Before and after—processing presuppositions in discourse

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Keeping track of real-world temporal sequence?

- Compared to after-initial clauses, before-initial clauses have been shown to elicit extra processing cost.
- A larger prolonged left frontal negativity on before-initial sentences, as early as 300ms after the onset of the connective (Münte, Schiltz and Kutas, 1998).
- The extra processing cost on “before” clauses is confirmed in fMRI studies (Zheng et al., 2012).

Behavioral studies have also observed the same asymmetry on young children (Natsopoulos and Abadzi, 1986; Troberg, 1982), and on patients with Parkinson’s (Natsopoulos et al, 1991).

It was thus hypothesized that while comprehending temporal clauses, people directly map the linear order of the temporal clause to the chronological order of the events in the real world. Before-initial clauses evoke additional computations because the events are presented in an order different from how they would be sequenced in the real world.

Keeping track of discourse presuppositions?

- Previous discussion, however, overlooked how different temporal connectives impose distinct conditions on discourse coherence.
- The eventualities introduced by temporal connectives are generally presupposed to have occurred. But before-clauses allow non-veridical events, whereas after-clauses do not (Heinämäki, 1974; Condoravdi, 2010; Krifka, 2010).

1) Before/After John won the Oscar, he bought a big house. 2) Before/After the bomb exploded, it was defused by the police.

In before-initial sentences, comprehenders are uncertain about how to interpret the subordinate event until they have information from the matrix clause.

In the current study, we compare “ad-hoc” and “real-world” events—the latter eliminated any uncertainty associates with the veridicality of the subordinate events.

- 80 ad-hoc before/after items (translated and modified from Zheng et al., 2012), 80 real-world before/after items.
- 80 when-clauses fillers (half ad-hoc, half real-world)
- 1/3 trials followed by a comprehension question
- 1-7 offline coherence ratings in the table above

Subject N=28; Clause 1: 0-3150ms; clause 2: 3150-6200ms
Time locked to the onset of the connectives (200ms baseline)
Analysis done on the average voltages over the time window between 1000-6250ms.

Ad-hoc events

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Real-world events

Between 1000-6200ms:
AP (anterior to posterior position) x Event type x Connective: F(2,54)=4.1, p=.05
No effect of Clause (clause 1 or clause 2), or Hemisphere

Conclusion:

- Events presented out of their chronological order do not necessarily evoke more processing cost.
- Comprehenders seem to closely track whether the presuppositions of temporal clauses are satisfied. This leads to working memory cost indexed by a prolonged negativity, most prominent in the central-frontal area.
- People with higher working memory capacity are more sensitive at keeping track of the semantic and discourse relations that hold between the two temporally related events.

Averages between 1000-6200ms for the central-frontal 19 channels

Correlations on the central-frontal channels, for the ad-hoc events. Y-axis indicates differences in averages between before and after conditions within the 1000-6200ms window. Participants with higher working memory (estimated by the R-span task), showed stronger negativity effect, replicating the same correlation in Münte, Schiltz and Kutas, 1998. No significant correlation was found for the real-world events (p=.2).

References:

[6] Natsopoulos, D., Abadzi, H., 1986. Understanding linguistic time sequences and the time memory (estimated by the R-span task), showed stronger negativity effect, replicating the same correlation in Münte, Schiltz and Kutas, 1998. No significant correlation was found for the real-world events (p=.2).