## FENS Forum 2010 - Amsterdam

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Poster board F12 - Wed 07/07/2010, 11:15 - Hall 1
Session 205 - Human cognition 5
Abstract n° 205.3
Publication ref.: *FENS Abstr., vol.5, 205.3, 2010*

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**Title**   Frequency-based segregation of syntactic and semantic unification?

**Text**   During language comprehension, word-level information has to be integrated (unified) into an overall message-level representation. Unification operations occur in parallel at the phonological, syntactic and semantic levels, and meta-analyses of fMRI studies shows that largely overlapping areas in left inferior frontal gyrus (LIFG) are activated during different unification operations. How does the brain functionally segregate these different operations?

Previously we established that semantic unification modulates oscillatory EEG activity in the gamma frequency range, and that syntactic unification modulates MEG in the beta range. We propose that there is functional segregation of syntactic and semantic unification in LIFG based on frequency-coding. We report a within-subjects replication of the previous findings.

Subjects read visually presented sentences that were either correct (COR), semantically incorrect (by replacing the nouns, verbs, adjectives of the COR sentences with semantically unrelated ones) or semantically and syntactically incorrect (by randomizing word order of the COR sentences). Time-frequency analysis of power was performed on EEG epochs corresponding to entire sentences.

The COR-GSEM and the COR-GSYN contrasts show larger power for the semantically correct sentences in a frequency range around 40 Hz. . The COR-GSYN and the GSEM-GSYN contrasts show larger power in the 13-18 Hz frequency range for the syntactically correct sentences.

In sum, during the comprehension of correct sentences, both low beta power (13-18 Hz) and gamma power (here around 40 Hz) increase. When a sentence is devoid of syntactic structure, the beta increase is absent, when there is no semantic structure the gamma increase is absent. Thus, our data are consistent with the notion of functional segregation through frequency-coding during unification operations.

**Theme**   F - Cognition and behaviour
Human cognition and behaviour - Language

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