

# LEXICAL PRE-ACTIVATION AND POST-LEXICAL INTEGRATION ACCOUNTS OF THE N400:

## WHEN SEMANTIC RELATIONAL PRIMING INTERACTS WITH WORDS' SYNTACTIC CATEGORIES

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Poster and references:



### WHAT MECHANISMS ELICIT THE N400 PRIMING EFFECT?

Many experiments found that context influences meaning retrieval in sentences but also in priming experiments.

McKoon & Ratcliff (1995) relational priming experiment showed that related word pairs of a given semantic relation (e.g., antonyms) showed **stronger priming effects when embedded in a list with other prime-target pairs of the same semantic relation** than in a list promoting a different relation (e.g., synonyms).

Steinhauer et al. (2017) showed that this effect was reflected by **an N400 with a later onset (>400ms)**

This effect would be compatible with:

#### PREDICTIVE PROCESSING

**Predicting the target would lead to orthographic and semantic pre-activations in long-term and working memory that would either facilitate target processing or need to be inhibited in case of prediction error.**

In line with Lau et al. (2013) who found N250 and N400 priming effects for lists with a high Relatedness Proportion (RP, 50% of related pairs) relative to lower RP levels (10%).

In Steinhauer et al. (2017), the short 250ms Stimulus Onset Asynchrony (SOA) may have led to delayed prediction-based priming effects.

#### POST-LEXICAL INTEGRATION

**The promoted semantic relation would be used in analogical reasoning in order to integrate the target with the preceding prime**

This integration processes would follow lexical retrieval and therefore have a late onset.

► In the current experiment, we:

- use a 450ms SOA, longer than Steinhauer et al. (2017)
- manipulate word's syntactic category in each list
- use the same words to create unrelated pairs

### RESEARCH QUESTIONS

- Does a longer SOA lead to consistency effects:
  - reflected by an N250 and an early N400 as predicted by the expectancy-based mechanism
  - a late N400 as predicted by post-lexical integration?
- Does words' syntactic category interact with the semantic relational priming?

### METHODOLOGY

The EEG of 40 right-handed native French speakers was recorded while participants **read**, and subsequently judged the relatedness of 720 prime-target pairs distributed in 9 different blocks of 80 French word pairs. The 9 combinations of promoted semantic relations and syntactic categories are displayed below.



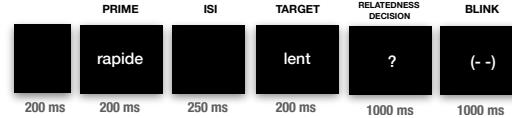
### CONCLUSION

**Semantically related pairs with a different semantic relation but the same syntactic category produce an early effect likely to reflect prediction error following pre-lexical expectation. This result supports the predictive processing approach (Lau et al., 2013).**

**An inconsistent syntactic category disrupts or delays predictive processes and only elicits late effects after 400ms.**

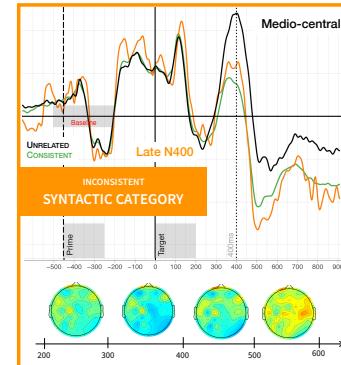
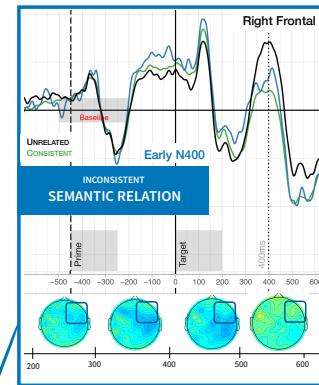
Same words were used to create all 3 conditions (across subjects). Presentation order was pseudo-randomized and counterbalanced across experimental lists.

#### ► Stimulus Onset Asynchrony (SOA): 450 ms



### EFFECTS OF SEMANTIC AND SYNTACTIC INCONSISTENCIES

Each word-pair list promotes a **specific semantic relation** and a **syntactic category** creating three types of inconsistent related pairs



- SEMANTIC INCONSISTENCY EFFECT**  
frontal ; starts at 250ms, until 450 ms
- SYNTACTIC INCONSISTENCY EFFECT**  
parietal ; starts just before 400 ms, until 450 ms , potential P600
- SYNTACTIC & SEMANTIC INCONSISTENCY**  
parietal ; starts just before 400 ms, until 450 ms
- Relatedness effect (Unrelated - Inconsistent)**  
observed as soon as 320 ms with a sustained negativity

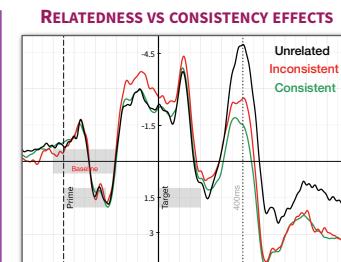
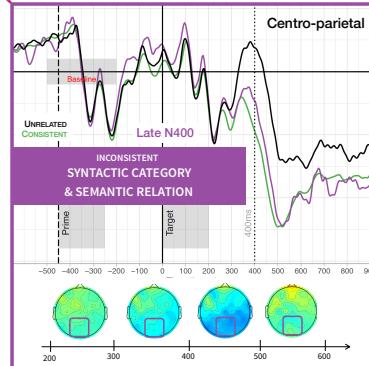
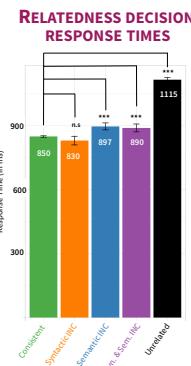


Illustration of an experimental block promoting adjectives antonyms →

strong
weak
thick
thin
public
private
heavy
light
far
remote
studious
lazy
early
late
loose
win
temporary
permanent
positive
negative
next
previous
salmon
fish
rich
poor
even
odd
happy
sad
thumb
port
young
old
full
empty
dirty
clean
fertile
sterile
new
used