

Event-related brain potentials in language

Matthias Schlesewsky (schlesel@mail.uni-marburg.de)

Research Group Neurolinguistics, Philipps University Marburg
Wilhelm-Roepke-Strasse 6A, 35032 Marburg, Germany

Ina D. Bornkessel (bornke@cbs.mpg.de)

Independent Junior Research Group Neurotypology,
Max Planck Institute for Human Cognitive and Brain Sciences
Stephanstrasse 1A, 04103 Leipzig, Germany

Description of the Tutorial

In the investigation of human cognitive abilities, language has always played a primordial role. With the advent of neurophysiological methods (such as electroencephalography, EEG, or functional magnetic resonance imaging, fMRI), which map the neural responses to cognitive stimuli with a high temporal and spatial resolution, respectively, this research has taken on a new dimension. This tutorial provides a state-of-the-art introduction to event-related brain potentials (ERPs; cf. Fig. 1) with a special focus on language and its different domains (e.g. lexicon or syntax).

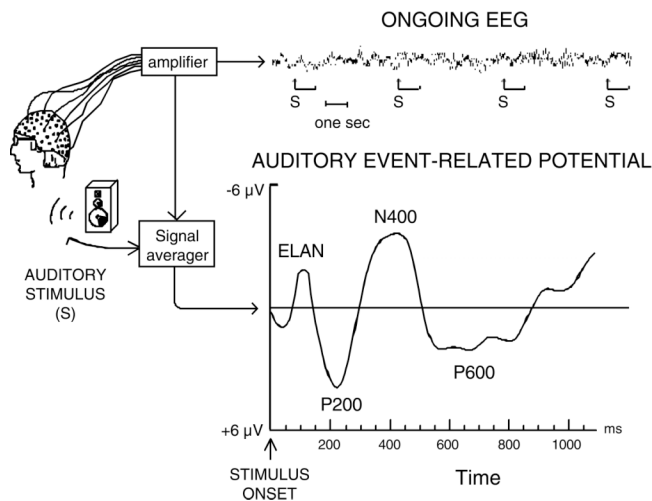


Figure 1: A schematic illustration of the ERP methodology.

The tutorial will begin with a brief introduction to the history of the ERP method and its basic premises, followed by a critical review of the physiological and functional nature of language-related components (e.g. left-anterior negativities, N400, P600) and the scope of their interpretation. This initial section will further include a discussion of the technical and experimental requirements for running ERP studies, including a practical demonstration.

In a second section, the ERP method will be compared and contrasted with other experimental techniques in cognitive science. On the one hand, we will focus on a comparison of ERPs and fMRI, in order to shed light on the

relation between temporal and spatial characteristics of neurocognitive processes. Furthermore, the relationship between ERPs and behavioural methods with a high temporal resolution (particularly speed-accuracy tradeoff, SAT) will be discussed.

Finally, language-related ERP components will be situated in the broader context of current neurocognitive models of language processing. Moreover, language-related ERP findings will be compared to neurophysiological responses observed with respect to other domains of higher cognition (e.g. music, arithmetic).

Intended Audience

The tutorial is aimed both at non-linguists with a general background in cognitive science and at linguists without a specialisation in neurolinguistics. It intends to demonstrate the capacity and scope of the method as a means of investigating language as an example of higher cognition. Basic knowledge in linguistics, psychology, computer science or biology will be helpful.

Suggested Readings

- Friederici, A. D. (2002). Towards a neural basis of auditory sentence processing. *Trends in Cognitive Sciences*, 6, 78-84.
- Rugg, M. D., & Coles, M. G. H. (Eds.) (1995). *Electrophysiology of Mind. Event-Related Brain Potentials and Cognition*. Oxford: Oxford University Press.
- Segalowitz, S. J., & Chevalier, H. (1998). Event-related potential (ERP) research in neurolinguistics: Part I. Techniques and Applications to Lexical Access. In B. Stemmer & H. A. Whitaker (Eds.), *Handbook of Neurolinguistics*. San Diego: Academic Press.
- Segalowitz, S. J., & Chevalier, H. (1998). Event-related potential (ERP) research in neurolinguistics: Part II. Language Processing and Acquisition. In B. Stemmer & H. A. Whitaker (Eds.), *Handbook of Neurolinguistics*. San Diego: Academic Press.