

VIRTUAL-031 | STIMULUS-INDUCED CHANGES IN 1/F-LIKE ACTIVITY IN EEG

Mate Gyurkovics¹, Grace Clements², Kathy Low²,
Monica Fabiani², Gabriele Gratton²

¹University of Glasgow, ²University of Illinois, Urbana-Champaign

Descriptors: 1/f activity, frequency domain, event-related changes

Research into 1/f-like, non-oscillatory electrophysiological activity has been growing exponentially in recent years in cognitive neuroscience. The shape of this activity has been linked to the balance between excitatory and inhibitory neural circuits, which is thought to be important for information processing. However, to date, it is not known whether the presentation of a stimulus induces changes in the parameters of 1/f activity that are separable from the emergence of event-related potentials (ERPs). Here, we analyze event-related broadband changes in scalp-recorded EEG both before and after removing ERPs to demonstrate their confounding effect, and to establish whether there are genuine stimulus-induced changes in 1/f activity. Using data from a passive and an active auditory task ($n = 23$), we found that the shape of the pre- and post-event spectra differed significantly after removing the frequency-content of ERPs, and that this difference reduced significantly after accounting for a shift in 1/f activity. This 1/f change manifests as an increase in low and a decrease in high frequencies. Importantly, the magnitude of this rotational shift was related to the attentional demands of the task. The 1/f change is consistent with increased inhibition following the onset of a stimulus, and likely reflects a disruption of ongoing excitatory activity proportional to processing demands. Finally, these findings contradict the central assumption of baseline normalization strategies in time-frequency analyses, that background EEG activity is stationary across time.

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VIRTUAL-032 | NUMERICAL RATIO AND CONGRUENCE EFFECTS IN THE QUANTITY ESTIMATION: ERPS STUDY

Timofey Adamovich¹, Julia Marakshina², Yulia Kuzmina³, Marina Lobaskova²

¹Lomonosov Moscow State University, ²Psychological Institute of Russian Academy of Education, ³Higher School of Economics

Descriptors: number sense, numerical ratio effect, congruence

The aim of this study was to reveal the numerical ratio and congruence effects in the separate and intermixed formats of stimuli presentation in the non-symbolic comparison test “Blue-yellow dots” in adolescents ($N = 36$) that asked to evaluate which of the sets was larger. For each condition of the stimuli presentation the event-related potentials (ERPs) were recorded. The global field power (GFP) was calculated in P3, P7, CP5, O1 in the left hemisphere and in the symmetrical sites in the right one. The maximum amplitude and its latency in the ERPs in the range 280–600 ms were calculated. Main effects of the congruence, ratio, format, hemisphere and interactions between factors with a mixed ANOVA were evaluated. The analysis of the maximum amplitude revealed a main effect for the format of the presentation ($F[1576] = 11.69$, $p < .001$, $\eta^2p = .02$), hemisphere ($F[1576] = 5.01$, $p = .026$, $\eta^2p = .009$), interaction between congruence and ratio ($F[1576] = 5.28$, $p = .022$, $\eta^2p = .009$). Post-hoc analysis with Tukey's test revealed the increased maximum amplitude in the separate format ($t = -3.42$, $p < .001$, Cohen's $d = -0.281$) and in the right hemisphere ($t = -2.24$, $p = .026$, Cohen's $d = -0.184$), the decreased maximum amplitude for the difficult ratio in the incongruent condition ($t = 2.927$, $p = .019$, Cohen's $d = 0.3403$). The analysis of the latency revealed the significant interaction between congruence and ratio ($F[1576] = 5.6$, $p = .018$, $\eta^2p = .01$), however post-hoc analysis didn't find any significant differences. Results can be discussed in terms of the direct and indirect (visual) mechanisms of quantity estimation.

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VIRTUAL-033 | FEEDBACK NEGATIVITY AND FEEDBACK-RELATED P3 DURING THE MONETARY INCENTIVE DELAY TASK IN INDIVIDUALS AT HIGH AND LOW FAMILY RISK FOR DEPRESSION

Yifan Gao¹, Lidia Panier¹, Marc Gameroff^{1,2},
Randy Auerbach^{1,2}, Jonathan Posner^{1,2},
Myrna Weissman^{1,2}, Jürgen Kayser^{1,2}

¹New York State Psychiatric Institute, ²Columbia University

Descriptors: event-related potentials (ERPs), reward processing, depression risk

Blunted responses to reward feedback have been linked to major depression (MDD) and MDD risk. To explore the impact of family risk and lifetime history of MDD (+ vs –), we recorded 72-channel ERPs from 29 high and 32 low