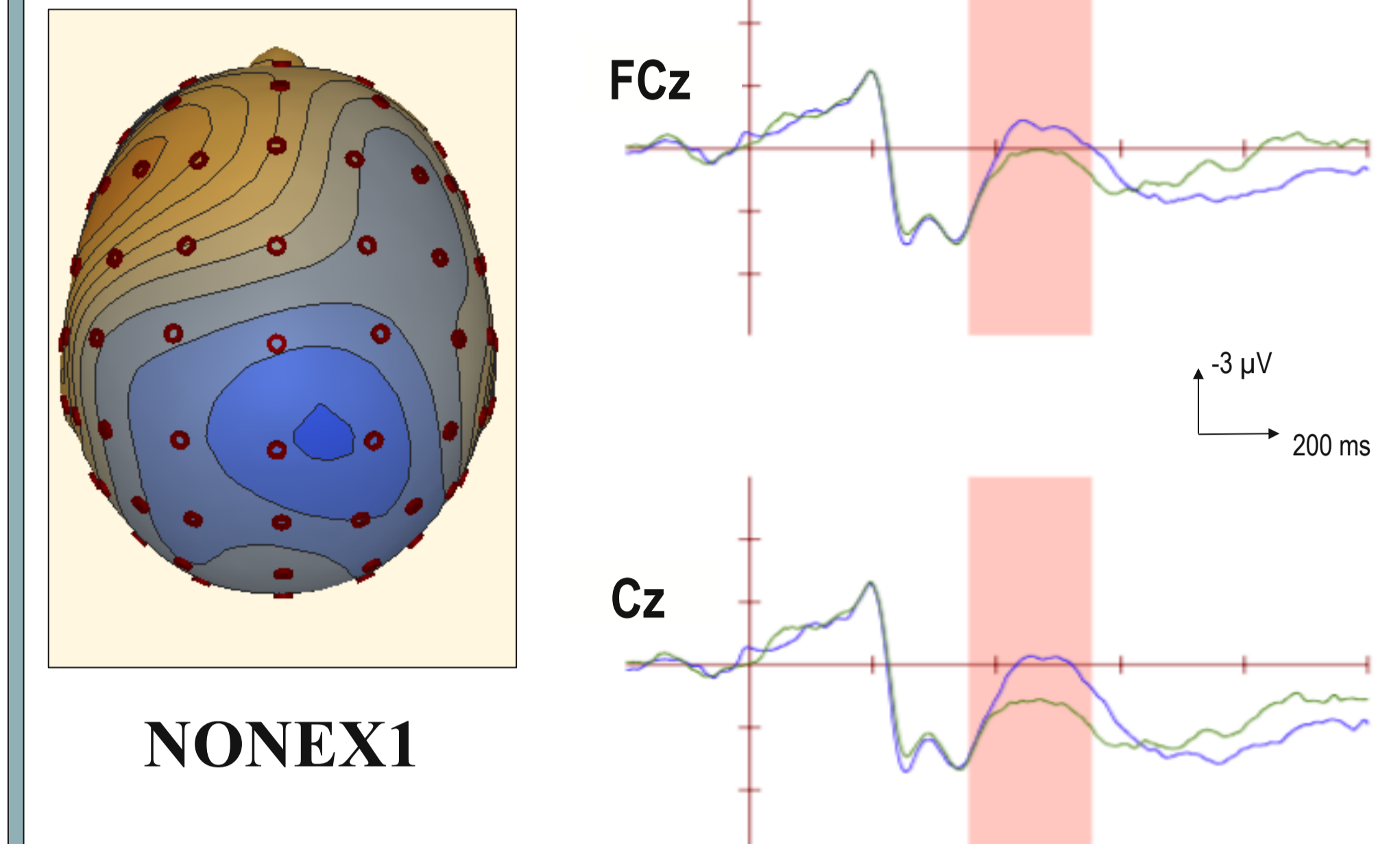


Figure 2 Waveforms following **Related** vs. **Unrelated** primes in **Condition NonEx1** (**Spitzung*)

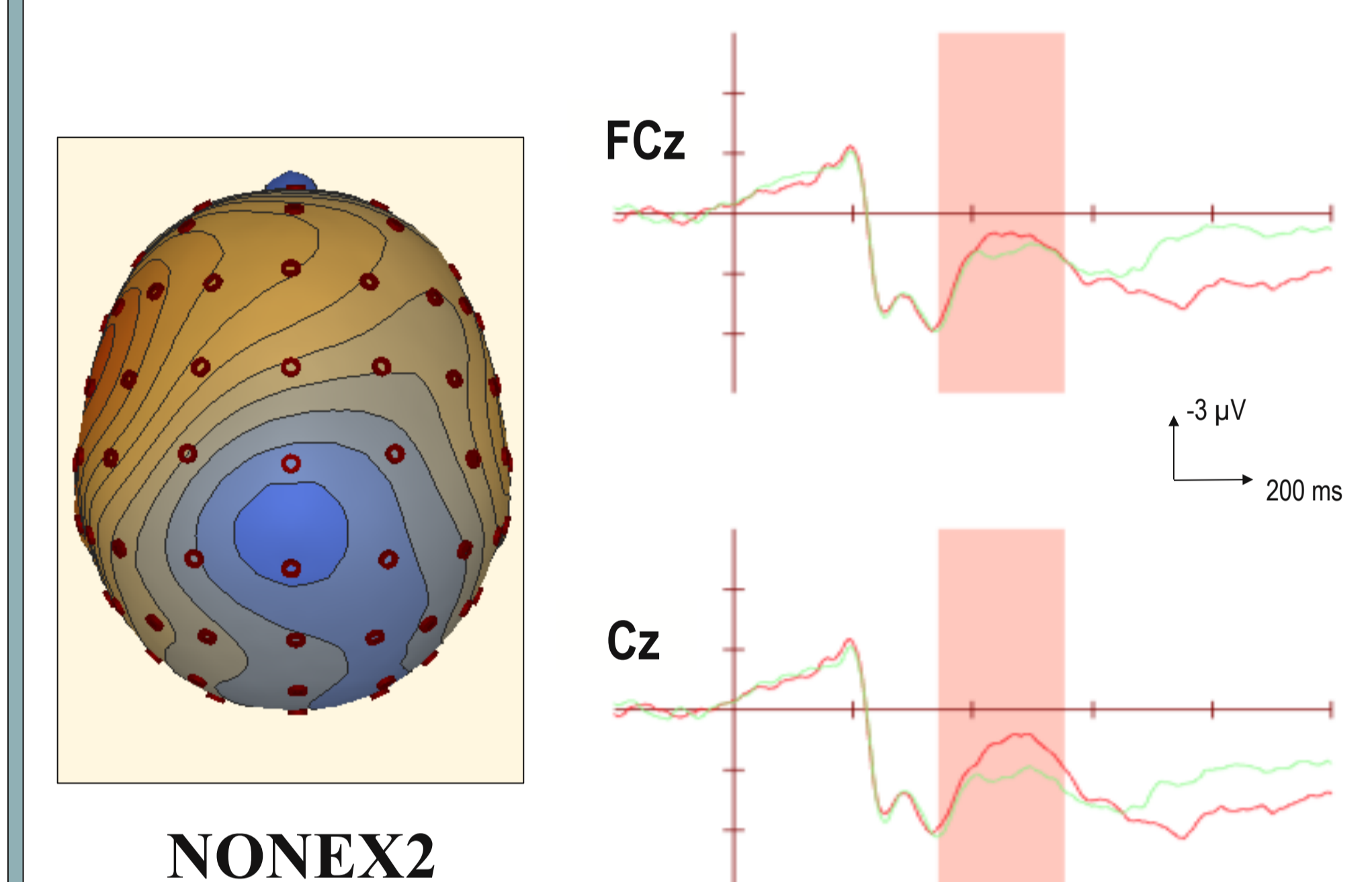


Figure 3 Waveforms following **Related** vs. **Unrelated** primes in **Condition NonEx2** (**Hübschung*)

Discussion

1. Both types of pseudowords **Spitzung* and **Hübschung* can be decomposed and lead to priming effects in the N400 window as they are semantically interpretable and grammatically well-formed.

2. Since no facilitation is observed in the **Control condition**, this suggests that morphological constraints on the composition of pseudowords modulate processing, i.e. only pseudowords that follow existing morphological rules of the language show priming effects.

3. In a direct comparison between **Condition NonEx1** and **Condition NonEx2**, we find significantly more facilitation in **Condition NonEx1**.

- The integration of complex pseudoword consists of more than the ‘stripping’ of the identical suffix.
- We see evidence for sensitivity to the internal structure of complex pseudowords.
- When presented with pseudowords, speakers identify differences in intermediate levels of structure.
- Intermediate derivational steps (in this case the availability of *spitzen* versus **hübschen*) are considered during processing.

Selected References

- Longtin, C. & Meunier, F. (2005). Morphological decomposition in early visual word processing. *Journal of Memory and Language*, 53(1), 26-41. Meinzer, M., Lahiri, A., Fleisch, T., Hannemann, T., & Eulitz, C. (2009). Opaque for the reader but transparent for the brain: Neural signatures of morphological complexity. *Neuropsychologia* 47, 1964-1971. Marslen-Wilson, W., Tyler, L., Waksler, R., & Older, L. (1994). Morphology and meaning in the English mental lexicon. *Psychological Review*, 101(1), 3-33. Meunier, F. & Longtin, C. (2007). Morphological decomposition and semantic integration in word processing. *Journal of Memory and Language*, 56(4), 457-471. Pliatsikas, C., Wheeldon, L., Lahiri, A., & Hansen, P.C. (2014). Processing of zero-derived words in English: An fMRI investigation. *Neuropsychologia*, 53, 47-53. Rastle, K., Davis, M. H., & New, B. (2004). The broth in my brother's brothel: Morpho-orthographic segmentation in visual word recognition. *Psychonomic Bulletin and Review*, 11, 1090-1098. Wheeldon, L., Schuster, S., Pliatsikas, C., Malpass, D., & Lahiri, A. (2018). Beyond decomposition: processing zero-derivations in English visual word recognition. *Cortex* (in press).

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