

values of CSMRT1 measured in different persons. The RT is significantly larger (about 2.5 times) in the CSMRT1 measurements compared to the SSMRT1. This can be explained by the longer decision-making process required for the appropriate reaction.

Conclusions: On first and second-year healthy male medical students the parameters of mental chronometry are different. Worse parameters in first-year males during CSMRT1 measurements relate to the lousy adaptation to new environments that negatively affect their ability for performing the decision-making process appropriately and that are canceled during the second-year study period. In addition, first-year students showed more individual differences during the performances. Our results contribute to a better understanding of the psychophysiology of mental chronometry and help the discovery of the factors that affect the decision-making process.

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Does looking at a 360° video elicit stress-related psycho-physiological activation? A case in emergency professions

R. Cosoli^a, F. Amenduni^a, V. Candido^a, A. Cattaneo^a

^aSwiss Federal University for Vocational Education and Training (SFUVET), Lugano, Switzerland

Introduction: Rescuers are regularly involved in highly stressful contexts. Their vocational programmes should provide in-training opportunities to learn how to manage stressful situations. Educational technologies could support this objective, although their effectiveness in eliciting a psycho-physiological response similar to real-work needs to be verified. This study investigates this potentiality, comparing the psycho-physiological changes of apprentices watching a 360° video (360V) showing a road rescue simulation (indirect simulation, IS), to those elicited by performing a simulation (DS). The research question is: Does a 360V of a high-emotional-impact emergency simulation elicit similar psycho-physiological activation as when the simulation is experienced in real-world? The underlying hypothesis is that IS produces a comparable stress-related psycho-physiological activation to DS.

Methods: Nineteen in-training rescuers from a Swiss vocational school participated into two experimental conditions: a simulation of a road rescue (DS, N=12); watching a 360V of a road rescue (IS, N=7). Both conditions included three salivary cortisol detections (baseline, 20 and 50 minutes after the simulations) and a questionnaire (before and after the simulations), including the reduced Activation-Deactivation Adjective Check List (AD ACL) and the Rapid Stress Assessment scale (VRS).

Results: The average cortisol levels show the same decreasing pattern in the two conditions across time: participants are more activated before the simulation and then cortisol progressively decreases at T2 and T3. The delta of the cortisol values (T1-T2 and T1-T3) were calculated to control for differences participants' basal values. Mean values of $\Delta T1-T2$ do not differ between conditions (DS=2.25; IS=2.37). The mean values of $\Delta T1-T3$ (DS=4.17, IS=2.87) shows a more evident decrease in the DS condition: participants who watched the 360V are more activated than DS. In both cases, differences are not significant between conditions (Mann-Whitney test: T1-T2=40.0, $p=0.899$; T1-T3=38.0, $p=0.773$).

The AD ACL results show no statistically significant differences between the two conditions (Mann-Whitney test for activation: T1=25.0, $p=0.157$; T2=31.5, $p=0.389$ – for deactivation: T1=20.5, $p=0.073$; T2=41.5, $p=1.000$).

The total index of perceived stress of the VRS and the values of all its five subscales show non-significant differences between the two conditions in both T1 and T2 ($p>0.05$).

Conclusions: Viewing a 360V can be psycho-physiologically activating: differences in cortisol levels and self-assessment questionnaires on arousal and perceived stress were not statistically significant between DS and IS, confirming our hypothesis that there is a comparable psycho-physiological activation between DS and IS.

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The aperiodic slope of the MEG spectrum reflects an increase in inhibition, but only when measured in the high-frequency range

E. Orekhova^a, V. Manyukhina^{a,b}, A. Prokofyev^a, D. Goiaeva^a, T. Obukhova^a, T. Stroganova^a

^aMoscow State University for Psychology and Education, Moscow, Russian Federation

^bNational Research University Higher School of Economics, Moscow, Russian Federation

Introduction: The MEG/EEG power spectrum can be divided into periodic and aperiodic parts, with the latter following the 1/f power law. It is assumed that the 1/f slope reflects the ratio of neural excitation-to-inhibition (E/I ratio), which makes this parameter appealing for the study of the state/task-dependent changes in the E/I ratio and its putative imbalances in clinical populations.

The aperiodic slope can be estimated either in the high frequency range (>30Hz), where periodic activities are absent, or in a wide range after separating periodic and aperiodic activity. In the first case, the slope estimation is complicated by the presence of myogenic artifacts and instrumental noises. In the second – by the difficulties in separating periodic and aperiodic activity and detecting the 'knee' – a change of the slope coefficient. We compared the sensitivity of the aperiodic slopes estimated by these two methods to functional changes in the E/I ratio.

Methods: MEG was recorded in adults viewing high-contrast visual gratings moving at 1.2-3s at 1.2, 3.6 or 6.0°/s, followed by post-stimulus interval of 1.2s. It has been previously shown that such intense visual stimulation increases neural inhibition in the post-stimulus interval. We analyzed how the post-stimulus alpha-beta power, weighted alpha frequency and aperiodic slopes estimated in high (30-45Hz) or wide (2-40Hz) frequency ranges depended on the intensity of the preceding stimulation. In addition, 5 minutes of MEG was recorded at rest when subjects fixed their gaze on a cross.

Results: Post-stimulus periodic alpha-beta power and alpha frequency increased from low (1.2°/s) to high (6.0°/s) intensity condition, confirming a decrease in the E/I ratio with increasing intensity of the preceding stimulation. All effects were maximal in the visual cortex. The 1/f slope, estimated at 30-45Hz, became steeper with increasing intensity of the preceding stimulation ($p<0.001$), which also confirmed a decrease in the E/I ratio, whereas the slope estimated at 2-40Hz remained unchanged ($p>0.5$). Moreover, both in the poststimulus period and at rest, the slope estimated at 30-45Hz correlated with the power of the inhibition-based rhythms (alpha-beta), whereas no such correlation was observed for the slope estimated at 2-40Hz.

Conclusions: We conclude that the aperiodic spectral slope estimated in the high-frequency range reflects functional changes in the E/I ratio, whereas the slope measured in the broad frequency range may be insensitive to such changes. Our results call for caution when interpreting aperiodic slope estimated over a wide frequency range.

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