

## Investigating language comprehension mechanisms in the EEG laboratory

Lecturer: Paolo Canal

H: 30

Credits: 3

Semester: II

Compulsory course: C

Description:

Language comprehension is an extremely fast and efficient process that is achieved with almost no apparent effort, despite the variety of psychological mechanisms devoted to the analysis of the different levels of the linguistic input. The research carried out with the EEG technique greatly contributed to describing how comprehension arises from the rapid interplay of syntactic, lexical and pragmatic information that can be studied isolating specific “components” of the Event Related Potentials (ERP).

The aim of the course is to provide the students with a set of skills enabling them to intraprehend an EEG experiment. Specifically, the course will focus on a) a detailed description of the EEG/ERP methodology, b) a conceptual overview of the most studied ERP components in research on language comprehension (LAN, N400 and P600) and psychology (P300, MMN, CNV, LRP), c) a description of the principles and tools for analyzing EEG data, d) the description of the most frequently used experimental paradigms, and e) an overview of the EEG signal in the time-frequency domain. The examples used in the course will be taken from the literature on language processing.

### *Suggested Readings*

Coles, M. G., & Rugg, M. D. (1995). *Event-related brain potentials: An introduction*. Oxford University Press.

Friederici, A. D. (2011). The brain basis of language processing: from structure to function. *Physiological reviews*, 91(4), 1357-1392.

Kutas, M., & Federmeier, K. D. (2011). Thirty years and counting: finding meaning in the N400 component of the event-related brain potential (ERP). *Annual review of psychology*, 62, 621-647.

Hagoort, P., & van Berkum, J. (2007). Beyond the sentence given. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 362(1481), 801-811.

Lau, E. F., Phillips, C., & Poeppel, D. (2008). A cortical network for semantics:(de) constructing the N400. *Nature Reviews Neuroscience*, 9(12), 920.

Tanner, D. (2019). Robust neurocognitive individual differences in grammatical agreement processing: A latent variable approach. *Cortex*, 111, 210-237.

### Calendar

Week1 (3 April) 9.00- 11.00; 14 - 17	5 h	Introduction to the EEG/ERP technique
Week1 (5 April) 9.30- 12.30; 14 - 16	5 h	ERP components associated with language processing mechanisms (syntax, semantics and pragmatics)

Week2 (8 April) 9.30- 12.30; 14 - 16	5 h	ERP components associated with language processing mechanisms (syntax, semantics and pragmatics)
Week2 (9 April) 9.30- 12.30; 14 – 16	5 h	Signal processing (hands-on)
Week3 (15 April) 9.30- 12.30; 14 – 16	5 h	ERP derivation (hands-on)
Week4 (17 April) 9.30- 12.30; 14 – 16	5 h	Time-Frequency domain (hands-on)

Classroom 1-15