SOLAB

# How the brain finds meaning in time

**Kara D. Federmeier**[1]

1. Department of Psychology and the Program in Neuroscience, University of Illinois Urbana-Champaign and Beckman Institute for Advanced Technologies

## Abstract

A central feature of human cognition is the ability to rapidly and effectively link incoming sensory information to knowledge stored in long-term memory. Work using temporally sensitive measures, such as event-related brain potentials (ERPs), has revealed the critical import of time and context for meaning processing. In particular, compelling evidence shows that language processing can be facilitated by expectations for semantic, lexical, and sensory features of likely upcoming words. This ability to actively use context information to predict features of likely upcoming words uses left hemisphere mechanisms shared with language production. However, we have also found that prediction and comprehension generally change throughout normal aging. Emerging data show that aging is associated with changes in how information accrues over time, how context shapes word processing, and how the brain responds to unexpected language events. In turn, these age-related changes affect how comprehension unfolds at the moment and what people later remember about what they have experienced and understood. Taken together, data from across the lifespan reveal that multiple language comprehension mechanisms are implemented in parallel and that the brain dynamically adapts its use of these mechanisms, both over the long-term, in response to changing neural and cognitive abilities with age, and over the short-term, in response to situational and task demands. These findings reveal the complex relations among sensory processing, attention, memory, and control systems that allow people to rapidly and fluidly understand one another across the lifespan.

**Keywords:** ERPs, Meaning processing, Language and memory, Normal aging

**Email:** Kfederme@illinois.edu

doi.org/10.30514/icss.25.0.20