

(Miltner et al., 1997). The ERN appears to have a source in the anterior cingulate cortex (Debener et al., 2005) and is thought to either reflect a conflict monitoring (Botvinik et al., 2004) or a reinforcement learning system within medial-frontal cortex (Holroyd & Coles, 2002). While the ERN is a well studied ERP component, conflicting accounts suggest how the ERN should be measured and quantified. Here, we present the results of analyses of experimental and simulated ERN data that has been quantified using a variety of reported techniques: local and global maxima and minima, base to peak, and mean measures. We address the implications and reasoning behind using a difference wave approach to ERP waveform analysis with regard to the ERN (see Luck, 2005). Further, we take into account the issues of analyzing the ERN when stimulus frequency is a confounding factor (Holroyd & Krigolson, 2007). Finally, we take into account recent findings that suggest that the ERN actually is driven by changes in the correct trial waveforms (Holroyd et al., 2008), and the implications these findings have on analyzing the ERN component. In sum, our results suggest that the analysis of difference waveforms, using global maxima and minima, is the best technique for quantifying the ERN - a finding which hopefully will provide a basis for the adoption of a standard analysis approach for analyzing this ERP component.

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GLOBAL VS. LOCAL VISUAL RECOGNITION IN 7-8-YEAR-OLD CHILDREN: AN ERP STUDY

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Descriptors: *global/local visual recognition, ERP, children*

In order to study developmental changes of the brain organization of perception of compound visual stimuli we analyzed event-related potentials (ERP) and behavioral parameters in adults and 7–8-year-old children. Participants were asked to recognize a hierarchical letter while attending to either its global (GL) or local level (LL). The recognition level was prompted by a warning signal and varied in pseudo random order. The GL precedence effect, i.e. an increase in a small letter recognition time when this letter is a part of an incongruent stimulus was found only in adults. The main age-related ERP differences were found for anterior N2 component associated with cognitive control: in adults, the N2 amplitude for incongruent hierarchical stimuli was higher in the right frontal cortex during LL than GL recognition, whereas in children, it was higher in the left inferior frontal cortex during GL than LL recognition. The P1 amplitude related to the activation of early sensory processing was higher for LL than GL recognition in both groups, although with different topography: in adults, LL recognition accompanied by higher P1 amplitude in posterior associative zones of the right hemisphere, whereas in children, the same ERP differences were found in the left fronto-central regions. In general, GL vs. LL ERP differences were more pronounced in the right hemisphere in adults and in the left hemisphere in 7–8-year-old children. The results suggest long-lasting development of the brain mechanisms of GL visual recognition.

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THE RELATIONSHIP BETWEEN PUPIL SIZE AND ANTISACCADE PERFORMANCE

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Descriptors: *pupillometry, antisaccade task, cognitive control*

Modern eye trackers continuously record pupil size as well as gaze position. Previous research has shown that pupil size increases as a function of mental effort or cognitive load, although these concepts are poorly defined. The antisaccade task requires participants to inhibit the reflexive tendency to look at a sudden onset target and instead direct their gaze to its mirror image location. As such it provides a convenient tool with which to investigate the cognitive and neural systems that support goal-directed behavior. Using a large database of > 50,000 antisaccade trials we explored the relationship between pupil size at the start of each trial and standard antisaccade metrics including trial outcome (correct vs incorrect), primary saccade latency, amplitude and velocity. In order to avoid potential confounds, pupil size values were only included in the analysis if they occurred during a fixation within .5 degrees of the screen centre, and in trials without blinks. Data were analysed using a hierarchical linear models. Maximum pupil size was significantly larger during the fixation period of trials in which participants went on to make errors compared to trials in which a correct antisaccade was made. Importantly, maximum pupil size during the fixation period of trial N was more strongly related to the outcome of trial N-1. This result suggests that maximum pupil size on trial N may be a consequence of processes involved in error detection (conscious or not) and reflect trial-to-trial dependencies that have previously been documented during the antisaccade task.

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TIME COURSE OF ATTENTIONAL BIAS IN DEPRESSION WITH AND WITHOUT COMORBID ANXIETY

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Descriptors: *attentional bias, anxiety, depression*

Depression and anxiety are both characterized by cognitive biases, including attentional bias to unpleasant stimuli. Accounts differ on the timing of bias in depression, and comorbid anxiety may complicate findings. Nonpatients high in self-reported anhedonic depression and low in anxious apprehension and anxious arousal (pure depression), high in anxious apprehension, anxious arousal, and anhedonic depression (comorbid), or low in anxious apprehension, anxious arousal, and anhedonic depression (controls) completed an emotion-word Stroop task during ERP recording. Depressed individuals were predicted to show later preferential processing of unpleasant stimuli than individuals with comorbid anxiety. ERP results supported hypotheses. The anhedonic depression group showed later preferential processing of unpleasant stimuli in the absence of early effects. The comorbid and not the depressed group showed early preferential processing of unpleasant compared to pleasant stimuli in the absence of later effects. The control group showed no early effects in combination with later preferential processing of pleasant compared to unpleasant stimuli. These data reveal a distinct time course of attentional processing in depression with and without comorbid anxiety. Implications for treatment will be discussed.

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EEG CONTROL OF EMOTIONAL STATES INDUCED WITH ORAL READING

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Descriptors: *emotion induction, oscillatory eeg, gamma oscillations*

In our previous studies positive and negative human emotional states were induced with silent autobiographical recalls, scenic recalls and imagined situations (Danko et al., 2003a,b, 2004, 2005, 2007). The aim of the present study was to objectively evaluate emotions aroused directly in the process of oral reading in a special way used in actors' training. The main test tasks included reading aloud with the technique "self-regulative utterance" (TSU – the author L.V.Gratcheva): a text of neutral emotional-semantic dominant; b) personal texts - recollection with either a positive or a negative emotional-semantic dominant; c) literary texts with similar dominants. EEGs were recorded and processed to evaluate EEG power and coherence in frequency bands from delta to low gamma (30–40 Hz). EEG power and coherence in the states of TSU reading of emotiogenic texts differed with statistical significance from those in the state of TSU reading of a non-emotiogenic text. The differences are most explicit in the frequency ranges of gamma and beta2. States of reading of emotionally positive texts are characterized by an increase in the power in these ranges, as compared to emotionally negative texts. These differences are in many respects similar to the highly reliable and reproducible dynamics of EEG indices, when mentioned silent internal inductions of emotions (less muscle artifact prone) were used. The obtained results provide some confidence to consider the TSU as a way to modulation of mental, at least emotional, states of human subjects.

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FORMATION OF SYNDROME OF EMOTIONAL BURNOUT IN FIRST-YEAR STUDENTS STUDYING PSYCHOLOGY

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The aim of the study was to determine factors that are responsible for burnout development in first-year students. For the determination of stages of burnout we used the test "Syndrome of emotional burnout" (Boyko), adapted for students. 122 healthy volunteers (98 women and 24 men) – students aged 17 to 22 years participated in this study. The stage of anxiety tension was detected in 29 students, the stage of resistance – in 96 students, and formation of emotional deficit – in 41 students. Such personal factors as levels of neuroticism, trait anxiety, emotional response to the influence of environmental factors, and strengths of excitation, inhibition and mobility of nervous processes, were shown to determine the probability of formation and severity of burnout. EEG was registered over a period of 3 minutes during the rest state. The spectral power density (SPD) of all frequencies from 0.2 to 35 Hz was estimated. The Spearman rank test was carried out for the correlation analysis. It was shown that the intensity of the stage of anxiety tension in women varies inversely with SPD in b1-subband (O1), and in b2-subband (F7). The intensity of the resistance stage varies inversely with SPD in b1-subband (O1). The intensity