trial ERPs, from which N1 and the Late Positive Complex (LPC) were estimated at each trial in EOG-corrected data. Each response measure was analysed in a factorial design examining intensity and trial effects. The ECR, a simple heart rate deceleration, was unaffected by intensity or trials. Respiratory pause decreased over trials, but showed no intensity effect. SCR reflected stimulus intensity and showed significant decrement over trials. N1, with a midline centro-parietal distribution, showed a frontal increase with stimulus intensity, but no decrement over trials. The LPC, with a fronto-central distribution, showed a main effect of intensity with some evidence of a frontal decrement over trials. The topographic interactions in the N1 and LPC suggest that different subcomponents in these are differentially sensitive to stimulus intensity and novelty (N1 and LPC, respectively). These results are discussed in the context of Preliminary Process Theory, a sequential-processing model of the Orienting Reflex.

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EEG and cardiovascular correlates of working memory load and motivation

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Previous research has identified a number of EEG measures that are sensitive to computational effort in response to increased working memory load, e.g. frontal theta and suppression of alpha activity at parietal-occipital areas (Gevins et al, 1997). By contrast, very high levels of working memory load may cause computational effort to decline due to motivational factors, e.g. reduced likelihood of task success (Wright, 2008). Studies of motivational intensity have relied heavily on cardiovascular responses in order to index effort mobilisation, particularly systolic blood pressure. Frontal EEG asymmetry has been linked to motivational disposition towards approach and avoidance, but has not been investigated in connection with cognitive challenge or working memory load. The current paper is based on two studies that were conducted to investigate how both cognitive and motivational measures of psychophysiology responded to working memory load and the presence of financial reward. Participants in the first study ($N=20$) were required to perform the n-back working memory task under three conditions: low load (1-back), high (3-back), and excessive (6-back). EEG, systolic blood pressure (SBP), and subjective self-report data were collected. The results revealed a linear increase of frontal theta activity in response to working memory load in combination with a decline of approach motivation as referenced by frontal EEG asymmetry (at fronto-central sites). The second study contained two independent variables: low/high/excessive working memory load (as in the previous study) in combination with a condition where financial reward was available that were contingent on performance. The goal of this study was to simultaneously manipulate cognitive demand and extrinsic motivation. Twenty participants took part in the study and the same dependent variables were measured. The results of the second study revealed a quadratic trend for frontal theta, i.e. theta increased from low to high load, but declined when load became excessive. This pattern of response was mirrored by changes in systolic blood pressure and upper- and lower-band of alpha activity, i.e. suppression of alpha reached a maximum level during high load. In addition, suppression of lower-alpha band was enhanced during the presence of financial reward, but only for low working memory load. The frontal asymmetry data indicated an increase of relative left activation (approach motivation) in response to financial reward, but only during high load condition. The implications of both studies for psychophysiological measurement of cognitive effort and motivation are discussed.

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Psychophysiologic mechanisms of formation of arterial hypertension in children and adolescents

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Insufficient information is known about the role of psychophysiologic factors in the formation of psychosomatic disorders in children and adolescents with essential arterial hypertension (EAH) with regards to the pathogenesis of the disease. In our study, we sought to research the contribution of certain brain structures to the formation of psychosomatic disorders in ontogenesis of children and adolescents with EAH.

We examined 344 children ages 8–15 years with EAH. We studied autonomic status, reactivity of the cardiovascular system by variation rhythmography, electrobiological activity of the brain, and specific features of the development of local brain structures.

Results. Formation of brain activity in children and adolescents with EAH proceeded against a backdrop of insufficient stable functioning in deep (diencephalic) parts of the brain and with retardation in maturation of mediobasal structures of the frontal region of the head. Combined, these factors formed a single pathologic system that determined all subsequent development. These changes were accompanied by a predominance of vagal influence in combination with an excessive increase in heart rate in orthostatic challenge, which were indicative of tension in adaptive compensatory mechanisms. In addition, in children and adolescents with EAH, there were marked difficulties in formation of interhemispheric asymmetry and interhemispheric interrelations. The existing changes on that level have mainly nonspecific characteristics and do not allow for predictions on specific psychosomatic syndromes or the existence of future psychosomatic disorders. But at this stage, changed psychosomatic responses appear and a predisposition to somatic responses as an answer to unfavorable effects can be noted.

Changes in the emotional sphere of children with EAH were accompanied by an increase in anxiety in combination with emotional lability and predisposition to immaturity of emotional response. The distinctive feature in these children, as compared with the control group, was an increased predisposition to depression that arose as a response to different loads. Difficulties in formation of cognitive processes were connected with variations of activity and signs of depletion of psychological activity.

Conclusion. Against a background of the development of emotional and cognitive changes, in combination with changes in functional brain systems and autonomic homeostasis, we observed the first psychosomatic symptoms that more definitely indicate the way of psychosomatic development.

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Relationships between heart rate variability and attention instructions on golf putting performance: A pilot study

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This study investigated alterations in heart rate variability (HRV) and varying conditions of attention during athletic motor perfor-