group of altruists in the low-frequency band immediately after the stimulus demonstration in parietal leads. Large desynchronization was observed in the SAT group while choosing interactive action type during the second experimental situation. The synchronization related to the same action was noticed in FAT group, which may be associated with a specific activity of the limbic system. It can be assumed that altruists more intensively evaluate the biological meaning of the stimulus.

Poster 4-89

THE FREQUENCY SPECTRUM OF P300 COMPONENTS IN LEFT- AND RIGHT-HANDERS

Tetiana V. Kachynska, Illya P. Kuznietsov, Ihor Y. Kotsan, & Ella I. Kolodich
Lessia Ukrainka Eastern European National University

Descriptors: ICA-components, P300, manual asymmetry

The study investigated specific spectral features of ERP components. We hypothesized that handedness effects characteristics of ERP components. 14 left-handed and 15 right-handed subjects participated in the study. ERPs were recorded with a standard P300 paradigm and ICA analysis was used to extract ERP components. Anatomical location, frequency spectrum and component waveform of dipoles were analyzed. The components that contributed to the generation of the P300 were analyzed. Both right- and left-handed subjects had three similar ICA components, and right-handers an additional ICA component in the right insula was part of the P300 generators. One of the dipoles in temporal lobe was located significantly more sinistral in left- compared to right-handers. A dipole in extrastriate cortical areas had high absolute alpha power in both groups, particularly in right-handers. The other dipoles, with similar locations in both groups, had higher delta-frequency power in right-handers and higher theta-, alpha- and beta-frequency power in left-handers. Hence, estimating spectral EEG characteristics is a valuable tool to distinguish ERP components. Moreover, the frequency spectrum of ERP components is sensitive to individual differences such as handedness.

Poster 4-90

ESTIMATING PHASE SYNCHRONY REORGANIZATION COEFFICIENTS IN ODD-BALL PARADIGM

Nataliia V. Ievpak, Illya P. Kuznietsov, Nataliia V. Kozachuk, & Olena R. Dmytrotsa
Lessia Ukrainka Eastern European National University

Descriptors: Phase difference, Odd-ball paradigm, EEG

The usage of EEG for estimating the level of interaction between different cortical regions is a promising approach in neuroscience and cognitive biology. However, the indices of EEG synchrony are sensitive to noise and thus usually have poor statistical quality. The estimation of the phase difference between EEG channels is considered to be one of the most informative methods to analyze the interaction between brain areas. In our study we evaluated three phase synchrony coefficients, which represent the ratio between mean phase difference in pre-stimulus and post-stimulus interval. Each coefficient represented the changes of phase difference relative to a pre-stimulus interval for different post-stimulus intervals (0–300 ms, 300–600 ms and 600–900 ms, respectively). The EEG was recorded from 10 healthy right-handed volunteers. A standard odd-ball paradigm was used for presenting stimuli. According to the coefficients values and their statistical features, phase synchrony reorganization as a response to target trials was apparent in 20–22 Hz frequency band during 600–900 ms of post-stimulus interval in the F4-O2 lead pair. We suppose, that this effect reflects the end of desynchronization in visual cortex. The same coefficient was sensitive to phase reorganization in P3-P4 interaction on 6 Hz frequency during presenting non-target trials. Therefore, we consider, that indices, which reflect the phase synchrony reorganization have statistical properties that are good enough for use in functional diagnostics and technical applications, such as brain-computer interfaces.

Poster 4-91

LONG-DISTANCE SYNCHRONIZATION OF OSCILLATORY EEG IN PHASES OF PURSUANCE OF VERBAL TASKS

Julia A. Boytsova, Sergey G. Danko, & Maruya L. Solovjeva
N.P. Bechtereva Institute of the Human Brain RAS

Descriptors: EEG, coherence, attention

This study aims to compare EEG coherence between different phases in a visually presented verbal problem solving paradigm. The phases were: rest with eyes opened, readiness to perceive and solve; actual perceptions of problem statements; actually solving the task. 44 healthy participants had undergone 19-channel monopolar EEG registration. Subject-averaged EEG coherence estimates were calculated for every condition and for different frequency ranges. Statistical analysis was performed using dispersion analysis ANOVA for within-subjects designs. The most dominant changes of EEG coherence were: multiple augmentations of coherence in beta2 and gamma ranges as a result of transition from a condition of operational rest in a ready state, multiple decreases of coherence in the theta and alpha1 ranges upon transition from a ready state to perception and multiple augmentations of coherence in the theta range related to the transition from perception to solution of the tasks. The obtained results show that features of systemic reorganization of activity of the cerebral cortex at various stages of integrative activity are reflected in multiple changes of EEG coherence specific to frequency ranges and directions of change. Our findings can be used to develop a taxonomy of behavioral conditions and their corresponding states of steady integrative attention on the basis of objective electrophysiological data.

Poster 4-92

LOCAL SYNCHRONIZATION OF OSCILLATORY EEG IN PHASES OF PURSUANCE OF VERBAL TASKS

Sergey G. Danko, Julia A. Boytsova, & Maruya L. Solovjeva
N.P. Bechtereva Institute of the Human Brain RAS

Descriptors: EEG, spectral power, attention

The goal of the present investigation was to compare EEG power across different frequency bands (delta, theta, alpha1, alpha2, beta1, beta2, gamma) between different types of goal-directed behavior such as readiness to perceive and solve visually presented verbal problems, actual perceptions of the problem and actual solutions of the task. 44 healthy examinees had undergone 19-channel monopolar EEG registration while performing the tasks or while in a state of rest with eyes opened. When the readiness phase was compared to the rest state power increases in beta2 and gamma bands could be observed all over the cortex. For the delta, theta, alpha1, alpha2 and beta1 bands the power increased mainly over pre-frontal and anterior temporal sites. A transition from readiness to perception resulted in an increase of EEG power in delta, theta bands all over the cortex as well as alpha1 increases over posterior locations. The transition from perception to problem-solving produced a variety of effects in all frequency ranges except gamma. Power increased for most locations in the delta range, also for the theta band over all, except of occipital, sensors, and alpha1 increased over frontal sites and decreased over posterior sites. Alpha2 decreased over central, parietal and occipital sites. Beta1 and beta2 significantly decreases were found over various sites. Therefore, the possibility to distinguish different types of mental behavior and accordingly different attentional mechanisms using quasi-stationary EEG power was revealed in this experiment.

Poster 4-93

SHORT-TERM MEDITATION IMPROVES WORKING MEMORY PERFORMANCE THROUGH CHANGING FRONTAL-PARIETAL NETWORK EFFICIENCY

Xiu Xin[1], Yuqin Deng[1], Xiaoqian Ding[1], & Yi-Yuan Tang[2]
[1]Dalian University of Technology, [2]Texas Tech University

Descriptors: working memory, frontal-parietal network

Previous studies have indicated that short-term Integrative Body-Mind Training (IBMT) improves attention and self-regulation ability. Since attention and working memory (WM) have a close relationship, we hypothesized that IBMT could improve WM performance compared to Relaxation Training (RT). Using a dual n-back experimental paradigm in healthy college students, behavioral results showed that the visual spatial n-back accuracy improved significantly after 1-week IBMT compared to the same amount of RT, but the audio n-back accuracy improved significantly in both groups. We further applied the resting state fMRI to investigate the brain mechanism underlying the improved WM. The resting state fMRI results indicated more frontal-parietal network involvement with increasing task difficulty and load (N-back from 3, 4 to 5) in RT group, however the IBMT group showed the opposite pattern. These results suggested that short-term IBMT enhances the WM performance through improving the integration of resources and efficiency of working memory associated network.

Funding: ONR.

Poster 4-94

SHORT-TERM RELAXATION TRAINING MODULATES THE RESTING STATE OF BRAIN CONNECTIVITY

Rongxiang Tang[1], Lixin Zhu[2], & Yi-Yuan Tang[2]
[1]University of Texas at Austin, [2]Texas Tech University

Descriptors: intervention, brain plasticity, resting state

Relaxation training is one of the effective behavioral therapies and self-regulation techniques. Many studies focused on the physiological effects of relaxation using the measurements of heart rate, respiration rate and amplitude, skin conductance response, etc. However, whether and how short-term relaxation training modulates the brain connectivity remains unclear. Using fMRI, we here investigated the neural modulation using 4-week of relaxation training in a population of 23 college students. Functional data were preprocessed and analyzed using Data Processing Assistant for Resting-State fMRI. Processing streamline includes slice timing, motion correction, spatial normalization and smoothing. For the functional connectivity analysis, a voxel-wise correlation method was performed using two seed ROIs: left and right Brodmann area 32 (part of anterior cingulate cortex associated with self-regulation), which were created using the Wake Forest University Pick