Wolf-hound vs. sled-dog: ERP evidence reveals that semantic constituent properties are accessed during compound recognition

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Background

Access to constituent properties during compound processing?

- Certainly morphological decomposition – monitored with intrinsic constituent properties [1, 8, 11, 12, 13, 17, 19, 26, 15, 16, 20, 23, 30…]
- Probably some amount of semantic decomposition – monitored with contextual semantic constituent properties (headedness, transparency) [3, 14, 21, 25, 31]
- **Animacy = intrinsic semantic property**! Lexical access for animates less costly than for inanimates; visible in RTs [7, 9], memory tasks [22, 29], picture and word recall and recognition tasks [5, 7 , BOLD response [2], **N400 amplitude** [24]

→ **Does constituent animacy influence the recognition of German noun-noun compounds** like *Schlitten.hund* ('sled dog')?

Method

- Lexical decision task with EEG measurements
- 39 participants (18-31 years, mean 23.2; 18 male).
- N400 amplitude (ROI-based, please ask for details)
- Separate analysis for simple (control) and compound (critical) conditions.

Discussion

Simple: Control experiment works, replicates literature [24]

Compound:

Both head and modifier animacy influence N400 amplitude

→ Access to modifier semantics

→ **Semantic decomposition**

Simple lexical decision task, no priming, only transparent words, only "simple" pseudowords

→ Semantic decomposition is automatic

Results look additive:

- Number of animate constituents ~ N400 amplitude.
- No interactions of head and modfier animacy – currently no evidence for a stronger influence of head / full-form than modifier animacy

Results fit models allowing early access to lexical and semantic constituent properties

- full-parsing models [18, 28]
- dual/multiple route models [4, 10, 16]

Stimuli

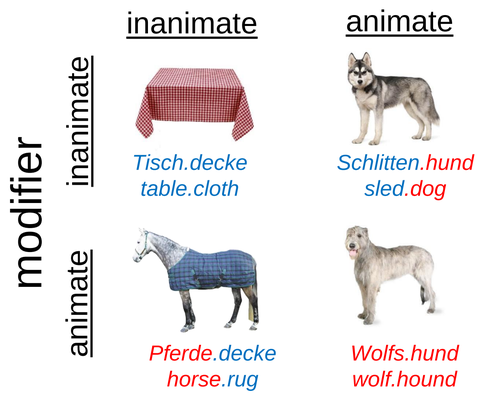
Critical: German compounds, 2x2-design

- modifier animacy (inanimate / animate)
- head animacy = full-form animacy (inanimate / animate)
  Important: German has no head-first compounds!

Control: Simple words, inanimate / animate

40 items / condition, equal number similar pseudowords

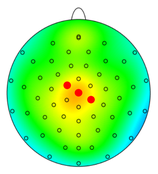
Matched for length, frequency, transparency, familiarity

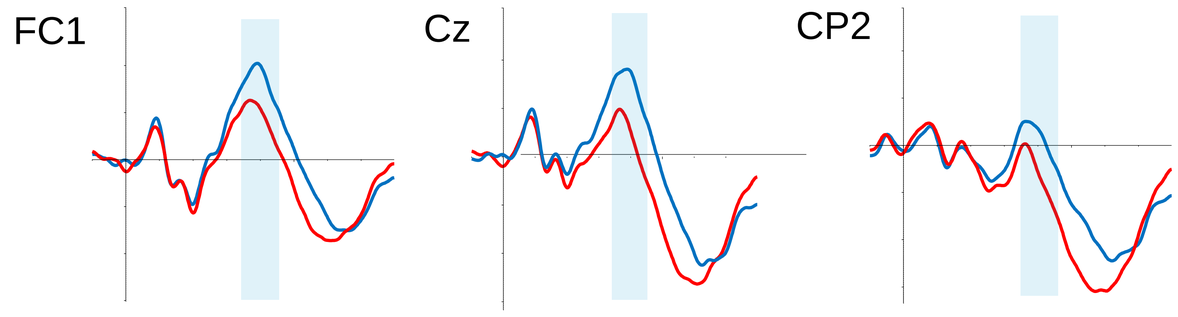


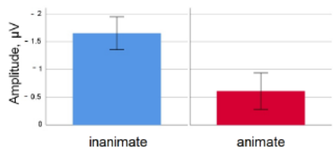
Results

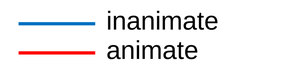
Simple words

350 ms - 450 ms


animate – inanimate



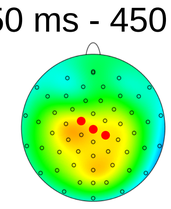


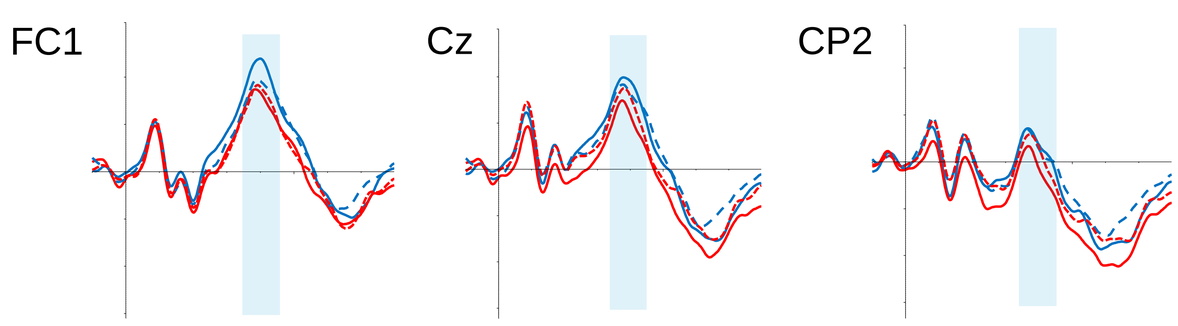


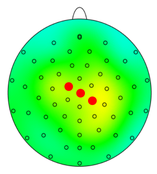
N400 amplitude is smaller for animates than for inanimates.
ANIMACY significant in medial-lateral regions medial-left ($p < .001$), midline ($p < .001$), medial-right ($p < .05$)).

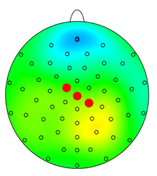
Compounds

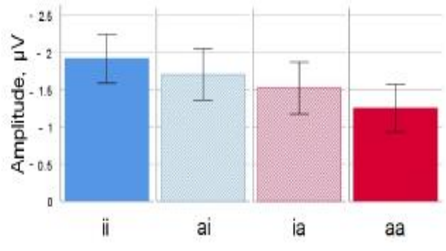
350 ms - 450 ms

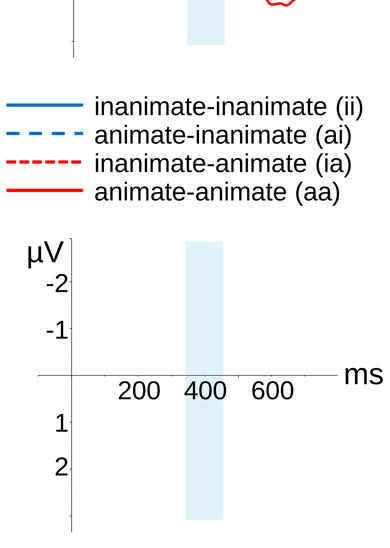

animate-animate-inanimate-inanimate




animate-animate-animate-inanimate


animate-animate-inanimate-animate





N400 amplitude: AA < IA ≈ AI < II

- sign. main effect HEAD ($F(1,38) = 11.20$, $p<.01$)
- MODIFIER sign. in medial ($p < .01$), posterior-medial ($p < .01$), and posterior ($p < .05$)).

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Poster download

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