

Distinct neural processes engaged during temporal sequencing and coherence building during discourse processing

**Wonja M. Fairbrother¹, Martin Paczynski¹, Eric. C. Fields^{1,2}, Gina R. Kuperberg^{1,2};
¹Tufts University, ²Massachusetts General Hospital**

In the real world, causes always come before effects, while in communication, events can be described in either this canonical temporal order using causal connectors such as “and so”, or in non-canonical order using connectors like “because”. Using event-related potentials (ERPs), we determined whether the canonical sequencing of events influences the establishment of causal coherence, or vice versa, during online discourse processing. Two-clause cause/effect sentences were created, in which we fully crossed temporal sequencing of events with discourse coherence, yielding four experimental conditions (example set: Fred was hungry [and so/*because] he ate...; Fred ate [*and so/because] he was hungry...). 24 participants read these sentences, presented word-by-word (450ms, ISI: 100ms), and made acceptability judgments at the end of each sentence. At anterior electrode sites, ERPs to critical words (“ate/hungry”) in clauses appearing in non-canonical sequence evoked a larger negativity between 350-450ms than in clauses appearing in canonical temporal sequence. This effect was particularly marked in the causally incoherent scenarios. At centro-parietal sites, ERPs to critical words in incoherent clauses evoked a larger negativity between 350-450ms (an N400 effect) and a larger positivity between 500-800ms (a P600 effect) than in coherent clauses. Together, these results suggest that during discourse comprehension, establishing the temporal sequencing of events and establishing their causal coherence are driven by distinct but interactive neural mechanisms.

Topic Area: LANGUAGE: Syntax