

Poster Session Abstracts

Poster 1

RESPONSES TO SEARCH-AND-RESCUE ROBOTS IN A SIMULATED DISASTER ENVIRONMENT: THE INFLUENCE OF ROBOT BEHAVIOR

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Descriptors: stress, robotics

Robots are commonly used for victim location and management in urban search and rescue (US&R). It can take 4 – 10 hours to extricate trapped victims. Robots might serve as surrogates for rescue staff, staying with victims until human help arrives. Research shows that US&R robots are operated to maximize assessment, using fast, erratic, and potentially stress-inducing robot movement. We hypothesized that robot behavior influences victims’ responses; slow/fluid robot movement may be perceived as more calming than fast/erratic movement, and participants’ physiological responses should correspond. Participants were recruited from the university area (N = 128, aged 18 – 62 years, 62% female). Participants interacted with two US&R robots in counterbalanced order and were randomly assigned to a robot movement condition: fast/erratic or slow/fluid. Supine participants engaged in resting baselines and two robot interactions in a simulated disaster environment. We measured participants’ heart rate (HR), respiration, skin conductance level (SCL), and self-reported valence and arousal. Fluid robots elicited more positive and calm self-reports. F(1, 121) = 5.02, p < .05, than erratic robots, F(1, 121) = 5.98, p < .05. Participants’ HR decreased in response to the slow robot but increased in response to the erratic robot, F(1, 111) = 5.02, p < .05. A robot type by operating mode interaction emerged for SCL, F(1, 122) = 5.02, p < .05. Respiratory sinus arrhythmia (RSA) processing is ongoing. Findings illustrate the importance of movement in determining responses to non-anthropomorphic robots.

Poster 2

THE FEEDBACK-RELATED NEGATIVITY AND FRONTAL MIDLINE THETA DURING GAMBLING IN EXTREME BIS/BAS GROUPS

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Descriptors: BIS/BAS, theta power, feedback related negativity

The present study tested whether subjects showing high vs. low punishment sensitivity (behavioral inhibition system, BIS), or high vs. low trait-anxiety would show increased processing of negative feedback. In contrast, high vs. low reward sensitivity (behavioral activation system, BAS) would correlate with increased processing of positive feedback. Processing of negative feedback during gambling evokes frontal midline theta activity (Fm theta) and the feedback-related negativity (FRN). Sixty female undergraduate students, prescreened on the basis of extreme BIS and BAS scores, were separated into four different groups (low BIS/low BAS, high BIS/low BAS, low BIS/high BAS and high BIS/high BAS; n = 15 each) and participated in a gambling task during which Fm theta activity and FRN were recorded. A highly sensitive BIS, high trait-anxiety and high inattention were associated with decreased Fm theta activity during the processing of losses in the gambling task. A highly sensitive BAS and high inattention were both further associated with a larger difference between evoked Fm theta activity following losses compared to gains. Finally, there was a significant BIS x BAS interaction effect. FRN was small for subjects with high BIS/low BAS, compared to the other three BIS/BAS groups. Thus, anxious, inattentive and punishment-sensitive (especially when also reward-insensitive) individuals all showed indications of a lack of adequate and effortful processing of negative feedback.

Poster 3

PSYCHOPHYSIOLOGY OF FEAR OFFSET

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Descriptors: startle, fear

The psychophysiology of fear is relatively well studied. However, few studies have explored reductions in fear that occur when a threatening period ends. In this study, we aimed to investigate the psychophysiological correlates of threat offset. An instructed threat paradigm was used to induce fear in 25 participants. The auditory startle response was probed during and following alternating periods of shock threat and safety. Results show a fear induced potentiation of the startle response during the threat cue. This response was positively correlated to trait anxiety (r = .50, p < .05). Startle potentiation disappeared within 1 – 3 s after threat offset, and showed no further decline. Potentiation of the startle response after threat offset and the decline in startle potentiation were not related to trait anxiety. These results indicate that, regardless of individual differences in fear, subjects were able to fully down-regulate their fear almost immediately after threat cues disappeared.

Poster 4

THE DOPAMINE TRANSPORTER GENOTYPE AND PUNISHMENT/ REWARD SENSITIVITY PREDICT ANXIETY IN A SAMPLE OF HEALTHY FEMALE STUDENTS

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Descriptors: dopamine transporter, anxiety, punishment sensitivity

This study aimed to investigate the role of the dopamine transporter 3’SLTR VNTR genotype (DAT) in anxiety, punishment/reward sensitivity and neurophysiology. Healthy female students (N = 58) provided DNA by buccal swabs, filled in an anxiety (STAI) and feedback sensitivity (BIS/BAS) questionnaires and completed EEG-measurements that included a gambling task measuring a feedback related negativity (FRN). Carriers of the 10/10 DAT genotype, which indicates a relatively active DAT resulting in low brain dopamine (DA) levels, showed more anxiety, made less risky choices during gambling and showed a smaller FRN than carriers of the 9/10 genotype (a relatively inactive DAT resulting in high brain DA levels). High DA activity and/or low DA levels hence were related to anxiety and risk avoidance, suggesting the 10/10 DAT genotype as risk factor for anxiety. High punishment sensitivity and low reward sensitivity, which both were linked to higher anxiety levels, showed further significant interactions with the DAT. Even though high punishment sensitivity was related to anxiety (r = .60, p < .01), this link could not be observed in the 9/10 DAT group. This suggests that the 9/10 genotype of the DAT might be a resilience factor for anxiety, even in individuals who are at risk for anxiety due to high punishment sensitivity. In conclusion, the 10/10 and 9/10 genotypes of the DAT were introduced as risk and resilience factors in anxiety, especially when interacting with punishment sensitivity.

Poster 5

ELECTROPHYSIOLOGICAL EVIDENCE FOR RAPID PREFERENTIAL PROCESSING OF ELECTROSHOCK CONDITIONED FACES

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Descriptors: affective processing, aversive face conditioning, EEG

Prior electrophysiological research revealed preferential neural processing of aversively conditioned faces in the EPN (120 – 300 ms) and LPP (> 300 ms) time range. In a recent MEG study, we found amplified processing of 104 olfactory conditioned faces in prefrontal and secondary visual cortex regions starting already around 50 ms, indicating affective evaluation via fast thalamo-amygdala connections (‘low road’). Using shock-conditioning of 8 neutral faces (4 CS+), we explored rapid affective evaluation.

Poster 6

FREE WILL: A QUESTION OF PERSONALITY? AN INVESTIGATION OF LATERALIZED READINESS POTENTIALS IN EEG

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Descriptors: LRP, free will, personality

Previous research initiated by Benjamin Libet suggests that human volition and decision are determined. However, the studies conducted have been questioned for several reasons such as strong interindividual differences in the onset of preparatory neural motor activity or the personal relevance of the decisions to be made. The present study investigates the chronology of neural motor activity as indicated by lateralized readiness potentials (LRPs) and subjective moment of decision making as a function of (a) personal relevance of the decision and (b) personality differences. Specifically, we used a modification of Libet’s paradigm that includes the presentation of a rotating clock hand. Twenty participants were asked to decide by key press whether attributes presented in the center of the clock described themselves or not. Afterwards, they reported the position of the clock hand. In general, data from previous studies could be replicated. In addition, however, we found substantial moderating effects of personal relevance of the decisions and personality differences. The findings are discussed with respect to an integrative model of physical determinism and the psychological impression of freedom and self-determination (Kuhl, 2008).

Poster 7

POST-EVENT PROCESSING IN MUSICAL PERFORMANCE ANXIETY

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Descriptors: musical performance anxiety, heart rate, post-event processing

Negative rumination contributes to the maintenance of social anxiety. Although musical performance anxiety (MPA) and social anxiety are closely related, little
EFFECTS OF SIMULATED MICROGRAVITY ON HUMAN EMOTION PROCESSING AND STARLITE REFLEX MODULATION

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Descriptors: emotion, simulated microgravity, starlite reflex

The aim of the present study was to investigate the influences of simulated microgravity on psychophysiological responses to emotional pictures. For this purpose, we selected a sample of 22 male subjects with characteristics similar to those of an astronaut. A group of 11 males submitted to simulated microgravity (BR; 4 hours head-down bed rest) were compared with a matched group of 11 sitting controls. The experimental session consisted of passive viewing of 75 affective pictures, divided in three emotional categories: pleasant, neutral and unpleasant. Slides were randomly presented for 6 seconds. During picture viewing, starlite reflex, pre-pulse inhibition (PPI), and evoked potentials from three scalp sites (Pz, F7, and F8) were recorded. Results showed an impaired starlite reflex habituation in BR subjects compared to controls. The PPI task, which reflects orienting of attention towards primary stimulus, showed in BR a reduced elaboration of unpleasant stimuli compared to pleasant stimuli. Furthermore, evoked potentials showed specific cortical inhibition to arousing emotional pictures in BR subjects compared to controls, this occurred at both, intermediate component (P300) and late positive complex (SPW). Results point to an impairment of emotional processing in humans under microgravity condition. This altered perception could threaten the success of spatial missions, for instance in case of impaired capability of astronauts to adequately perceive an emergency situation.

RESPONSE SELECTION, RESPONSE THRESHOLD AND STIMULUS-RESPONSE CONFLICT: LAPLACIAN ERP STUDIES

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Descriptors: motor areas, stimulus-response conflict, laplacian

Thanks to Laplacian transformation of monopolar data, Vidal et al. (2003) revealed three noticeable features of the motor command in choice reaction time tasks. First, just before the response, a negativity develops over the contralateral Primary Motor Cortex (M1), revealing an increase in the correct response activation. Second, a positivity over the incorrect M1 develops symptomatically, which reveals an active inhibition of the incorrect response. Finally, a centro-parietal negativity, likely generated within the Supplementary Motor Area (SMA), precedes the activation inhibition pattern by about 50 ms. This centroparietal activity was proposed to reflect the response selection stage. Here, we investigated the impact of stimulus-response conflict on those three components, in two different compatibility tasks: A Simon and an Eriksen task. The results are similar for the two tasks. We show that the activity recorded over SMA is largely reduced in the compatible condition. Over the M1s, the activation is larger in the incompatible condition whereas no compatibility effect shows up on inhibition. The sensitivity of SMA to compatibility suggests that this structure is involved in stimulus-response translation. In relation to a formal model of decision making, the increased activity over the contralateral M1 suggests that the response threshold is enhanced under incompatible situations, likely to reduce the risk of an error.

CHARACTERIZATION OF ELECTROENCEPHALOGRAPHIC (EEG) COMPONENTS ELICITED BY OVERT SPEECH PRODUCTION IN THE PICTURE NAMING TASK: A LAPLACIAN ERP STUDY

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Descriptors: speech monitoring, ERP

We characterized a sequence of electroencephalographic (EEG) events elicited by the picture naming task. EEG has scarcely been used to investigate the neural processes of speech production, presumably because of feared contamination of the EEG signal by the artifacts generated by articulation. We addressed this challenge using a blind source separation algorithm based on the canonical correlation analysis. Clean EEG data were successfully obtained. A surface Laplacian transformation of the signal was also computed. As a result, a clear succession of activities was revealed. A spatio-temporal sequence of visual evoked potentials was observed between 95 and 160 ms post-stimulus. This was followed by the emergence of more sustained centro-parietal activities, best seen time-locked to the response. Peaking 250 ms before vocal onset, we observed activity over the supplementary motor area which resembles activity previously associated with decision-making processes. Shortly after vocal onset, there was a clear negativity (peak 45 ms) similar to the one reported previously in segmental responses, and that likely reflected performance monitoring. This negativity was followed by activity over the left temporal cortex (peak 178 ms). These activities were affected differentially by visual complexity, picture name, lexical frequency, and length. A tentative interpretation of these observations provides a window on the temporal sequence of mental operations underlying picture naming.
FACE NAMING AND TIP-OF-THE-TONGUE STATE:
AN EVENT-RELATED POTENTIALS STUDY PROVIDING
FURTHER FINDINGS

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Descriptors: tip-of-the-tongue state, face naming

In a previous study (Díaz, Lindín, Galdo-Alvarez, Facal, & Juncos-Rabadan, 2007), the event-related potentials associated with correct naming (KNOW) and failure to name (tip-of-the-tongue, TOT) the faces of famous people were determined. The aims of the present study were 1) to establish, with greater temporal precision, the ERP correlates of the genesis of the TOT state, as well as the time interval in which the TOT phenomena takes place, and 2) to determine the influence of the delay of the verbal response on the LNW. A task involving identification and naming of the 800 faces of famous people with three response categories: KNOW (correct naming), DON´T KNOW (name not known), and TOT, was employed. The results indicated that the latencies of Early P3 and N450 components were significantly longer in the TOT than in the KNOW response category, which may reflect slower access, to information about the famous people in TOT than in KNOW from the 300 ms post-stimulus. No LNW was detected, which was attributed to the delayed of the verbal response, and shows that the brain activity associated with the verbal response modulates the amplitude of LNW.

THE INFLUENCE OF PREFERENCE ON THE NEURAL CORRELATES OF MEMORY

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Descriptors: differential memory effect

The Event Related Potential (ERP) literature shows enhanced activity in the 400–700 ms time window during encoding for stimuli that will later be remembered (the DM effect). Our study investigated whether or not emotional preference for a product modulated the DM effect. ERPs were used to describe differences in neural activity during encoding and recognition of preferred vs. unpreferred vs. unknown brands. First, participants (N = 17) provided subjective ratings of preference and familiarity for 300 different products found in grocery stores. During the encoding part of the experiment, two-thirds of the rated stimuli were presented, and participants classified them as liquid or solid. Five minutes after the encoding session, participants were asked to freely recall as many items as they remembered. Finally, in the recognition phase, all of the stimuli were presented randomly and participants classified them as old or new. Participants freely recalled significantly more preferred than unpreferred items (p < .05) overall for recognized items compared to forgotten items. This DM effect was more enhanced for preferred items (p < .05) and unknown items (p < .05). People seem to form stronger memory traces for preferred compared to disliked/unknown items.

COVERT AND OVERT PROCESSING OF SAD AND HAPPY FACES:
EARLY ERP EFFECTS

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Descriptors: emotion, EEG/ERP

Recent studies exploring early effects of emotion on face-sensitive event-related potentials have produced inconsistent findings. Neuroimaging shows different neural systems involved in covert vs. overt processing of emotion, with activations in limbic and paralimbic areas recruited for covert processing of facial expressions. We hypothesized that only emotional faces presented covertly would yield significant modulations of the N170, vertex positive potential (VPP) and early anterior positivity (EAP) whereas overt presentations would not. We expected covert sad faces to elicit enhanced effects compared to neutral and happy faces, which were expected to elicit equal electrophysiological responses. High-density electroencephalography was recorded while subjects viewed photographs of emotional faces with a colored square around the eyes. In the covert task, subjects identified the emotion of the face. In the covert task, they identified the color of the square. Results revealed that covertly presented sad faces elicited a greater N170 response over right temporal-parietal sites (N = 170; t = 2.4, p = .03) and a greater positivity over frontal sites (VPP; t = 3.6, p < .05). Findings suggest that covert emotion recruits different neural regions at early stages of face processing, supporting separable systems of emotion processing.

DYNAMICS OF SEXUAL STEROIDS’ LEVEL IN RATS’ MALES BRAIN DURING FORMING OF THE CONDITIONED REFLEX

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Descriptors: steroid hormones, brain, conditioned reflex

The cognitive functions of realization in an ontogenesis in many ways is determine by the influence of sexual steroids both gonadal, and a cerebral parentage. We investigated the dynamics of sexual hormones levels in the brain of male rats of different ages during the formation of a conditioned reflex. Studies were conducted on 180 male rats, of the Vistar’s line, at the ages of 1, 2, 6 and 18 months. A conditioned reflex was formed in a Morris’ water labyrinth. The amount of testosterone and estradiol in blood plasma, hypothalamus, hippocampus, amygdale, circular and frontal cortex were found by method of radioimmunoeassay. Data were statistically analyzed with the help of “SPSS-13.0”. Data revealed that the formation of conditioned reflex was enhanced when 1- and 6-months old rats were kept out of water. Otherwise this process was decreased with 18-months old rats. In all male age groups, the dynamic testosterone and estradiol level is revealed not only in blood plasma, but also in all investigated structures of brain during the formation of a conditioned reflex. Change of number and character of correlations of learning’ level with the amount of sexual steroids in a brain can confirm the existence of age features and mechanisms of testosterone and estradiol that the organization of learning and memory. The data specify the important role of testosterone and estradiol in brain in conditioned-reflex and memory mechanisms.
**Poster 19**

LACK OF EARLY SEARCH FOR TRUTH IN HIGH SCHIZOTYPAL PEOPLE: ERP EVIDENCE

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Descriptors: schizophrenia, verification, P1

Most people tend to verify their thoughts against reality. This tendency might ensure our understanding of the real world, but there might be individual differences in this. In particular, schizophrenic patients, and non-clinical populations predisposed to schizophrenia (schizotypy) could be an exception, showing a tendency not to verify information. To test this hypothesis, we selected the 10% highest- and lowest-scoring individuals on the SPQ (Raine, 1991) from a sample of 371 healthy people, and recorded event-related potentials (ERP) while they performed a sentence-picture verification task. Trials consisted of affirmative or negative sentences such as The circle is/not red, followed by colored circles that either corresponded or not with the sentences. The P1 visual component in response to the picture onset was analyzed in order to test whether color expectancy had different effects in high and low schizotypal participants. As expected, in the low-schizotypal group P1 amplitude was higher for true than for false items, showing an early tendency toward verification. In contrast, in the high schizotypy group, P1 amplitude was higher for circles that made sentences false than for those that made them true. Thus, it seems that P1 amplitude in schizotypal traits do not follow a verification strategy when solving this task (behavioral results are congruent with this point). Further research is needed to ascertain the extent to which this tendency could be related to the formation and maintenance of delusion in schizophrenia.

**Poster 20**

KEEPING IN MIND WHAT IS NOT TRUE: N200 EFFECTS OF EXCLUSIVE DISJUNCTIONS

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Descriptors: disjunction, conjunction, N200

The present study concerns how people represent conjunctive vs. disjunctive assertions, such as: “The figure is a circle and is red,” vs. “The figure either is a circle or is red.” In both cases the same possibility is represented in that it is explicitly mentioned in the assertion (a red circle). However, given that the semantic status of this possibility differs in each sentence (true in conjunctions, false in disjunctions), some record of being a false possibility (or NOT true) should be tagged to the representation of the disjunction. To test this hypothesis, we conducted a verification study in which sentences of these sorts were contrasted against figures that made them true or false. The ERP response to the processing of figures was registered and analyzed in the time window of the visual N200 component. Consistent with literature (e.g. Fiehnen & Van Petten, 2008), we predicted that mismatching between the figure that was explicitly mentioned in the assertion and the depicted figure should yield larger N200s than matching between them, and that this effect should be modulated by the type of assertion. Results confirmed this prediction. N200 amplitudes were significantly larger for mismatching (false conjunctions and true disjunctions) than for matching conditions (true conjunctions and false disjunctions), and also for disjunctive than for conjunctive assertions. Hence, it seems that participants kept in mind the same possibility for conjunctions and disjunctions, but tagged a NOT true (or false) status in the case of disjunctions.

**Poster 21**

EEG CORRELATES OF THE SEMANTIC VISUAL PROCESSING IN HUMANS

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Descriptors: ERP, ICA, semantic analysis

In order to find the correlates of the semantic processing of visual stimuli in humans, we recorded event-related potentials (ERPs) for emotionally neutral and distorted (nonsense) images from the International Affective Picture System. It was found that ERPs from both types of stimuli had the same form that consists of three waves: P1 (latency 110 – 125 ms), N1 (145 – 160 ms), P2 (230 – 240 ms). Positive fluctuations of the ERPs from normal (semantic) versus distorted images had bigger amplitudes. Additionally, the amplitude of P2 from semantic stimuli quickly (80 ms) reached maximum and slowly (350 ms) turned to baseline. In contrast, the amplitude of P2 from distorted images quickly (50 ms) reached maximum (approx. 100 ms) and after that began to decrease to baseline (260 ms). We assume that successful semantic processing is related to increasing neuronal synchrony. At the next stage of our investigation the independent component analysis (ICA) was applied to distinguish the components of EEG related to semantic analysis. It was found that three-component waveforms (P1-N1-P2) were extracted from only the one of the ICA components. The dipole model was used to localize the source of this activity. It was revealed that this source was localized in the inferior temporal cortex. It is important that left hemisphere location of that dipole was registered in about 50% of participants and another 50% demonstrated right hemi-

**Poster 22**

CENTRAL AND PERIPHERAL HEMODYNAMICS DURING EMOTIONAL ACTIVATION IN ESSENTIAL HYPOTENSION

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Descriptors: hypotension, transcranial doppler sonography, impedance cardiography

Essential hypotension has been associated with reduced cognitive performance and altered regulation of cerebral blood flow. On the other hand, the possibility of impairments in emotional reactivity remains largely unexplored, despite some evidence of lower positive affect in hypotension. This study was aimed at investigating systemic and cerebral hemodynamic changes in chronic hypotensives during emotional activation. Impedance cardiography and blood pressure (BP) measures were recorded from 15 hypotensives and 15 normotensives during the viewing of 3-min blocks of pleasant, unpleasant and neutral pictures. Doppler sonography blood flow velocities in both middle cerebral arteries (MCA) were also measured continuously. Valence and arousal ratings were collected after each block. Significantly higher increases in systolic BP were observed in normotensives than hypotensives during picture viewing, independent of content. However, no evidence of lower sympathetic control was found for the latter group, as assessed by pre-ejection period. MCA flow velocity showed a significantly lower increase in hypotensives, specifically during the viewing of pleasant pictures. Interestingly, highly significant negative correlations between changes in MCA flow velocity and subjective arousal were found only in hypotensives, and specifically for the pleasant condition, indicating a dissociation between self-report of emotional activation and cerebral perfusion. This effect might suggest a failure to integrate peripheral and central arousal responses under positive stimulation.

**Poster 23**

THE NEURAL CORRELATES OF ATTENTIONAL BIAS IN BLOOD PHOBIA AS REVEALED BY THE N2pc

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Descriptors: blood phobia, n2pc, emotion

A large body of experimental investigations has consistently demonstrated that anxiety and pathological fears are associated with an attentional bias, i.e., a systematic tendency to selectively attend to stimuli that are relevant to the individual’s concerns. Conversely, a lack of attentional bias in blood phobia has been reported, using both behavioral and event-related potential (ERP) measures. However, in the tasks employed so far, attentional resources to single stimuli, rather than attentional selection, were evaluated. The present study investigated whether disorder-relevant pictures can capture visuospatial attention when paired with neutral or non-specific unpleasant pictures for blood-phobic individuals while they had to focus on a visual detection task. The N2pc component of the ERPs was measured as an index of spatial attentional selection. Results showed that in blood phobics, but not in controls, pictures of injuries elicited a reliable early N2pc not only when paired with neutral, but also with unpleasant pictures, suggesting that phobic contents did bias visuospatial attention. A late N2pc reversal to injury pictures suggests that early orienting to phobic cues was followed by cognitive avoidance.

**Poster 24**

MULTIMODAL ASSESSMENT OF EMOTIONAL DISTRESS AFTER WORK-RELATED ACCIDENTS

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Descriptors: work accidents, emotional distress, post-traumatic stress disorder

Work accidents can be traumatic events that give rise to a variety of symptoms of emotional distress. Overall, these symptoms have been described as a dysfunctional stress response, sometimes meeting the diagnostic criteria for acute stress disorder, or post-traumatic stress disorder (PTSD). The present study was aimed at investigating the severity of emotional distress symptoms in individuals who experienced workplace accidents. A multimodal assessment was adopted, including subjective and psychophysiological indices of affective and cognitive responding. Thirty-eight subjects who had experienced work-related accidents were recruited from the Italian National Association for Workers’ Compensation Injuries (Associazione Nazionale Mutilati e Invalidi del Lavoro, ANMIL) and compared with 38 control subjects. In a sub-group of subjects, skin conductance and the startle reflex were recorded during the viewing of standardized trauma-related and trauma-unrelated pictures. Participants who experienced a work accident reported more severe post-traumatic symptoms than controls, as indicated by
higher PTSD Symptom Scale (PSS) scores. They also showed more attentional and memory deficits than controls. Moreover, participants with higher PSS scores showed more severe depressive symptomatology and lower psychophysiological reactivity than participants with lower PSS scores, indicating a lack of concordance between self-reported symptoms and physiological activation.

**Poster 25**

**DELT A EEG BAND AS A MARKER OF LINGUISTIC LEFT HYPOFRONTALITY IN SCHIZOPHRENIA PATIENTS**

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Descriptors: psychosis, language, lateralization

Delta activity is a demonstrated index of cortical inhibition, which reflects the amount of neurons not engaged in specific cognitive processes. To study the brain dysfunction/inhibition and the degree of linguistic dominance across different linguistic tasks, delta activity was measured in 17 schizophrenia patients and 17 matched controls. Most of patients suffered from paranoid schizophrenia, and obtained relatively high rating in Delusions (P1) and Conceptual disorganization (P2) subscales of the PANSS. Delta amplitude was measured while participants performed three (visuo-perceptual, rhyming and semantic judgment) linguistic tasks. Compared with healthy controls, patients showed no overall delta difference, revealing neither detrimental effects of pharmacological treatment nor brain structural alteration. The analysis of four quadrants/regions of interest revealed, in controls, higher delta amplitude in right vs. left anterior sites.

**Poster 26**

**EEG DELTA BAND AS A MARKER OF BRAIN DAMAGE IN RECOVERED NON-FLUENT APHASIC PATIENTS**

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University of Padova

Descriptors: neurological disorders, language, lateralization

In the present study, EEG delta band was used to investigate, in recovered aphasic patients, both brain dysfunction/inhibition and functional linguistic recovery. Delta amplitude was measured in 17 chronic non-fluent aphasic patients while engaged in three linguistic tasks: Orthographic, Phonological and Semantic. The average mapping of aphasic’s structural lesion located core damage in left cortical-subcortical perisylvian areas. Compared with matched controls, patients showed higher delta levels (p < .05), a result which suggests that dissociation/cortical inhibition persists, to some extent, also in the chronic phase. The analysis of four specific regions of interest revealed a peak of delta amplitude in left perilesional EEG sites (p < .01), posterior to the core damage where residual suffering tissue probably projects its dysfunctional activity. Significant task modulation was found in patients, who showed greater left posterior delta amplitude (inhibition) in all tasks (p’s < .001) and smaller left vs. right delta amplitude (left anterior disinhibition, p < .05) only during the Phonological one. Instead, controls showed greater left vs. right delta disinhibition at anterior sites in all tasks (p’s < .01). Delta band, besides its ability to reflect a structural damage, was effective in the assessment of both patients’ functional impairment, and their linguistic reorganization at hemispheric level, with a spatial scalp distribution consistent with lesion map.

**Poster 27**

**VERBAL INSTRUCTION ABOLISHES FEAR CONDITIONED TO RACIAL OUT-GROUP FACES**

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Descriptors: race bias, fear conditioning, prepared learning

Previous research has demonstrated that fear conditioning to racial out-group faces is more resistant to extinction than is fear conditioning to racial in-group faces, suggesting that out-group stimuli may be subject to prepared fear learning (Olsson et al., 2005). The current study demonstrates that fear conditioning to racial out-group faces is reduced by verbal instruction. This does not conform with a second criterion of prepared fear learning, encapsulation from cognitive interventions. Four groups of Caucasian participants were trained with male in-group (Caucasian) or out-group (Chinese) faces as conditional stimuli in a differential human fear conditioning paradigm. In each group, presentation of one face (CS+) was paired with an aversive electrotactile shock, whereas a second face was presented alone (CS−). Before extinction, half of the participants in each group were instructed that no more shocks would be presented. Fear conditioning, larger electrodermal responses to CS+ than to CS− and larger fear-potentiated startle during CS+ than during CS−, were evident in all groups during acquisition. Resistance to extinction was found in the racial out-group and the no-instruction condition, but was not present in the racial out-group, instructed-extinction condition. Thus, resistance to extinction of fear learning to racial out-group faces does not appear to reflect evolutionarily prepared learning. It may be better explained by differential exposure to in-and out-group race faces (latent inhibition).

**Poster 28**

**MY PARIETAL CORTEX 'KNOWS' WHAT YOU ARE DOING: THE HUMAN MIRROR NEURON SYSTEM MEASURED BY fNIRS**

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Descriptors: fairs, mirror neuron system, parietal cortex

We used functional near-infrared spectroscopy (fNIRS) to investigate brain activity during the execution and observation of actions in 20 healthy participants. Furthermore, we examined the role of the observer’s orientation. Participants were asked to perform object-related grasping movements and to observe them from two different perspectives (egocentric and allocentric perspective) in a video clip. Brain activation was measured by changes in oxy- and deoxyhaemoglobin concentrations with a 52-channel NIRS system (Hitachi ETG-4000). We found stronger activation (increase in oxy- with a corresponding decrease in deoxyhaemoglobin concentration) during the execution and observation compared to a control condition in the inferior parietal cortex, but not in the frontal or motor cortex. Interestingly, the activation in the parietal cortex was stronger for the egocentric, compared to the allocentric, perspective. Our results provide further evidence for an observation-execution matching system in the human brain and its dependence on the observer’s orientation. To our knowledge, this is the first NIRS study involving an action execution and action observation condition at the same time.

**Poster 29**

**BRAIN ACTIVATION DURING JOINT ACTION MEASURED WITH FUNCTIONAL NEAR-INFRARED SPECTROCOPY**

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Descriptors: joint action, human mirror system, fairs

Many everyday situations require humans to execute actions together with a partner. Which brain mechanisms underlie the engagement in such joint actions? To investigate this question we used functional near-infrared spectroscopy (fNIRS) to discover differences of brain activity during the execution of solitary actions in comparison to the execution of nearly-natural joint actions. fNIRS allows the measurement of brain activity in nearly-natural situations and has not yet been applied in such joint action settings. Subjects were 17 healthy participants which completed an object-related grasping task and also displacing movements, namely, setting a table. They either executed the task alone (solitary action), together with a partner (joint action), or observed the partner executing the action (action observation). Brain activation was measured by changes in oxy- and deoxyhaemoglobin concentrations with a 52-channel NIRS system (Hitachi ETG-4000). Compared to the solitary action, the joint action task elicited a stronger activation in regions of the inferior parietal cortex and frontal cortex. Interestingly, these regions, which are outside the visual processing stream, are also involved in our action observation task. Results suggest the notion of an involvement of the human mirror system in joint action. This study shows that fNIRS is a suitable tool for investigating joint action in nearly natural situations.

**Poster 30**

**AUDITORY ATTENTION TO TARGETS IN THE CONGENITALLY BLIND ENHANCES OCCIPITAL GAMMA-BAND OSCILLATORY ACTIVITY**

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Descriptors: auditory attention, congenital blindness, reorganization

In an earlier ERP study, we reported that in the congenitally blind brain, electrical activity associated with auditory attention to targets in a dichotic task shows marked plasticity changes with a prolonged negativity (200 – 450 ms) over occipital areas (Liotti, Ryder & Woldorff, 1998). In the present study, auditory-target-related EEG time-frequency activity was analyzed in 11 congenitally blind and 10 sighted participants. Theta (4 – 7 Hz) and gamma (30 – 40 Hz) activity was extracted in each of seven consecutive 50-ms intervals following auditory targets (200 – 550 ms). In the theta-band range, target-related activity was observed in both groups over centro-parietal scalp, reflecting prominent P30 waves that did not appear to be reorganized in the blind. More importantly, in the gamma-band range, differential target-related activity in the congenitally blind was observed over occipital scalp. Beamformer spatial filtering (BESA 5.1) was used to image the sources of gamma-band activity for each time interval, which were then subjected to nonparametric statistical analysis using random permutation tests to determine significance increases (blind > control, p < .005). Group images were displayed on a surface rendered brain
using AFNI software. Gamma-band activity was centered in L lateral occipital cortex and bilateral medial occipital cortex (peak: 300 – 350 ms). Boosting of gamma-band activity in specific regions of visual extrastriate cortex appears to selectively account for cortical reorganization in auditory attention in the congenitally blind.

**Poster 31**

TACTILE FREQUENCY DISCRIMINATION WITH CONSECUTIVE AND SIMULTANEOUS STIMULUS PRESENTATION

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University Leipzig

Descriptors: tactile, frequency discrimination

Several recent studies examined frequency discrimination with vibrotactile stimuli in the frequency range (5– 50 Hz). Typically, these studies presented consecutive stimuli separated by a temporal gap. We compared performance under consecutive and simultaneous presentation conditions in a within-subject design. In our experiment, mechanical stimuli in the frequency range were delivered to both index fingers. Subjects were instructed to determine the location (finger) where the stimulus with higher frequency was presented. Responses were given by foot button press. Results show an interference effect when stimuli were presented simultaneously. Performance was significantly reduced compared to consecutive presentation. Therefore, comparing two ongoing tactile streams is assumed to be more demanding than comparing a stream against a memory trace. We consider this effect to be related to contralateral SI suppression in the presence of additional ipsilateral input, as reported by a number of recent neurophysiological studies.

**Poster 32**

AN ERP SOURCE LOCALIZATION STUDY OF PERFORMANCE MONITORING IN AUTISM SPECTRUM DISORDER

Diane L. Santesso1, Irene E. Drmic2, Michelle K. Jetha3, Karen J. Mathewson3, Susan E. Bryson3, Joel O. Goldberg2, Geoffrey B. Hall2, Sidney J. Segalowitz4, & Louis A. Schmidt5
Brock University, 1York University, 2McMaster University, 3Dahlhouse University

Descriptors: error-related negativity, autism spectrum disorder, anterior cingulate cortex

Electrophysiological and fMRI studies have linked autism spectrum disorders (ASD) with dysfunction of frontal cortical networks, including the anterior cingulate cortex (ACC), which are critical for performance monitoring. A recent study examined performance monitoring in ASD using the error-related negativity (ERN) and correct-related negativity (CRN) as indices of ACC activity in children. Smaller ERNs were reported in ASD than controls, with no difference in the CRN, suggesting insensitivity to performance outcomes which may lead to poor behavioral adaptation and social impairment. We examined response monitoring using a modified flanker task in 14 adults with ASD and 16 age- and IQ-matched controls. Compared to controls, ASD individuals had smaller ERNs at FCz. Despite no group differences in the CRN, individuals with ASD showed less differentiation between error and correct trials than controls, suggesting general dysfunction in the performance monitoring system. These differences, however, could be accounted for by social skills: Poor social skills were related to the smaller ERNs explaining the group difference. LORETA source localization of the ERN revealed ACC activation in both groups, with controls showing slightly greater activity. Significant differences, however, were apparent when localizing the correct-error difference wave: ASD individuals exhibited less ACC (BA 32, 24) and prefrontal (BA 11) activity than controls. These findings provide support for ACC and prefrontal dysfunction in ASD relating to underlying poor social skills and social deficits.

**Poster 33**

CARDIAC RESPONSES TO AFFECTIVE AUDITORY AND VISUAL STIMULI IN ADULTS WITH AUTISM SPECTRUM DISORDER (ASD)

Karen J. Mathewson1, Irene E. Drmic2, Michelle K. Jetha3, Diane L. Santesso4, Susan E. Bryson3, Joel O. Goldberg2, Geoffrey B. Hall2, Sidney J. Segalowitz4, & Louis A. Schmidt5
McMaster University, 1York University, 3Brock University, 4Dalhousie University

Descriptors: autism spectrum disorder, RSA, emotions

Few studies have examined parasympathetic functioning in autism, especially during affective challenges. Heart period and respiratory sinus arrhythmia (RSA) were derived from ECG recordings in 15 high-functioning adults with autism and 16 age, sex, and IQ-matched controls. ECG was collected during rest and two tasks designed to elicit affective challenges. Heart period displayed a strong positive relation with Vt and absorbed any shared variance between PEP and Vt. Heart rate variability (HF) and RSA did not correlate with RR during rest (R square = .014). RSA and HF power weakly correlated with RR during rest (R square = .091, R square = .072), but RMSSD did not significantly relate to RR during rest (R square = .098, R square = .042) respectively. These findings suggest that the relationship between RR and RSA varies across HRV measures and experimental contexts and (b) in general, this relationship is significant but quite modest.

**Poster 34**

TIDAL VOLUME MEASUREMENT DURING SLOW PACED BREATHING IS RELATED TO SEVERAL CARDIAC INDICES

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Virginia Polytechnic Institute and State University

Descriptors: slow breathing, tidal volume, heart rate variability

Tidal volume (Vt) measurement is essential to the study of slow breathing. Novice slow breathers may breathe too deeply, which can lead to an excessive decrease in carbon dioxide and a decrease in cardiac vagal tone. Although calibration of strain gauges with a fixed volume bag is necessary to render Vt measurements in milliliters, this metric may not be necessary. The present study (N = 70) examined the utility of a strain gauge as a proxy Vt measurement during slow paced breathing (075 – 0.108 Hz). Vt was quantitated as the difference between the average maximum strain gauge amplitude during inspiration and the average minimum strain gauge amplitude during expiration. Vt was negatively correlated with mean heart rate (r = -.48, p < .001), pre-systolic period (r = -.20, p = .08), and several measures of heart rate variability (peak-to-peak RSA: r = -.30, RMSSD: r = -.24, pNN50: r = -.37, all p < .05). Multiple regression analyses were conducted to determine the unique relationship between these cardiac measures and Vt during slow breathing. The final regression model (R square = .51) indicated respiration rate and peak-to-peak RSA were negatively related to Vt, while low frequency power (LF: .05 – .15 Hz) and RMSSD were positively related to Vt. Heart rate displayed a strong positive relation with Vt and absorbed any shared variance between PEP and Vt. Strain gauge amplitude, used as a proxy tidal volume (Vt) measurement, displayed important relationships to several cardiac indices during slow breathing (.075 – 0.108 Hz) and should be validated in future research.

**Poster 35**

EFFECTS OF RESPIRATION RATE ON FOUR METRICS OF RSA DURING A QUIET REST AND DUAL STRESSOR TASK

Thomas J. Pardikes, Ben Allen, & Bruce H. Friedman
Virginia Polytechnic Institute and State University

Descriptors: respiratory sinus arrhythmia

Much debate exists over the relationship between respiratory sinus arrhythmia (RSA), an index of heart rate variability (HRV), and respiratory parameters. To examine this issue, the relationship between respiration rate (RR) and four metrics of RSA was investigated in this study. The electrocardiogram (ECG) and RR were recorded in 107 college students under two three-minute conditions: (1) sitting quiet rest; (2) A dual stressor task consisting of hand cold pressor combined with mental arithmetic. Pearson’s correlation and simple linear regression models were used to explore the relationship between respiration rate (RR) and (1) root mean square of successive differences of heart period (RMSSD), (2) peak-to-trough RSA, (3) the natural log of ECG spectral power (Fast Fourier Transform) in the high frequency band (HF; .015 – 4 Hz), and (4) the peak frequency of the HF band (HF-peak). Results showed that HF peak had a strong relationship with RR only during rest (r square = .40). RR and HF peak were not significantly related during stress (r square = .014). RSA and HF power weakly correlated with RR during rest (R square = .091, R square = .072), but RMSSD did not significantly relate to RR (R square = .098, R square = .042) during rest. During stress, RMSSD, RSA and HF power all displayed a weak albeit significant negative relationship to RR (R square = .094, R square = .098, R square = .042) respectively. These findings suggest that (a) the relationship between RR and RSA varies across HRV metrics and experimental contexts and (b) in general, this relationship is significant but quite modest.

**Poster 36**

MEAN DAILY TEMPERATURE MODERATES THE SHARED ENVIRONMENTALITY OF THE SKIN CONDUCTANCE RESPONSE

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Descriptors: skin conductance response, heritability, adolescents

Skin conductance response (SCR) magnitude has been found heritable and to correlate with indices of fearfulness, suggesting that the SCR may provide a marker of genetic risk for fear-related psychiatric conditions. Interestingly, the SCR has been shown to increase during warmer months (i.e. summer) relative to colder months (i.e. winter) even when laboratory conditions are held constant. If the heritability of the SCR is sensitive to seasonal temperature variation, then the SCR may have less utility as a genetic marker...
during conditions when heritability is lowest. To our knowledge, the question of whether SCR heritability changes as a function of seasonal temperature has not been examined. This study employs biometric moderation modeling to examine the genetic and environmental variance underlying the SCR as a function of daily temperature. We recorded the SCR to a sudden, unseen blast of noise from approximately 3500 adolescent twins from the Minnesota Twin Family Study year round from 1990 to 2005. Mean daily temperature was extracted from a national weather database. Our results indicated that the shared environmental variance underlying the SCR increased as daily temperature increased, while the genetic and non-shared environmental variances remained relatively constant. In addition, this effect was present in the raw SCR peak but not in the raw SCR baseline. This indicates that the heritability of the SCR decreases during warmer months due to an increase in shared environment and that this is a property of the peak response.

Poster 38
PERSONALITY DIMENSIONS ARE ASSOCIATED WITH ERP TIME-DOMAIN AND TIME-FREQUENCY FEATURES IN ADULT MALES
University of Minnesota

Descriptors: personality, event-related potentials, time-frequency

Broad personality dimensions are sometimes thought to be associated with various forms of psychopathology. For instance, high levels of negative emotionality (NEM) and low levels of dispositional constraint (CON) characterize externalizing disorders, such as antisocial behavior and substance abuse. A robust body of research has found that P300 amplitude is reduced in individuals with externalizing psychopathology or at risk for such problems. However, associations between these constructs and personality measures have not been as well documented. The present investigation used high-density ERP data from approximately 400 adult males from the Minnesota Twin Family Study (mean age = 29.6; range 28.5 to 31.9) to examine associations between ERP features and the personality factors of positive emotionality (PEM), NEM, and CON from the Multidimensional Personality Questionnaire. Subjects were divided into groups representing the extremes of the distribution on each personality dimension, and these groups were compared with respect to time-domain amplitude and latency measures as well as time-frequency features. Principal components analysis (PCA) was used to reduce the time-frequency surfaces into meaningful components. Results indicate a time-frequency component related to NEM and CON corresponding to the P300 peak. Amplitude was reduced in individuals high in NEM and low in CON. In addition, a component spanning earlier peaks was associated with CON; subjects low in CON displayed reduced amplitude.

Poster 39
CROSS-TASK AND CO-TWIN SIMILARITY IN ERP COMPONENTS DURING ADOLESCENCE: A TEMPORAL-SPATIAL PRINCIPAL COMPONENTS ANALYSIS
Greg Perlman, Steve M. Malone, Edward M. Bernat, & William G. Iacono
University of Minnesota

Descriptors: event-related potential, adolescence

ERP components with similar spatial and temporal characteristics are assumed to measure similar psychological processes across different experimental tasks and stimuli conditions (i.e. P300b amplitudes share much in common). However, it is unclear whether similar ERP components demonstrate a sufficiently high correlation to support this assumption. In this study, we examined the correlations among prominent ERP components in a sample comprised of 48 pairs of monozygotic (MZ) twins between the ages of 14 and 16 years old. We recorded EEG data using a 64-sensor dense-array net during a three-stimulus oddball paradigm and a Go/NoGo paradigm. Temporal-spatial principal components analysis was used to identify P3B amplitude, P3A amplitude, and N2 amplitude components from each task and stimulus-type. We observed robust correlations among P3B amplitudes across tasks and conditions, while the inter-correlations among N2 and P3A amplitudes were moderate. The correlations between identical twins, a lower-bound estimate of reliability, were moderate for P3B and P3A amplitudes and modest for N2 amplitudes and components elicited by frequent, non-target stimuli. This pattern of results indicates that similar ERP components share much variance and have modest reliability across tasks and conditions, consistent with the notion that they tap similar psychological processes.

Poster 40
ERP FEATURES IN ADULT FEMALES WITH TRAITS INDICATIVE OF BORDERLINE PERSONALITY DISORDER
University of Minnesota

Descriptors: borderline personality, ERP, time-frequency

Among the fundamental characteristics of Borderline Personality Disorder (BPD), behavioral disinhibition and emotional dysregulation. Behavioral disinhibition, as evidenced in antisocial behavior and substance use disorders, has been associated with reductions in visually elicited P300 amplitude. More recently, time-frequency analysis has been used to further elucidate the relationships between event-related potentials and behavioral disinhibition. Although research is meager, reductions in P300 amplitude have been found in patients with the disorder. Using a visual oddball paradigm, the present study seeks to explore the underlying dynamics of the ERP in a group of adult females with dispositional characteristics that typify BPD using time-frequency analysis in addition to time-domain measures. Subjects (N = 413) were drawn from the Minnesota Twin Family Study (MTFS), and included all female subjects (mean age = 29.5; range, 28.5 to 31.4) with usable ERP data from the third follow-up assessment of the older cohort. Borderline characteristics were assessed using a previously validated scale derived from the Multidimensional Personality Questionnaire (MPQ-BPD scale). Subjects were grouped based on extremes of this distribution. Time-domain and time-frequency measures yielded parallel results. Subjects scoring high on the MPQ-BPD showed reduced amplitude responses in general. The strongest effect was found for a time-frequency component that approximately corresponds to the P300 peak.
**Poster 43**

AGE-RELATED ELECTROPHYSIOLOGICAL ASPECTS OF PROBABILITY LEARNING
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Descriptors: aging, EEG complexity, probability learning

The effects of aging were investigated on the resting EEG (eyes closed, eyes open conditions) and on that recorded during probability learning in the young and elderly (N = 64). Absolute spectra, Omega complexity (OM) and synchronization likelihood (SL) were calculated in the conventional EEG frequency bands in young (n = 31, MA = 22.71 ± 3.58 yrs) and elderly (n = 33, MA = 66.09 ± 3.88 yrs) adults. No differences were found between the groups regarding the frequency spectra. The total power was higher in the young in the eyes-closed condition, but activation (opening eyes) eliminated group differences. OM and SL showed group differences at anterior sites during eyes open condition: OM was higher and SL was lower in the elderly. In a probability learning task, the performances of young (n = 14, MA = 21.93 ± 1.73 yrs) and old (n = 15, MA = 66.47 ± 4.61 yrs) adults were compared. After presenting an emotional picture (selected from IAPS), participants predicted whether the figure in the following picture would point to the left or to the right. Feedback adequacy was 90%. Behavioral data showed that young adults learned the task after the 23rd probe, while old participants did not learn at all. ERPs to the feedback during hits were subtracted from ERPs during misses. A positive potential was found between 330 – 430 ms at frontal sites for young but not for the elderly subjects. Our results indicate that the frontal areas are the most sensitive to aging effects, which can be shown best with complexity measures in the resting EEG. This functional background may be responsible for poor learning efficiency in the elderly.

**Poster 44**

STARTLE MODULATION AND AUTONOMIC REACTIVITY IN PSYCHOPATHY: THE ROLE OF THE AFFECTIVE AND THE ANTISOCIAL FACTORS
Rosario Poy, Pilar Segarra, M. Carmen Pastor, Raúl López, Ángels Estellé, Alicia Fonfría, Carla Colomer, M. Pilar Torno, & Javier Molto
Jaume I University

Descriptors: startle reflex, skin conductance, hare psychopathy checklist-revised (pcl-r)

This study examined the role of the lower order facets underlying the two broad components of psychopathy (interpersonal/affective and social deviance) in explaining psychophysiological reactivity to affective pictures. Participants were 69 male inmates assessed by Hare’s PCL-R. Eyeblink responses to noise probes, skin conductance changes and subjective ratings of valence, arousal and dominance were obtained during a passive viewing task (erotic couples, female nudes, thrill, babies, objects, suffering, threat to self, aggression, and mutilation IAPS pictures, 6 s presented). Preliminary hierarchical regression analyses showed that facet 2 (Affective)—independently of facet 1 (Interpersonal)—scores were inversely related to the magnitude of startle potentiation during mutilation scenes (and directly to dominance ratings). Moreover, facet 4 (Antisocial)—independently of facet 3 (Lifestyle)—scores were related to smaller electrodermal changes during pleasant and unpleasant contents. Our results suggest that psychopaths’ blunted defensive reaction seems to be specifically related to the affective traits of psychopathy, whereas their classically reported autonomic hyperreactivity seems to be specifically related to the antisocial (not the lifestyle) features of the disorder. These data add to the increasing evidence for the differential association between psychopathy facets and physiological and cognitive dysfunctions, and provide support to the validity of the four-facet model of psychopathy in disentangling the etiology of this personality disorder.

**Poster 45**

AVERSIVE CONDITIONING DEFICITS IN NON-CRIMINAL PSYCHOPATHS
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Descriptors: aversive learning, peripheral measures, psychopathic personality inventory-revised

The present study explored differences in aversive learning as a function of PPI-R scales in a sample of 74 undergraduate students (42 females). Skin conductance changes and startle responses were obtained during a differential aversive conditioning task. Two NimStim neutral faces served as CSs (8 s presentation); a 500 ms train of electric pulses was used as the US, delivered immediately after each CS+ offset during the acquisition phase. The task consisted of 4 blocks (1 habituation, 2 acquisition, and 1 extinction) of 12 trials each (6 CS+, 6 CS–). With 8 probes presented at 5.5 or 6.5 s after picture onset: ITIs varied randomly between 15 and 25 s. ANOVA with group (high vs. low PPI-R total scores) as a between-subjects factor showed enhanced skin conductance changes and greater blinks to CS+ than to CS– during acquisition in both groups. CS+/CS– differentiation persisted throughout extinction in the low but not in high psychopathy group. Subsequent multiple regression analyses conducted with extinction data showed that the Self-Centered Impulsivity factor scores (especially the Machiavellian Egocentricity scale) were related to smaller CS+/CS– electrode differentiation, whereas Fearlessness scale scores (a Fearless Dominance factor) were inversely related to the magnitude of the CS+/CS– startle differentiation. The lack of persistence of aversive conditioning in non-criminal psychopaths— as assessed by PPI-R— is consistent with prior findings from our lab demonstrating aversive conditioning deficits in incarcerated psychopaths as assessed by Hare’s PCL-R.

**Poster 46**

ERROR PROCESSING AND CONFLICT MONITORING SHOW EVIDENCE OF HERITABILITY IN ADHD
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Descriptors: error monitoring, heritability, genetics

The error negativity (Ne), an ERP correlate of error monitoring, has been shown to be affected by dopaminergic manipulations (de Bruijn, 2004; de Bruijn, 2006, Zirnheld, 2004). This process has been localized to medial frontal brain regions, in particular the anterior cingulate cortex (ACC). Additionally, conflict monitoring (N2), which is correlated with the Ne, has been localized to this brain region. Studies in children and adults with attention deficit hyperactivity disorder (ADHD) have found that alterations in these electrophysiological parameters are mediated by familial factors (and may be genetically mediated) (Albrecht, 2008; McLaughlin et al., in press), and are therefore potential endophenotypes of the disorder. However, it is not known to what extent these processes are genetically and environmentally mediated. Using an arrow flanker task, we collected EEG data on 44 twin pairs who were concordant and discordant for ADHD and 22 matched controls. If these parameters are true endophenotypes of ADHD, it is expected that unaffected co-twins of ADHD probands will be less similar to controls than they are to their siblings. There were significant differences in N2 and Ne amplitude between siblings of ADHD probands and controls (p < .05). These results indicate that there are heritable effects on these parameters in ADHD and this may be related to dopaminergic dysfunction. Further investigations will examine the relationship of these parameters to risk alleles related to dopaminergic pathways.

**Poster 47**

STRIATAL ACTIVATION TO NEGATIVE FEEDBACK DIFFERS BETWEEN BEHAVIORALLY INHIBITED AND NON-INHIBITED ADOLESCENTS
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Descriptors: striatum, motivation, temperament

The temperamental style of behavioral inhibition (BI) is characterized by heightened sensitivity to novelty and enhanced responsivity to threat. In addition, in two recent studies we have shown enhanced striatal response in BI adolescents to cues signaling the potential to earn reward or punishment. These findings suggest that unique functional patterns in the mesencephalic dopaminergic system may contribute to the expression of BI. We thus expected that BI individuals would show enhanced striatal response to valenced feedback as well. However, this has not been tested, nor is it known whether temperamental differences in striatal activation are seen in response to receipt of reward, punishment, or both. To examine these questions, BI and behaviorally non-inhibited (BN) adolescents performed a response selection task where they believed their choice of a button press determined monetary outcomes and a control motor task where their button press was always rewarded. Striatal responses to positive and negative feedback were examined. Group differences emerged only in response to punishment, with stronger caudal-dorsal striatal activation to punishment in the BI than the BN group. In addition, rostro-ventral striatum was activated in response to reward in both groups. These results suggest that BI and BN individuals may differ in their dopaminergic response to negative feedback. Previous findings of enhanced striatal response to anticipation of reward among BI subjects may reflect enhanced sensitivity to potentially missing a reward, rather than potentially winning a reward.

**Poster 48**

NEUROMAGNETIC AND AUDIOMETRIC INVESTIGATION OF TRANSIENT TINNITUS
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Descriptors: tinnitus, MEG, audiometry

Tinnitus is defined as an auditory perception in absence of any external source of sound. Thus far, most research in humans has been done on patients with chronic tinnitus. In this study focus was laid on transient tinnitus and gamma band activity as its neural...
correlate. To measure transient tinnitus, we invited 14 members of rock bands (m:f = 13:1), who reported having transient tinnitus after band practice on a regular basis, both directly after band practice and in a control condition. Additionally, we conducted a wide range of measurements including audiometry, a five minute resting MEG and questionnaires. Data was analyzed using R and Matlab. To localize the sources of oscillatory brain changes we used a frequency-domain adaptive spatial filtering algorithm, called Dynamic Imagine of Coherent Sources (D.I.C.S.). Our analyses showed that transient tinnitus was accompanied by temporary hearing loss in both ears and by an increase in gamma band activity in the right auditory cortex. Also, tinnitus frequency was strongly correlated to hearing loss (r = 0.84), with tinnitus frequencies being most likely located in higher frequencies. Confirming previous results we conclude that deafferentation, caused by e.g. hearing loss, triggers an increase in gamma band synchrony in the auditory cortex. We hypothesize that this synchronized signal is misinterpreted on higher levels of information processing as a real tone, and develop a model for the conscious perception of tinnitus.

Poster 49

AEROBIC FITNESS EFFECTS ON COGNITIVE TASK PREPARATION
Keita Kamijo1, Kevin C. O’Leary2, Matthew B. Pontifex2, Jason R. Themanson3, & Charles H. Hillman2
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Descriptors: aerobic fitness, task preparation, CNV

Aerobic fitness effects on task preparation were examined in 65 young adults (43 females) separated into higher-fit and lower-fit groups according to their maximal oxygen consumption. Participants performed a modified Sternberg working memory task, which required participants to encode a memory set containing an array of 3, 5, or 7 letters (S1) and decide whether a single probe letter (S2) was present in the encoded array. The task was performed under Accuracy instructions and Speed instructions while measures of task performance (i.e., response speed, accuracy) and contingent negative variation (CNV) were collected. Analyses revealed that participants responded more slowly and accurately during Accuracy instructions relative to Speed instructions. No significant fitness differences were evident between groups on task performance measures. However, CNV amplitude was significantly larger in the frontal region for lower-fit participants compared to higher-fit participants during Speed instructions; an effect not found for the Accuracy instructions. These results suggest that lower-fit individuals may recruit increased resources to respond as quickly as possible, whereas higher-fit individuals might require fewer resources irrespective of task instructions. These alterations in CNV amplitudes suggest that aerobic fitness may selectively benefit cognitive preparation rather than motor preparation. The present study supports previous findings showing fitness-differences in cognitive function even during early adulthood.

Poster 50

STABILIZATION OF ERROR-RELATED BRAIN ACTIVITY ACROSS THE LIFESPAN
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1University of Illinois, Urbana-Champaign, 2Illinois Wesleyan University

Descriptors: ERN, children, older adults

The stability of the error-related negativity (ERN) and the error positivity (Pe) across the lifespan was investigated in 56 preadolescent children (24 female), 57 college-age young adults (34 female), and 26 older adults (12 female). Participants completed a modified flanker task during which event-related potentials and task performance were measured. Response locked averages were created using sequentially increasing subsets of 2, 4, 6, 8, 10, and 12 errors of commission from each participant and a within participant grand average of all error of commission trials (mean = 31.2 ± 1.7, range = 14 – 156; Olvet & Hajcak, in press). Findings indicated that across age cohorts ERN and Pe exhibited non-significant differences relative to the within-participants grand average after six trials. Further, results indicated that the ERN and Pe exhibited excellent internal reliability in pairs. Descent was seen in error rates of preadolescent children, young adults and older adults, indicating that the ERN and Pe may be accurately quantified with as few as six to eight commission error trials.

Poster 51

FITNESS AND THE MODULATION OF COGNITIVE CONTROL IN PREADOLESCENT CHILDREN
University of Illinois, Urbana-Champaign

Descriptors: cognitive control, children, ERN

Fitness effects on the cognitive control of action monitoring were assessed in 9 – 10 year old children separated into higher- and lower-fit groups according to their maximal oxygen consumption. ERPs and task performance were measured during compatible and incompatible stimulus-response conditions of a subsequently administered modified flanker task. Higher-fit participants exhibited higher performance accuracy, overall, than lower-fit participants, particularly in the more challenging incompatible condition, where higher-fit participants were able to maintain their performance levels but lower-fit participants were not. Neuroelectric indices of action monitoring suggest a possible mechanism for the behavioral findings. That is, higher-fit participants exhibited smaller ERN amplitudes in the compatible condition, and greater modulation of the ERN potential between the compatible and incompatible conditions, relative to lower-fit participants who exhibited large ERN amplitudes in both conditions. These findings suggest that lower-fit participants may exert increased activation of their action monitoring system to meet the demands of more simplistic tasks, and thus are unable to up-regulate their cognitive control processes to meet increased task demands, resulting in decrements in response accuracy. In contrast, higher-fit participants appear better able to maintain high levels of task performance despite increases in task difficulty by selectively modulating cognitive control processes to meet task demands.

Poster 52

HOW DO SUBJECTS EXPERIENCE AN fMRI SESSION? CONCORDANCE BETWEEN SUBJECTIVE AND NEUROENDOCRINE STRESS INDICATORS
Ulrike Lueken1, Markus Muehlhan1, Hans-Ulrich Wittenchen1, & Clemens Kirschbaum3
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Descriptors: stress, cortisol, fnri

Background. In routine care patients, magnetic resonance imaging (MRI) examinations may produce adverse anxiety-related reactions, followed by impaired data quality and premature terminations of scans. The aim of the present study was to translate these findings into a research setting where subjects undergo a series of functional MRI scans. Methods. Scanner-naive subjects (N = 34) participated in an fMRI task containing a training phase, two experimental runs (attentional task), and a structural scan. In order to control for differences in cognitive load, we used the same task for both runs. We assessed subjective state affectivity using a multidimensional approach and neuroendocrine stress indicators. Assessments were carried out before and after each experimental phase. Results. All indicators changed significantly during the entire assessment. Negative mood, vigilance, restlessness and alpha-amylase peaked immediately before the fMRI session. Negative mood was selectively correlated with cortisol, while vigilance was associated with alpha-amylase. Subjective state measures showed dissociable trends, pointing towards the incremental value of multidimensional mood assessments. Conclusions. Results extend previous reports of routine care patients in a typical research setting. Subjects participating in fMRI experiments are likely to show pronounced changes in state affectivity and neuroendocrine stress markers in the course of the assessment. The impact of these changes on functional activation patterns induced by the MRI environment remains to be evaluated.

Poster 53

ARE YOUR RUNS COMPARABLE? DIFFERENCES IN SUBJECTIVE AND NEUROENDOCRINE STRESS INDICATORS IN THE COURSE OF AN fMRI SESSION
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Descriptors: fnri, stress, alpha-amylase

Background. Participating in a functional magnetic resonance imaging (fMRI) experiment can alter subjective and neuroendocrine stress markers. However, data from several runs are usually pooled. In the present study we aimed to compare stress responses and neural activation patterns during the first and second run to see whether subjective, physiological, and neural responses are comparable. Methods. Scanner-naive subjects (N = 34) participated in an fMRI session encompassing two experimental runs. Identical tasks were employed for both runs (attentional task). We assessed subjective state affectivity and neuroendocrine stress indicators. Assessments were carried out before and after each experimental phase. Results. Negative mood, restlessness and alpha-amylase were significantly higher during the first run, as well as intra-subject variability in stress indicators. Fifteen percent of our subjects responded with elevated cortisol levels towards the fMRI session exceeding 2.5 nmol/l. Preliminary analysis of fMRI data yielded pronounced differences in neural activation patterns between the first and second run. Conclusions. Although identical paradigms were used, results indicate that psychological processes may differ significantly between two runs. Pooling data from several runs may thus yield increased error variance. In a subgroup of subjects, pronounced cortisol responses may occur in response to the scanner. Further studies are needed to evaluate the impact of elevated cortisol levels and autonomic response systems on functional activation patterns.
Poster 54
FUNCTIONAL HEMISPHERIC LATERALIZATION OF EXECUTIVE FUNCTION BY TRANSCRANIAL DIRECT CURRENT STIMULATION
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Descriptors: executive function, dorsolateral prefrontal cortex, transcranial direct current stimulation
The executive functions underlying Tower of London (TOL) planning performance depend on the integrity of the dorsolateral prefrontal cortex (DLPFC) and can be modified by acute transcranial direct current stimulation (tDCS) with lasting effects to performance. Both anodal and cathodal DCS of the left DLPFC result in phase-dependent, polarity-specific benefits on TOL performance (Dockery et al., 2009). This experiment evaluated differential effects of DLPFC hemisphere stimulated by comparing TOL performance in a between-subject design with 46 randomly assigned healthy participants (left n = 24, right n = 22). tDCS (real or sham) was applied over three sessions. Subjects were then grouped according to tDCS sequence, defined as either anodal DCS before cathodal (tDCS_AC), or the contrary (tDCS_CA). For reaction time, a significant interaction of STIMULATION CONDITION X tDCS SEQUENCE, F(2,32) = 18.063, p = .000, showed that only the real tDCS groups but not sham tDCS was sensitive to phase of application. A significant interaction of HEMISPHERE X tDCS SEQUENCE, F(1,14) = 5.144, p = .029 showed that left DLPFC benefited more from the tDCS_CA sequence (tDCS_AC: 8.208 ± 0.538, tDCS_CA: 6.561 ± 0.515) while right DLPFC benefited from tDCS_AC (tDCS_AC: 7.489 ± 0.538, tDCS_CA: 8.257 ± 0.538). This study elucidates how tDCS can be used to study differences in the functional anatomy of dorsolateral prefrontal cortical circuits and their role in planning. The results suggest optimal stimulation parameters to achieve the most beneficial effects of tDCS on these executive functions.

Poster 55
EMOTIONAL IMAGERY ACTIVATES REWARD CIRCUITS
Vincent D. Costa, Peter J. Lang, & Margaret M. Bradley
University of Florida
Descriptors: imagery, reward, fmri
Research on emotional perception and learning indicates that appetitive cues engage nucleus accumbens (NAc) and medial prefrontal cortex (mPFC), whereas amygdala activity is modulated by the emotional intensity of both appetitive and aversive cues. Using event-related fMRI, we examined activation of mesocorticolimbic regions when 32 healthy volunteers passively viewed stimuli presented in an event-related series (3 seconds on, 12 seconds dark screen) while 8 sagittal slices covering midline structures and extending laterally to sample both amygdalae were collected every 500 ms on a 3 T GE Signa MR scanner. Relative to controls, depressive symptoms showed less amygdala and more medial prefrontal activity during pleasant picture perception. BOLD signal in depressives also suggested relatively greater BOLD signal in inferotemporal, intraparietal, and middle occipital cortex during pleasant picture perception relative to controls. These data support the perspective that depression may be associated with distinct patterns of corticolimbic activity during emotional perception. Further analyses will examine temporal interactions across regions of interest, as well as the role of specific categories of pleasant and unpleasant picture stimuli.

Poster 56
FEAR LESS? NEURAL CORRELATES OF FEAR REVERSAL
Vincent D. Costa, Margaret M. Bradley, & Peter J. Lang
University of Florida
Descriptors: fear, pain, emotion regulation
Threat of shock prompts fear related changes in the brain and body, while instructions that reverse a prior threat eliminate anticipatory fear. The present study used IMRI to examine the neural bases for plasticity of instructed fear. Color and shape were cued to form four sets of perceptual cues. In an initial learning phase, one dimension (color or shape) cued threat of shock and safety. In a second phase the shock contingency was shifted to a different perceptual dimension so that half of the cues retained their affective meaning, while the remaining half reversed their prior association with threat or safety. During the initial learning phase, threat compared to safety cues elicited increased activation in the pain matrix, including anterior insula, ventrolateral prefrontal cortex (vPFC), caudate, inferior parietal lobule, rostral anterior cingulate, and dorsomedial prefrontal cortex (dmPFC). Comparing activity before and after the instructed reversal, viewing a previously threatening cue that now signaled reduced threat activity in anterior insula, vPFC, and dmPFC. Increased activation occurred in the same regions for cues whose meaning shifted from safe to threat, and also in the orbitofrontal cortex and ventral striatum, representing a reward prediction error. Electrodermal responses confirmed fear learning in each phase. These data indicate that simple instructions are sufficient for the brain to flexibly encode and learn changes in the aversive associations that mediate fear.

Poster 57
FAST AND EASY: REFLEX MODULATION FOR SIMPLE PICTURES
Bethany C. Wangelin, Margaret M. Bradley, & Peter J. Lang
University of Florida
Descriptors: emotion, startle, P300
Attention and emotion differentially modulate the blink component of the startle reflex and the P3 component of the event-related potential to the startle probe. The present study investigated the modulation of blinks and ERPs when subjects viewed pictures that depicted mainly neutral, erotic, or violent scenes in an automated paradigm. When emotional cues markedly match existing exemplars and have also been primed by the presentation of similar exemplars, affective modulation is hypothesized to be facilitated. To further assist in rapid recognition, pictures were selected to comprise simple, figure-ground compositions. Sixteen subjects viewed simple pictures depicting erotic love, violence, or neutral people. Pictures were presented for 3 sec with a variable intertrial interval. Acoustic startle probes were presented at 250, 750, or 2500 ms after picture onset in a counterbalanced order. Startle blink magnitude was recorded, and the P300 component of the ERP to each probe was measured using dense array EEG. Results indicated significant startle reflex potentiation when viewing pictures of violence, compared to neutral or erotic content, at all three probe delays, which was independent of early prepulse inhibition. P300 amplitude at centro-parietal sites was reduced for probes presented during erotic or violent scenes, compared to neutral pictures. Together, these findings suggest that affective reactions are facilitated when processing easily recognized stimuli that are primed by repeated presentation of category exemplars.

Poster 58
EMOTIONAL DEPRESSION IN PERCEPSES AND CONTROLS: RAPID FUNCTIONAL IMAGING
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Descriptors: emotion, fnri, depression
Depression has been associated with dysfunctional corticolimbic networks, particularly with respect to the processing of pleasant stimuli. Here we rapidly collected blood oxygen level dependent (BOLD) signals in midline structures as control (n = 12) and undergraduates reporting depressive symptoms (n = 8) viewed a mixed series of affective and neutral pictures. We expected depressive symptoms to be associated with differential BOLD signal in subcortical and frontal cortical structures, relative to controls, and explored whether group differences might differ across specific picture contents. Fifty grayscale pictures consisting of 10 categories of pleasant, neutral, and unpleasant contents were presented in an event-related series (3 seconds on, 12 seconds dark screen) while 8 sagittal slices covering midline structures and extending laterally to sample both amygdalae were collected every 500 ms on a 3 T GE Signa MR scanner. Relative to controls, depressive subjects showed less amygdala and more medial prefrontal activity during pleasant picture perception. BOLD signal in depressives also suggested relatively greater BOLD signal in infratemporal, intraparietal, and middle occipital cortex during pleasant picture perception relative to controls. These data support the perspective that depression may be associated with distinct patterns of corticolimbic activity during emotional perception. Further analyses will examine temporal interactions across regions of interest, as well as the role of specific categories of pleasant and unpleasant picture stimuli.

Poster 59
HYPER- AND HYPO-ReACTIVITY IN PTSD: TRAUMA RECURRENTNESS AND NEGATIVE AFFECTIVITY
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Descriptors: PTSD, startle, trauma
Within PTSD, a potential dose-response relationship was investigated between past trauma recurrence and current comorbidity and intensity of physiological reactions to aversive imagery. Primary PTSD (n = 49; 22 single trauma exposure, 27 multiple trauma exposure) and control (n = 76; 46 never trauma-exposed, 30 trauma-exposed) participants imagined scenarios while startle probes were presented and eye-blink responses recorded. Autonomic and facial expressivity changes were also assessed. Overall, PTSD patients exceeded controls in defensive reactivity during idiographic trauma imagery and, though less pronounced, showed heightened reactivity to standard anger, hate, and physical danger imagery. In subgroup analyses, controls with and without past trauma exposure showed isomorphic patterns. However, within PTSD only the single-exposed patients evinced robust startle and autonomic responses, exceeding both controls and multiple-exposed PTSD. Despite greater reported arousal, the multiple-relative to single-exposed PTSD group showed blunted defensive reactivity associated with...
more chronic and severe PTSD, greater comorbidities, and more pervasive dimensional dysphoria (e.g., depression, trait anxiety). Whereas PTSD patients generally show physiological hyper-arousal during aversive imagery, concordant with self-reported distress, the most symptomatic patients with histories of recurrent traumatization show discordant physiological hypo-reactivity, perhaps attributable to sustained high stress and persistent negative affectivity that ultimately compromises defensive responding.

**Poster 60**

ATTENTION CAPTURE IN BLOOD-INJURY FEAR: PARAFOVEAL & FOveal PROCESSING

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Descriptors: emotion, fear, attention

The aim of the current investigation was to explore whether individuals reporting significant blood-injury fear would demonstrate hyper-sensitivity to mutilation pictures presented briefly and paravertically. Whether such pronounced reactivity would be similarly revealed during more sustained foveal processing was also explored. Forty undergraduates were selected based on responses to the Mutatiion Questionnaire. Participants initially viewed a series of paravertical presentations (150 ms) of pleasant and unpleasant (threat, mutilation) pictures each paired to the left or right of a neutral picture. Next, a series of individual, foveal (3 × 4) pictures depicting the same contents were viewed. Overall, during paravertical presentation more arousing pictures prompted greater lateral-occipital P2 responses in the contralateral hemisphere. High relative to low-fearful participants demonstrated more positivity to mutilation pictures, with the strongest effect in the right hemisphere when these fear-relevant pictures were presented to the left visual hemifield. Interestingly, during foveal presentation, the same pattern of increased late positive potential (LPP) and decreased startle probe P3 responses to more arousing contents was observed in both groups. Taken together, these data suggest that fearful individuals are hyper-sensitive to relatively degraded fear cues, even amid competition by concurrent stimuli, whereas more thorough processing in central fixation results in similar levels of motgational engagement irrespective of fearfulness.

**Poster 61**

THE TIME COURSE OF ATTENTION TO FACIAL EXPRESSIONS DISTINGUISHES HEALTHY CONTROLS, SOCIALLY ANXIOUS INDIVIDUALS, AND SOCIAL PHOBIA PATIENTS

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University of Florida

Descriptors: steady-state potential, attention dynamics

This study examined whether emotional expressions modulate the time-varying amplitude of the steady-state Visual Evoked Potential (ssVEP), a continuous measure of attentive electrophorical facilitation. Pictures with facial expressions (happy, neutral, fearful, angry) were flickered at a rate of 17.5 Hz for a duration of 3428 ms. Participants varied in social anxiety severity and included controls, a group high on self-reported social anxiety, and patients diagnosed with social phobia. Although main effects of facial expression were small, strong interaction effects emerged between group and expression: Social phobia patients showed earlier and stronger initial (within 300 ms of flicker onset) increase of the ssVEP amplitude for angry and fearful faces, compared to the low- and high anxious controls. Neutral and happy faces did not show such early differences in temporal dynamics. However, stronger engagement as indicated by ssVEP amplitude reduction over time was observed for the patients and socially anxious students across all facial expressions. These data suggest that both socially anxious students and social phobia patients evidence attention disengagement over time. They also suggest that early differences indicative of early hypervigilence for faces with threat features may not be seen in an analogue sample, but may require greater severity as reflected in patient status. The observed pattern of initial attention hypervigilance and subsequent perceptual avoidance may represent a marker of the psychopathology of social anxiety.

**Poster 62**

LOUDNESS DEPENDENCY OF MISMATCH NEGATIVITY (MMN): EVIDENCE FROM CSD-PCA

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Descriptors: mismatch negativity, current source density, laplacian, loudness dependency

Auditory N1/P2 covaries with stimulus intensity (loudness dependency; LDAEP). Intensity deviants also produce MMN but it is unclear to what extent this effect is affected by loudness. These relations were explored in a modified MMN task in which binaural tones were presented at four intensities, using one intensity in a block as standard (70%) and the remaining three as deviants (10% each). An additional block used equiprobable (25%) intensities to validate LDAEP effects. Dense ERPs (72-channel) were recorded from 13 healthy adults who watched a silent film and reported its content after each block. Neuronal generator patterns underlying LDAEP and MMN, obtained by temporal PCA of reference-free CSD waveforms, included: 1) N1 sink (113 ms peak); 2) temporal N1 sink (159 ms); 3) P2 source (218 ms). These three factors revealed robust, monotonous relationships with intensity for standards and equiprobable stimuli. In contrast, temporal N1 was augmented with increases but not decreases in intensity. Whereas temporal N1 sink and P2 source showed a similar association with intensity, these CSD-PCA factors had secondary midline maxima (N1: fronto-central; P2: mid-central) that were responsive to large intensity increases but not decreases. Likewise, these effects were present for factor score differences (deviant minus standard) revealing characteristic MMN and P3a topographies. The findings suggest that MMN of tone intensity is elicited primarily by louder rather than softer deviants, and that LDAEP effects may be affected by a selective MMN for loud tones.

**Poster 63**

REFERENCE-FREE ERP OLD/new EFFECTS OF VISUAL RECOGNITION MEMORY FOR WORDS AND FACES IN SCHIZOPHRENIC AND HEALTHY ADULTS

Jürgen Kayser, Craig E. Tenke, Christopher J. Kroppmann, Shiva Fekri, Daniel M. Alschuler, Nathan A. Gates, Roberto B. Gil, & Gerard E. Bruder

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Descriptors: schizophrenia, recognition memory, current source density (csd)

For words, we previously reported a preserved ERP ‘old’-new effect (enhanced parietal P2) but not VPP for deviants and impaired P2/P3 for deviants. In agreement with prior results, ERP correlates of recognition memory deficits in schizophrenia suggest functional impairments of lateral posterior cortex (stimulus representation).

**Poster 64**

CHARACTERIZATION OF N1/P2 LOUDNESS DEPENDENCY BY TEMPORAL PRINCIPAL COMPONENTS ANALYSIS OF CURRENT SOURCE DENSITY (CSD-PCA): PREDICTION OF TREATMENT RESPONSE IN DEPRESSED PATIENTS

Craig E. Tenke, Jürgen Kayser, Nathan A. Gates, Daniel M. Alschuler, Christopher J. Kroppmann, Shiva Fekri, Jonathan W. Stewart, Patrick J. McGrath, & Gerard E. Bruder

New York State Psychiatric Institute

Descriptors: surface laplacian, loudness dependency, depression

Auditory ERP loudness dependency (LDAEP) shows promise as a predictor of clinical response in depressed patients treated with serotonin agonists. Quantification of LDAEP used N1/P2 peak-to-peak differences and inverse models of N1 corresponding to primary auditory cortex generators (e.g., BESA, LORETA). Reference-free unrestricted Varimax CSD-PCA (covariance matrix) offers a conservative, model-independent alternative. Auditory 72-channel ERPs (BioSemi) were recorded from 23 healthy adults and 15 depressed patients (listening to 40 ms, 1600-Hz pure binaural tones (1600–2100 ms ISI) at five, equiprobable intensities (60 – 100 dB SPL). Subsequently, patients began treatment with an SSRI, NDRI, or both antidepressants, and were assessed for treatment response after 4 – 12 weeks (7 remitters; 8 nonremitters). An N1 factor (116 ms peak latency) with a tangentially-oriented sink/source topography consistent with activation of auditory cortex showed a robust, monotonic association with intensity. As predicted, the loudness dependency of this sink was greater for remitters than for non-remitters, who did not differ from controls. Also, N1 was greater for remitters (p = .006). The P2 factor (226 ms; midline source topography) showed intensity effects that were less robust, while a radial temporal lobe N1 sink (167 ms) and a temporal lobe P3 source (351 ms) failed to show consistent effects. Thus, CSD-PCA offers a concise, but
Predicting response to antidepressants. The present study examined whether procedure of refreshing memory (RM) of a mock-crime scene prior to administration of a standard P300-based guilty knowledge test (GKT) would enhance the test accuracy for repeated offenders whose memory of each specific crime might be vague. Participants were required to enact both of two mock-crimes. At the first mock-crime, the participants entered a room and stole a ring from one of five desk drawers. At the second mock-crime, they entered another room and stole a wallet from a bag. The ring was used as the critical item in the GKT that was administered approximately one month after the first mock-crime. Prior to the GKT, a RM group viewed a videotape that depicted the room in which they had committed the first mock crime, while the participants in a no-RM (NRM) group viewed a videotape of the same length that depicted scenes from other parts of the college. P300 amplitude was measured as an index of the GKT. The critical item elicited significantly larger P300 amplitudes than non-critical items only in the RM group but not in the NRM group. In addition, the correct detection rate of the P300 amplitude was higher in the RM group (94.4%) than in the NRM group (70.5%). These results suggest that P300-based GKT became effective even in those who repeated crimes by procedure of RM. The RM procedure should be innovated in the P300-based GKT in the real forensic field. Applications of the GKT using P300 as an index into the real forensic field may then become more feasible.

Top-down effects on the regularity representation revealed by visual mismatch negativity

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Descriptors: regularity representation, top-down attention, visual mismatch negativity
Regular patterns embedded in discrete visual events can be automatically represented in the memory at the level of the visual system. However, regular patterns that can be automatically represented are known to be considerably limited (e.g., “repetition of standard” in the oddball sequence). In the present study, we tested top-down effects on regular patterns represented in the memory. We presented deviant (low-luminance) and standard (high-luminance) stimuli in a fixed manner at a 600-ms stimulus onset asynchrony (i.e., PSSSDDSSSSSS ... ) and tested the elicitation of visual mismatch negativity (vMMN) by deviant stimuli under three attention conditions: (1) “Unattend condition” where participants were instructed to ignore the luminance, (2) “Attend condition” where instructed to detect luminance changes, and (3) “Attend-Pattern condition” where instructed to detect violations of the large-scale regular luminance pattern (SSSSS). Because vMMN is known to be elicited when the current input mismatches the memory representation, it was hypothesized that vMMN would not be elicited by deviant stimuli if the large-scale regular pattern (SSSSS) was represented in the memory. Results showed that vMMN was elicited in the Attend condition, but not in the Unattend and Attend-Pattern conditions. These results imply that the large-scale regular pattern was represented in the memory representation only in the Attend-Pattern condition. These results demonstrate top-down effects on the regular patterns represented in the memory at the level of the visual system.
Posters

**Poster 71**

NEURAL BASES OF BEHAVIOR SELECTION WITHOUT AN OBJECTIVE CORRECT ANSWER
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Descriptors: anterior cingulate cortex, medial prefrontal cortex, behavior regulation
Life choices (e.g., occupation choice) often include situations with two or more possible answers. How does the brain respond to such conflict-ridden situations? We investigated whether the dorsal anterior cingulate cortex (dACC) evaluates the degree of conflict between possible answers. Additionally, we investigated whether the medial prefrontal cortex (MPFC) or the medial temporal lobe (MTL) has a function in behavior selection with plural possible answers. We used an occupational choice task (e.g. Which occupation do you think you could do better? — dancer or chemist) with two possible answers and a word-length task (e.g. Which word is longer? — dentist or comedian) that has a correct answer. The conflicts in each task were manipulated. Results showed that the dACC and the MTL were activated when the conflict during occupational choice was large, and that the MPFC and posterior cingulate cortex were activated more in the occupational choice task than in the word-length task. Our results suggest that dACC evaluates the degree conflict between possible answers, and that the MTL, MPFC, and posterior cingulate cortex have a function in behavior selection without an objective correct answer. It is thought that the MTL has a function to reduce conflict when a large conflict is detected in dACC. Furthermore, the MPFC and posterior cingulate are thought to have a function of biasing any of plural answers in behavior selection without an objective answer.

**Poster 72**

PREFRONTAL CORTEX MODULATES PERIPHERAL IMMUNE FUNCTION ACCORDING TO CONTROLLABILITY OF ACUTE STRESS
Hideki Ohira1, Kenta Kimura1, Michio Nomura2, Tokiko Iwasa2, Naho Ichikawa3, Masahiro Matsunaga4, Seisuke Fukuyama2, Jun Shinoda2, & Jitsuhito Yamada6
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Descriptors: prefrontal cortex, immunity, stress
The most rapid immune responses to acute stress are the redistribution of lymphocytes, an increase of natural killer (NK) cells, and a decrease of helper T-cells. Also, the redistribution of lymphocytes is attenuated when a stressor is uncontrollable. To explore neural bases of such phenomenon, we conducted simultaneous recording of brain activity using 15O-posterior emission tomography (PET), as well as measurement of cardiovascular parameters and the numbers of subsets of lymphocytes during performance of a stochastic learning task during which controllability was manipulated. Specifically, we set a controllable condition where participants could obtain monetary rewards with a probability of 70% and an uncontrollable condition where participants could obtain rewards in a completely random way. Consistent with our previous studies, physiological responses, including redistribution of lymphocytes, were enhanced in the controllable condition and attenuated in the uncontrollable condition. The orbitofrontal and dorsolateral prefrontal cortices were more activated in the uncontrollable condition, probably reflecting more necessity for monitoring and evaluation of contingency between stimuli, actions, and outcomes. More importantly, correlation analyses indicated that in the situation of uncontrollable acute stress, activation in those prefrontal regions was correlated with redistribution of NK cells. This result suggests evidence that the prefrontal cortex can modulate peripheral immune function on the basis of evaluation of controllability of acute stress.

**Poster 73**

THE STRUCTURE OF THE MINDFUL BRAIN
Hiroki Murakami1, Takashi Nakao1, Masahiro Matsunaga2, Yukinori Kasuya3, Jun Shinoda3, Jitsuhito Yamada6, & Hideki Ohira1
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Descriptors: voxel based morphology, mindfulness, insula
Mindfulness, which is the practice of bringing one’s complete attention to the experiences occurring in the present moment in a nonjudgmental or accepting way, is called the third wave of behavioral cognitive therapy and has been confirmed to be effective in improving emotion regulation. In this study, we investigated the association of mindfulness tendency and regional gray matter volume in the human brain by optimized voxel-based morphometry. Describing/labeling with words, one of the five factors in the mindfulness questionnaire, is positively associated with the right insula and right parahippocampal gyrus. Nonjudging of experience is positively associated with the right parahippocampal gyrus. The insula, which is included in Damasio’s somatic marker circuit, represents subjective feelings from the body and feelings of emotion. The parahippocampal gyrus is known as negatively associated with anxiety. The present study suggested that the mindfulness attitude change brain structure and psychological state recursively.

**Poster 74**

AFFECTIVE RANGE VS. MEAN: A NOVEL METHOD FOR UNDERSTANDING ATYPICAL AFFECTIVE MODULATION OF STARTLE
C. Daniel Hornykij1, Jared P. Dempsey1, David E. Lovett1, Elizabeth D. Eldridge1, Ashley N. Junghans1, Ronni G. Grigsby1, Brooke N. Hill1, Charles J. Abramson1, & Lee M. Cohen2
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Descriptors: affective modulation of startle, atypical startle modulation, self-assessment variability
In Attractive Modulation of the Startle Reflex (AMSR), the common method of assessing differences in affective reactions involves comparing averaged EMG startle values across valence categories: pleasant to neutral and unpleasant to neutral pictures. The current investigation assessed the utility of analyzing these variables in a more linear fashion. Affective ranges were created: neutral scores were subtracted from unpleasant scores (Negative Affective Range - NAR), and neutral scores were subtracted from pleasant scores (Positive Affective Range - PAR). These new variables allow for easy identification of atypical affective modulation in both the positive and negative direction. The NAR and the PAR variables were used to split participants into 4 groups with typical vs. atypical response patterns. These groups were then compared on their subjective ratings of affect and arousal of the same images used in gauging AMSR. Participants with both atypical NAR and PAR showed blunted subjective experience for both positive and negative images, in comparison to the other 3 groups. Specifically, pleasant images were rated much less positively (F(3, 39) = 3.551, p = .024, and more dull, F(3, 39) = 2.512, p = .073 (trend). Aversive images were also rated less negatively and dull; however these differences did not reach significance. The current poster will detail the methodologies used to calculate the “affective range” categories, as well as the results of their relationship to several other psychological and physiological variables.

**Poster 75**

THE INDEPENDENT CONTRIBUTION OF ANXIETY IN NICOTINE WITHDRAWAL-INDUCED CARDIAC DECELERATION
Ashley N. Junghans1, Jared P. Dempsey1, Kasey R. Claborn2, Sasha D. Jaquez3, David E. Lovett1, William Lechner1, & Lee M. Cohen2
1Oklahoma State University, 2Texas Tech University

Descriptors: nicotine withdrawal, heart rate, anxiety
The robust psychophysiological responses to nicotine withdrawal are well known, involving increased anxiety and decreased heart rate, hypothesized to be a homeostatic response to withdrawal. The current exploratory study was conducted to better understand the changes in HR and anxiety across three levels of nicotine withdrawal — Ad lib smoking, Brief Abstinence (3.5 hr) and Extended Abstinence (18 hr). While several studies have examined this relationship previously, none have assessed the trajectory of change across multiple points within abstinence period. Participants remained in the laboratory for 4 hr, with abstinence conditions every half-hour. Anxiety was assessed using the Profile of Mood States (POMS). Participants were grouped based on POMS, into those who increased in anxiety (IA), and those who stayed the same or decreased in anxiety (DA), for each abstinence segment. For Extended Abstinence, no significant change was found for the IA group, while the DA group showed an expected decrease in HR across time, $F(1, 16) = 3.06, p < .05$. For Brief Abstinence, the expected deceleration in HR was seen for both the IA and DA groups, $F(1, 15) = 13.30, p < .001$, $F(1, 10) = 5.72, p < .05$, respectively. For Ad lib, the DA group did not show a significant change in HR. However, the IA group showed a significant HR deceleration, similar to a deprived state, while still smoking ad lib, $F(1, 11) = 13.40, p < .01$. Poster details the independent variance contributed by anxiety and the decrease of HR associated with nicotine withdrawal.

**Poster 76**

COTININE AS A POTENTIAL PREDICTOR OF INCREASED ANXIETY DURING NICOTINE WITHDRAWAL
Kasey R. Claborn1, Jared P. Dempsey1, Sasha D. Jaquez2, Ashley N. Junghans1, Brooke Hill1, William Lechner1, Lee Cohen2, & Mustafa al’Absi3
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Descriptors: cotinine, anxiety, nicotine withdrawal
Cotinine is a metabolite of nicotine that is reliably associated with changes in tobacco use. Little is known about the relationship between cotinine and anxiety, with limited information suggesting that cotinine may enhance nicotine's anxiolytic properties during withdrawal. Anxiety in response to withdrawal is well researched. However, no studies could be identified which utilized biomarkers of tobacco reduction (or lack thereof) for potentially identifying differential anxiety-withdrawal reactivity. The present investigation
used the biological marker of salivary cotinine as an indicator of ability to reduce smoking among 30 nicotine dependent smokers with no desire to quit smoking who participated in several levels of abstinence sessions. During the extended abstinence session (18 hrs), those showing a 50% or greater reduction in cotinine from a typical smoking day differed from those showing less than 50% reduction. During the 4-hour laboratory stay, ending the 3.5 hour abstinence period, those with > 50% cotinine change did not increase in level of anxiety over the 5 assessment points of the study, F(1, 11) = 1.91, p > .05. Results suggest that those nicotine dependent individuals able to abstain from tobacco for an extended period will likely differ in psychological reaction to the state of withdrawal.

Results suggest that sub-clinical levels of depression and aversive-image response may be depression, albeit at trend level.

BLUE LED PREPULSE INHIBIT MORE IN PPI OF HUMAN STARTLE

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Descriptors: PPI, LED
Purpose: Startle response is inhibited by weak prepulse, either auditory or visual, presented 100-ms before the onset of startle eliciting loud noise. This phenomenon is called PPI. The purpose of this experiment was to compare the effect of color of visual stimuli on PPI. Procedure: Subjects were 12 students (6 males, 6 females). Stimulus conditions: Prepulse was an onset of LED (Light Emitting Diode) with 50-ms duration. Intensity of the startle noise was set at 110 dBA, duration 50-ms, and rise/fall time less than 1-ms. Noise was presented via headphones. Subjects received 25 trials with 5 blocks of 5 trials including four prepulse-noise pair conditions (SOAs 50-, 100-, 150-, and 500-ms), and noise alone control condition. The order of presentation was modeled after the 5 by 5 Latin Square. ITIs were randomly varied from 25 to 35+s with mean of 30-s. Subjects received two sessions, one using red LED and the other using blue LED. Six subjects initially received red condition and another 6 subjects blue. Startle response was assessed by EMG recordings of the M. orbicularis occuli. An independent measure of reflex magnitude was defined as an integrated value from 20- to 120-ms time windows after noise onset. Result and discussion: Results showed that mean magnitude of blink reflexes were inhibited under SOAs of 100-, 150-, and 500-ms conditions in both color conditions, however the inhibition was more intense in the blue than in the red condition at 500-ms SOA condition. These results suggest that blue LED-prepulse has more attentional effects on stimulus sensation than red LED-prepulse.

SOCIAL DEVIANCE AND STARTLE MODULATION: DIFFERENT RESULTS FOR DIFFERENT MEASURES OF PSYCHOPATHY

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Descriptors: affective modulation of the startle response, psychopathy, California psychological inventory
In affective modulation of the startle reflex (AMSR), psychopathic traits are associated with decreased startle potentiation when viewing aversive images. While AMSR methodology has stayed fairly consistent across these studies, there are numerous measures available to assess psychopathy, the most common being the Psychopathic Checklist Revised and the Psychopathic Personality Inventory. It is currently unknown whether various measures of psychopathy differentially influence this AMSR-Psychopathy connection. The current investigation was conducted to explore relationships between the California Psychological Inventory – Socialization Scale (CPI-So) and the AMSR-Psychopathy link. The CPI-So is a less frequently utilized, yet validated measure of psychopathy. It was hypothesized that greater levels of psychopathy (assessed via CPI-So) would be correlated with lower levels of potentiated startle, while viewing aversive images. Surprisingly, results showed a significant relationship in the opposite direction, with the higher scores of psychopathy (lower CPI-So) being associated with greater potentiation, r(45) = −.35, p < .05. Further, those subjects who did not exhibit increased startle potentiation (low psychopathy) showed a significant relationship between the California Psychological Inventory – Socialization Scale (CPI-So) and the AMSR-Psychopathy link. This demonstrated the necessity of not assuming that different psychopathy measures will have similar results.

In this study we assessed blood pressure (BP), heart rate (HR), stroke volume (SV), cardiac output (CO), and total peripheral resistance (TPR) in response to 13 picture series in 18 men and 19 women in order to investigate their hemodynamic responses associated with activation of the appetitive and defensive motivational systems underlying emotional experience. Skin conductance level (SCL) was also recorded. BP and SV increased with increasing self-rated arousal both for appetitive and defensive activation, whereas HR decelerated more in response to negative than positive and neutral pictures. TPR showed a general increase from baseline to picture processing but was unrelated to self-rated valence and arousal. These findings suggest that affective modulation of the cardiovascular response to appetitive pictures is primarily myo-cardial. The observed response pattern is consistent with a configuration of cardiac sympathetic-parasympathetic coactivation. The relationships between self-reported arousal, BP and SV were mainly explained by men suggesting that increases in the sympathetic inotropic effect to the heart with increasing self-rated arousal might be larger in men than in women. In contrast, SCL covaried positively with self-rated arousal both in men and women. This suggests that sex differences in the affective modulation of the responses to pictures may be restricted to specific cardiovascular parameters and support the contention that the sympathetic nervous system does not discharge as a whole.

ATTENTIONAL STARTLE MODULATION: IT TAKES MORE THAN PAIRS OF TWO DIGITS

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Descriptors: attention, startle eyeblink reflex
Attentional startle modulation is modality specific in continuous performance tasks (CPT) and modality nonspecific in trial-structured tasks. The first study assessed whether the interstimulus interval (ISI) between cue and target affects the nature of attentional startle modulation. Participants responded by pressing a button to a 7 when preceded by a 3. In one task block, the ISI was 5,000 ms, resembling a differential reaction time (DRT) paradigm, whereas in the second it was 1,650 ms designed to resemble a CPT. A trend towards modality specificity emerged in the CPT-variant and a trend towards modality nonspecificity in the DRT-variant. In a follow-up study, participants were explicitly informed of the predictive relationship in the task. This abolished the apparent trends, suggesting that the different ISIs employed in previous studies were unlikely to determine the nature of attentional startle modulation. Moreover, it suggests that a 2-digit sequence is insufficient to support attentional startle modulation. The second study assessed this. One group was presented with 3 – 7 digit pairs embedded in a 6-digit stream. A second group, matched on time on task, was presented with discrete 2-digit pairs. As before, modality specific attentional startle modulation emerged in the 2-digit task. This suggests that a digit sequence consisting of more than the target pair may be necessary for attention to modulate the startle eyeblink reflex.

CARDIOVASCULAR PATTERNS ASSOCIATED WITH APPETITIVE AND DEFENSIVE ACTIVATION DURING AFFECTIVE PICTURE VIEWING

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Descriptors: cardiovascular patterns, emotion, appetitive pictures
In this study we assessed blood pressure (BP), heart rate (HR), stroke volume (SV), cardiac output (CO), and total peripheral resistance (TPR) in response to 13 picture series in 18 men and 19 women in order to investigate their hemodynamic responses associated with activation of the appetitive and defensive motivational systems underlying emotional experience. Skin conductance level (SCL) was also recorded. BP and SV increased with increasing self-rated arousal both for appetitive and defensive activation, whereas HR decelerated more in response to negative than positive and neutral pictures. TPR showed a general increase from baseline to picture processing but was unrelated to self-rated valence and arousal. These findings suggest that affective modulation of the cardiovascular response to appetitive pictures is primarily myo-cardial. The observed response pattern is consistent with a configuration of cardiac sympathetic-parasympathetic coactivation. The relationships between self-reported arousal, BP and SV were mainly explained by men suggesting that increases in the sympathetic inotropic effect to the heart with increasing self-rated arousal might be larger in men than in women. In contrast, SCL covaried positively with self-rated arousal both in men and women. This suggests that sex differences in the affective modulation of the responses to pictures may be restricted to specific cardiovascular parameters and support the contention that the sympathetic nervous system does not discharge as a whole.
**Posters**

### Poster 82
**MUSIC PERFORMANCE ANXIETY (MPA): CARDIORESPIRATORY ACTIVITY IN HIGH- AND LOW-ANXIOUS PROFESSIONAL MUSIC STUDENTS BEFORE A PERFORMANCE SITUATION**
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Descriptors: music performance anxiety, respiration, hyperventilation

Surveys indicate that high-anxious musicians may suffer from hyperventilation (HV) before or during performance. Reported symptoms include shortness of breath, fast, deep breathing and thumping heart. However, no study has yet tested if these self-reported symptoms reflect actual cardiorespiratory activity. The main goal of this study was to determine if MPA is manifested physiologically in specific correlates of cardiorespiratory activity associated with HV. We studied 74 professional music students from Swiss Music Academies. In this study, we compared the most anxious students (high-anxious; n = 20) with the least anxious students (low-anxious; n = 23) based on their self-reported performance anxiety. We measured cardiorespiratory patterns with the Lifeshirt system, end-tidal CO2 with a capnograph (EtCO2, a good non-invasive estimator of HV), self-perceived physiological activation and affective experience in three situations on different days: baseline, performance without audience, and performance with audience. Comparing measures for the private vs. the public concert, high-com pared to low-anxious students showed a significant drop in EtCO2 before the public concert and reported larger increases in anxiety, tension, palpitations and breathing difficulties. In contrast, heart rate, respiratory rate and volume did not differ significantly between groups. The results of this study support the hypothesis that MPA may be associated with a tendency to hyperventilate and, thus, point to a potential hyperventilation problem in high-anxious music students.

### Poster 83
**EFFECT OF INTENSITY IN CHOICE REACTION TIME TASKS: AN EEG STUDY**
Izabela Szumska, Edyta Sasin, & Piotr Jaśkowski
University of Finance and Management

Descriptors: intensity, lateralized readiness potentials, processing stages

Long reaction times (RT) paradoxically occur with extremely loud auditory stimuli (Van der Molen and Keuss, 1979, 1981), or with ultra bright and large visual stimuli (Jarecki & Wodarczyk, 2006) when the task requires a response choice. Van der Molen and Keuss (1981) hypothesized that this effect of intensity results from an arousal-driven elongation of response-selection processes. We tested this hypothesis using visual stimuli and chronopsychophysiological markers. The results showed that latency of both early (P1 recorded at Oz) and late (P300) evoked potentials decreased monotonously with intensity. In contrast, the latency of stimulus-locked lateralized readiness potentials (LRP) abruptly increased for the most intense stimuli, thus mirroring the reaction time-intensity relationship. Response-locked LRP revealed no dependence on intensity. These findings suggest that the processes responsible for the van der Molen-Keuss effect influence processing stages that are completed before the LRP’s onset. Hence, the van der Molen-Keuss effect likely occurs later than those represented by early sensory potentials. This is in keeping with van der Molen-Keuss’ hypothesis.

### Poster 84
**CROWDED TARGETS DO NOT CAPTURE ATTENTION: AN EEG STUDY**
Marcin Ciesielcki, & Piotr Jaśkowski
University of Finance and Management

Descriptors: crowding, visuo-spatial attention, lateralized parietal potentials

Crowding has been shown to be a very robust cue. There is also evidence that masked information is processed in the visual cortex (V1 and V5). One hypothesis (attentional resolution) assumes that crowding constrains resolution of attention (i.e. the minimum spacing at which observers can select individual items). We tested this hypothesis by studying the lateralized parietal potential (LPP). Two letters (the main stimulus) were displayed on the right or left of a fixation point. Participants task was to indicate as quickly as possible whether the letter S was displayed. The main stimulus was preceded by a pair of ‘curvilinear’ letters (S, C; B) displayed for 32 ms, each of them surrounded by four ‘straight-line’ letters (e.g. X, T, A), presented simulta neously on the left and right of fixation. 75% of the trials (go trials) were compatible (S-letters on the same side in both stimuli) or incompatible (S-letters on different sides). In the remaining 25% of the trials (no-go trials) no target letter was shown, and participants were not supposed to provide an answer. In go trials, LPP was observed in the post-stimulus window of 310 – 430 ms. This potential was identical in the compatible and incompatible trials. No LPP was found in no-go trials. Assuming that LPP represents attentional shift to a relevant stimulus, a conclusion can be drawn that stimuli were processed as if they were not surrounded by four ‘straight-line’ letters (e.g. X, T, A). Thus, our results support the responsivity-driven elongation of response-selection processes, which is independent of crowding.

### Poster 85
**ATTENTION NETWORKS IN THE LEFT AND RIGHT HEMISPHERES: A SPATIO-TEMPORAL EEG STUDY**
Edyta Sasin, Izabela Szumska, & Piotr Jaśkowski
University of Finance and Management

Descriptors: attention, hemispheric specialization, LORETA

Attention can be conceptualized as a system of three specialized neuronal networks associated with alerting, orienting and executive control. However, evidence is scant about hemispheric specialization for these networks. To clarify hemispheric contributions to these processes, we performed an experiment in which visual targets were displayed in the left or right visual hemifield. Participants had to identify the direction of an upward or downward pointing arrow which was flanked by 4 arrows (2 below and 2 above the target arrow). Flanking arrows pointed either in the same direction (congruent trials) as the target or in the opposite direction (incongruent trials). Targets were preceded by either a centrally presented cue or a cue presented at target location (valid cue). EEG was analyzed using low resolution tomography (LORETA). Hemispheric differences in the processing of stimuli presented in the left and right hemifields were found for both executive control and orienting in the superior frontal gyrus (SFG).

In the case of executive control, the left SFG activation was independent of hemisegregation, and the right SFG was more active 590 – 690 ms post-stimulus in congruent trials when the left visual hemifield was stimulated. The opposite pattern was observed in incongruent trials. With orientation, larger activity was found for central than for valid cues in the right SFG whereas the activity of left SFG was irrespective of cue location. These findings indicate that LORETA is well suited for investigating attentional networks in the left and right hemispheres.

### Poster 86
**ATTENTIONAL FACTORS IN CROSSED-UNCROSSED DIFFERENCE: AN EEG STUDY**
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Descriptors: crossed-uncrossed difference, interhemispheric transfer, attention

Crossed-uncrossed difference (CUD) is widely believed to reflect the time of interhemispheric transfer (IH). However, Weber et al. (2005) showed that attention significantly modulates CUD. In our study, we wanted to shed some light on this influence using evoked potentials. We manipulated attention by varying the proportion of crossed and uncrossed trials (75/25 or 25/75). CUD was calculated from the P1 latencies for several homotopic electrode sites. Larger CUDs were obtained for O1/O2, P3/P4, CP1/CP2, C3/ C4 than for FC1/FC2 and F3/F4. No effect of attention was found for O1/02. Leftward attentional bias (AB; 75% trials on the left side) increased CUD for C3/C4 and F3/F4. Rightward AB (75% trials on the right side) reduced CUD estimate of IH from left to right hemisphere and leftward AB and in the case of executive control, the left SFG activation was independent of hemisegregation, and the right SFG was more active 590 – 690 ms post-stimulus in congruent trials when the left visual hemifield was stimulated. The opposite pattern was observed in incongruent trials. With orientation, larger activity was found for central than for valid cues in the right SFG whereas the activity of left SFG was irrespective of cue location. These findings indicate that LORETA is well suited for investigating attentional networks in the left and right hemispheres.

Rightward AB (75% trials on the right side) reduced CUD estimate of IH from left to right hemisphere and leftward AB and in the case of executive control, the left SFG activation was independent of hemisegregation, and the right SFG was more active 590 – 690 ms post-stimulus in congruent trials when the left visual hemifield was stimulated. The opposite pattern was observed in incongruent trials. With orientation, larger activity was found for central than for valid cues in the right SFG whereas the activity of left SFG was irrespective of cue location. These findings indicate that LORETA is well suited for investigating attentional networks in the left and right hemispheres.

### Poster 87
**SPATIAL-NUMERICAL ASSOCIATION INTERFERES WITH ORIENTING AND EXECUTIVE ATTENTIONAL PROCESSING**
Malgorzata Gut, Marzena Wasilewska, Izabela Szumska, & Piotr Jaśkowski
University of Finance and Management

Descriptors: attention, spatial-numerical association, mental number line

Brain representations of numbers are spatially organized according to the so-called mental number line (MNL). We investigated the relationship between attentional processes and this spatial-numerical association. In Task 1 participants indicated the position (left/right) of an earlier displayed digit within a centrally presented four-digit number. The position of digit was either congruent with its localization on the MNL (e.g. 8 on the right) or incongruent (e.g. 9 on the left). In Task 2 subjects were asked to assess the parity of the central digit within five-digit numbers (right key for odd and left key for even). The condition was referred to as congruent when the reaction side corresponded to the digit position on the MNL, and as incongruent when there was no such correspondence. In both tasks subjects showed more accurate and faster reactions in the congruent than the incongruent conditions. This finding confirms the interaction between attentional shifting and digit line on MNL induced a conflict which proves that also executive attention can be evoked by digits. LORETA results showed greater activation in the incongruent than in the congruent trials: (1) in parietal cortex 400 ms post-stimulus in the orienting attention task, as well as (2) in parietal and cingulate areas 500 ms post-stimulus in the executive
attention task. These activation patterns in conjunction with behavioral results confirm functional relationship between attention and numbers processing.

**Poster 88**

CRAVING AND AFFECTIVE EVALUATION OF TOBACCO STIMULI WITH VIRTUAL ENVIRONMENTS: STARTLE BLINKING MODULATION IN SMOKERS ON PROCESS OF CHANGE

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Descriptors: startle reflex, virtual environment, smoking addiction

The paper reports the results of a study on emotional modulation of the startle reflex in female smokers with a double objective: (a) to test the effectiveness of virtual environments versus traditional image presentation to induce affective states and (b) to examine how motivation to quit smoking is a relevant factor in the affective evaluation of tobacco stimuli, independent of craving. Participants were 32 university students who smoked more than 10 cigarettes daily. They underwent a psychophysiological test to assess the modulation of the startle reflex and completed several scales and questionnaires to measure craving, motivation to quit smoking, and subjective reactivity to the stimuli. Results show no differences between virtual environments and traditional images. However, motivated smokers showed greater blink magnitude to tobacco cues compared with non-motivated smokers. These results indicate that virtual environments are effective in inducing emotional states and craving and that that motivation to quit smoking affects the subjective assessment of the stimuli and the modulation of the startle reflex.

**Poster 89**

SOMATOSENSORY ACTIVITY MODULATION DURING OBSERVATION OF OTHERS’ PAIN

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Descriptors: EEG, emotions, empathy

Previous studies have demonstrated that observation of others’ pain can modulate the affective and sensory components of the pain network. In the present study, we examined whether brain activity elicited by tactile pain stimulation could be also modulated by the observation of pain and touch delivered to a model’s hand. Twenty healthy female volunteers (aged 19–23 years) participated in the study. Somatosensory-evoked potentials elicited by non-painful somatosensory stimulation of the right hand were recorded when subjects were viewing video clips depicting either a static right hand, a needle penetrating the dorsum of the right hand (painful stimulation), or a Q-tip touching the dorsum of the right hand (non-painful stimulation). Subjects were asked to rate both, the intensity and unpleasantness supposedly felt by the model. Results indicated that observation of video clips depicting painful stimulation enhanced P50 amplitudes at electrodes located over the hemisphere contralateral to the stimulation site (C3, CP3, P3, P5) as compared to viewing either a static hand or non-painful stimulation. Our data are consistent with previous results suggesting that neural substrates for empathic experiences also involve early sensory components of the pain network. Moreover, these findings suggest that observation of others’ pain might modulate the processing of somatosensory information independently of the kind of somatosensory stimulation (electrical or pneumatic) used to examine brain activity.

**Poster 90**

ERPS ELICITED BY PAIN AND ANGER FACES WITH DIFFERENT INTENSITIES OF EMOTIONAL expression

Ana María González Roldán, Mercedes Martínez Jauand, Miguel Ángel Muñoz García, Carolina Sitges Quirós, Ignacio Cifre, & Pedro Montoya Jiménez

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Descriptors: facial expression, EEG, pain

Previous studies have shown differences in brain activity between facial expressions of negative and positive emotions. There is, however, no information about how brain activity is modulated by the observation of faces with different levels of emotional expression. A forced-choice affective judgment task was used to investigate brain activity elicited by pain and anger faces with three intensity levels of emotional expression (high, medium, low). Stimuli were obtained from 1-second video clips depicting actors expressing from neutral to intense pain and anger. Brain activity elicited by these facial stimuli and low- and medium-intensity levels were judged as more unpleasant and arousing than faces with low levels of expression intensity. In addition, a N230 component was observed in frontal regions, which was differentially modulated by emotional faces and intensity level of the facial expression. ERP analyses showed that pain faces elicited greater amplitudes for low levels of expression intensity than for high levels; whereas angry faces elicited greater amplitudes for high levels as compared to low. These findings indicate that brain activity elicited by affective faces is also modulated by the intensity of the facial expression.

**Poster 91**

SLEEP ONSET AND CARDIOVASCULAR MODIFICATIONS IN INSOMNIA

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University of Padova

Descriptors: insomnia, sleep onset, cardiovascular

The transition from wakefulness to sleep is typically characterized by a shift from sympathetic to parasympathetic predominance. Previous investigations have shown cardiovascular and electroencephalographic hyperventilation before and during sleep in insomniacs compared to normal sleepers. Few studies have investigated cardiovascular activity during sleep onset in primary insomnia. The purpose of this study was to compare cardiac response during 3 minutes before and after falling asleep in 10 insomniacs who met DSM-IV criteria for primary insomnia and 10 normal sleepers. Measures of heart rate (HR), stroke volume (SV), cardiac output (CO), pre-ejection period (PEP) and left ventricular ejection time (LVET) were collected using impedance cardiography during a night of polysomnographic recording. Significantly decrement of HR, CO and increase of SVand LVET was found in both groups after sleep onset compared to wakfulness. Differently, PEP showed an increase after sleep onset in controls while it remained unchanged in insomniacs. Moreover, PEP was significantly lower in insomniacs than normal sleepers in both conditions. Physiological data are also consistent with longer sleep onset time and higher scores at the Pre Sleep Arousal Scale found in insomniacs. Results suggest that in sleep onset, normal sleepers followed the expected progressive autonomic drop, whereas insomniacs demonstrated a constant sympathetic hyperactivation. These findings support the hypothesis that physiological hyperarousal can be involved in falling asleep.
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THE FUNCTIONAL LOCUS OF THE SNARC EFFECT: AN ERP INVESTIGATION

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Descriptors: erps, SNARC

The Spatial Numerical Association of Response Codes (SNARC) effect refers to the finding of faster parity judgments (odd vs. even) with the left hand to small numbers and the right hand to large numbers, even though number magnitude is irrelevant. As the processing architecture underlying the SNARC effect (single-route versus dual-route models) and its locus within information processing are still debated, the main aim of the present study was to inform this debate using event-related brain potentials (ERPs). This study measured while participants performed parity judgments to centrally presented numbers in different response modality conditions (left vs. right hand, simultaneous hands vs. feet). P300 peak latency and the onset and amplitude of the lateralized readiness potential (LRP) in stimulus-locked (S-LRP) and response-locked (LRP-R) waveforms were analyzed. For unilateral hand responses, we replicated the standard SNARC effect in RT, whereas chronometric ERP measures indicated a SNARC effect only in the S-LRP onset. Also, there was no evidence of initial incorrect activation in both S-LRP and LRP-R waveforms for incompatible SNARC trials. Simultaneous hand (foot) responses were faster (slower) to small numbers than hand (foot) responses to large numbers, while the proportion of first left vs. right responses was not influenced by number size, both results disagreeing with the traditionally assumed left-right mental number line. In conclusion, our findings strongly support a single-route model of the SNARC effect with its locus at the response selection stage.

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INTERHEMISPHERIC EEG ASYMMETRIES OF ERP OLD/NEW EFFECTS IN VISUAL PERCEPTION OF SIMPLE NONVERBAL STIMULI

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Descriptors: perception, ERP, priming

The meanings of affective words normally modulate cerebral functional asymmetry (Thierry et al., 2009 and others). This study investigated the asymmetry effect of nonsemantic context on the perception of simple nonverbal visual stimuli in 10 healthy volunteers by the evoked potential (EP) method. The nonsemantic context was specified by the formation of a memory trace of a test visual stimulus via its repeated presentation without any instruction. This stimulus randomly alternated with control stimuli that did not form memory traces before their presentation. Results indicated significant differences (p < .05) within the 200 – 340 ms in the EP amplitudes in response to test stimuli and other types of stimuli. In this interval, the test-induced EPs with preliminarily formed memory traces were more negative than the EPs caused by repeated stimuli and more positive than the EPs in response to control stimuli. The control stimuli did not differ from one another. This old/new effect was distributed predominantly in the right hemisphere and has a focus in the right centro-parietal area, which is in agreement with the data on lateralization of the old/new effect in the case of the presentation of word stimuli and object image stimuli. Thus, in the absence of a subject’s attention to any characteristic of a stimulus that has no semantic and verbal attributes, its multiple repetition results in the formation of a nonsemantic context, which can be seen as the differences in the EPs induced by stimuli that are relevant and irrelevant to the context formed.

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CONFLICT SIGNALS IN THE EXPLICIT WORD STEM COMPLETION TASK

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Descriptors: word stem completion, cognitive conflict, ERP

The word-stem completion tasks is characterized as a situation of underdetermined responding: Word stems associated with several completions do not uniquely specify the appropriate response, and should lead to greater cognitive conflict. We tested this central assumption of the conflict monitoring theory (CMT; Botvinick et al., 2001) in an event-related potentials (ERP) study wherein conflict is expected to lead to an enhanced N2 component. Subjects learned word stems with one completion and word stems with three completions. In a test phase, all word stems were presented again and subjects were asked to name a learned completion. ERPs (29 channels) were recorded during the test phase and the first 500 ms post stimulus onset were analyzed. Word stems with three completions elicited increased naming latencies and a higher frontal P200 compared with word stems associated with one possible completion. Thus, the behavioral data support the assumption of the CMT, whereas the P200 finding does not. Thus, the condition that was expected to be associated with greater conflict did not reveal a more negative going deflection in the ERP during the first 500 ms. Because a higher P200 is discussed to indicate higher activation in the mental lexicon, we think these results are best explained with higher lexicosemantic conflict in the mental lexicon in the three completions condition.

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ASSESSING THE IMPACT OF STIMULUS SIMILARITY ON THE P300 DURING A CARD-PLAYING DECEPTION DETECTION TASK

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Descriptors: P300, lie detection, malingering

The use of event-related potentials (ERPs) has been investigated in both forensic and clinical contexts as a tool for the detection of guilty knowledge or malingering. Study designs generally involve presenting probes (e.g. crime-related information) embedded within a series of irrelevant items. However, the impact of the irrelevant items has been given little attention. Thus, the present study investigated the impact of stimulus overlap of the irrelevant items with the probe. Twenty participants completed a computerized card-playing task with 156 trials. For each trial, participants were shown a “match” card followed by the sequential presentation of six “test” cards, one of which was the same as the match card (i.e. the probe). Participants were asked to either identify the probe when it appeared (truth condition) or to deny recognition of the probe (lie condition). The test cards varied in terms of shared features (e.g. suit and/or face value) with the probe. An accurate identification of the probe for each participant was determined if the P300 amplitude elicited to the probe was larger compared to the irrelevant test card that evoked the largest P300 response. Recognition of the probe card was found in 95% of participants in the truthful condition and in 80% of participants in the lie condition. In addition, the P300 elicited to the test cards was found to be modulated by stimulus similarity, whereby the majority of participants showed a statistically significant pattern of increased P300 amplitude as the overlapping features with the probe card increased.

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ERP P3 AMPLITUDE CHANGE OVER TRIALS DURING THE PERFORMANCE OF A WORKING MEMORY N-BACK TASK IN OLDER AND YOUNGER ADULTS

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Descriptors: working memory, habituation, age

A previous event-related potential (ERP) study from our laboratory showed increased frontal activity during a working memory (WM) n-back task in healthy aging adults relative to younger adults. As WM load increased, frontal ERP P3 amplitude increased and parietal P3 amplitude decreased. Here, we examined P3 amplitude change across trials at frontal and parietal scalp sites during an n-back task in older and younger adults. ERPs were recorded for 3 levels of task difficulty (load): 0-, 1-, and 2-back. We hypothesized that there would be greater habituation of the frontal P3 amplitude decrement over trial blocks of 15 stimuli per block in younger versus older adults with increased WM load, and that the opposite pattern would be observed for parietal P3 amplitude. An Age Group × WM Load interaction was present during the 2-back condition, indicating that the older group had greater frontal amplitude compared to the younger group. These findings lend support to our previous results that the more difficult WM tasks recruit more frontal and parietal resources, and more so in older versus younger adults. The relationship between frontal and parietal scalp sites is reflective of resource allocation during WM. Habituation occurs early in the more difficult task in younger versus older adults.

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MODULATION OF PARIETO-FRONTAL FEEDBACK LOOPS IN CONTINUOUS VISUOMOTOR LEARNING IDENTIFIED BY EVENT-RELATED POTENTIALS

Holger Hill
Goethe University

Descriptors: visuomotor learning, feedback loop, tracking

Sensory feedback is essential for visuomotor learning. The posterior parietal cortex should analyze the success of error corrections by integrating visual, kinesthetic, and internal (effence copy) feedback. This information should be used by premotor

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areas to improve motor programs. The present study addressed the evaluation of the spatio-temporal pattern of this parieto-frontal circuitry in a continuous visuomotor task using ERP measures. In three experiments (between-subjects designs), subjects tracked a computer-controlled target with either a mouse (Exp. 1) or joystick (Exp. 2 & 3) controlled cursor. Visuomotor learning was varied to increase difficulty and to create implicit and explicit learning conditions. The initial tracking error and its reduction (reflecting visuomotor learning) was largest in the explicit joystick task, followed by the implicit joystick and the implicit mouse task. Error reduction was achieved by a continuous offset (target-cursor-distance) reduction. Two ERP components were modulated by visuomotor learning: 1) A fronto-central positive ERP component, peaking about 100 ms after the change of target direction and related to movement programming and execution showed an activity shift, that is an earlier onset and offset of the component, and 2) In the time range around 250 to 500 ms after error correction, ERP activity at central-pontieral sites was shifted to more positive values. Data from these three experiments support our previously formulated hypothesis (Hill & Raab, 2005).

**Poster 100**

**CHANGES IN EEG THETA ACTIVITY AFTER WORKING-MEMORY STRATEGY TRAINING ON A DIFFICULT PLANNING TASK**

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Descriptors: strategy training, theta activity, working memory

For those with working memory deficits it would be very beneficial if training could improve this ability, especially if there was information on the brain changes accompanying the improvement. In this study, we explored the differences in EEG theta frequency before and after specific strategy training in healthy young adults (N = 24) to begin to understand the changes in spectral power resulting from such training. Participants were asked to solve multiple trials of the Tower of London (TOL), a difficult spatial planning task, pre- and post-strategy training. Before the post-training session, participants were taught a strategy which reduced working memory load by chunking several moves together. Three types of problems were presented: directly trained problems, indirect problems (those which could be solved if participants transferred the strategy), and control problems that could not be solved using the strategy. Behavioral results indicate significant improvement on both the direct and indirect problems and less so for the control problems. EEG data, taken during a time in which participants were likely to be applying the strategy, showed an increase in power across midline leads at the post-training session, especially for the frontal cortex. Frontally situated lateral leads show greater theta power in the right hemisphere than the left. Additional regression analyses will assess the relation between performance and theta activity.

**Poster 101**

**GENETIC AND DEVELOPMENTAL INFLUENCES ON EEG BAND POWER AND ANTERIOR ALPHA ASYMMETRY IN ADOLESCENCE**

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Descriptors: EEG, asymmetry, heritability

Previous studies have demonstrated heritability of brain oscillations as reflected in the resting electroencephalogram (EEG) in children and adults, however, the little is known about genetic influences on the human EEG in early adolescence. Here we examined heritability of resting EEG power, anterior EEG asymmetry, and coherence in a longitudinal sample of 752 twins (including 169 MZ and 203 DZ pairs, 48% females) tested at ages 12 and 14. Linear structural equation modeling of longitudinal data showed that heritability of EEG band power was very high at both ages, with 82 to 91% of the observed variance in total alpha power explained by genetic factors. Developmental stability of alpha power was very high, with test-retest correlations between the two ages ranging from .80 to .89. Importantly, individual differences in the rate of developmental changes in EEG frequency spectrum were also heritable (up to 61%). Anterior EEG asymmetry showed substantial within-session test-retest reliability (r = .46 – .68), but modest developmental stability (r = .34). Visuospatial Corsi Block Tapping (FBT) was the best predictor of performance. Electrophysiological performance was characterized by increasing EEG power in gamma and beta bands in frontal and temporal areas, while the Originality and Fluency components vs control. Fluency and Flexibility tasks are characterized by increasing of EEG power in low frequency bands (delta, theta) and alpha bands (10-20 Hz) compared to non-spatial features in response conflicts. In order to elucidate the mechanism, we controlled the dual task design with the Lateralized Readiness Potential (LRP). Performance confirmed additivity of the Simon effect and EEG power for the color task, and underdeterminity for the spatial version. Importantly, an early LRP-deflection indicating incorrect response priming was unaffected in the onset latency, but strongly diminished for short SOAs. Therefore, the color Simon effect seems to emerge during response selection and to be resource-invariant. In contrast, the spatial Simon effect, related to location-dependent response activation via the dorsal stream in the brain, appears to arise during pre-bottleneck processing and seems to be resource-dependent.

**Poster 102**

**DISSOCIATING FUNCTIONAL LOCI OF SPATIAL AND NON-SPATIAL SIMON EFFECTS: A PRP/LRP STUDY**

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Descriptors: dual task, priming, conflict

In Simon tasks, task-irrelevant stimulus features prime corresponding responses. If the primed response is incompatible to the required one, RT is longer compared to the compatible assignment (Simon-effect). Recent dual task studies revealed that Simon effects in spatial versions of the task interact differently with stimulus onset asynchrony (SOA) compared to color versions: The color Simon effect was independent of SOA, whereas the spatial effect decreased with SOA. This signals a specific role of spatial compared to non-spatial features in response conflicts. In order to elucidate the mechanism, we controlled the dual task design with the Lateralized Readiness Potentials (LRP). Performance confirmed additivity of the Simon effect and EEG power for the color task, and underdeterminity for the spatial version. Importantly, an early LRP-deflection indicating incorrect response priming was unaffected in the onset latency, but strongly diminished for short SOAs. Therefore, the color Simon effect seems to emerge during response selection and to be resource-invariant. In contrast, the spatial Simon effect, related to location-dependent response activation via the dorsal stream in the brain, appears to arise during pre-bottleneck processing and seems to be resource-dependent.
Complex cognitive processes cannot be explained by a single gene effect, however, a correlation between certain gene polymorphisms and some cognitive task performance may be informative and stimulating for further research. We were interested in 5HT2A receptor gene (polymorphism T102C). Thirty-four right-handed male volunteers participated in this study: 17 of them had two C alleles of the 5HT2A gene (CC-group) and the others had CT genotype (CT-group). 256-channel EEG was recorded with 500 Hz digitization rate while our participants performed dual-choice visual task. The stimuli were monochrome photographs of humans and animals. The instruction was to press button 1 for a human and button 2 for an animal. Half of images in either group were neutral and half were showing aggressive people or animals (aggression/treat directed to the observer). No explicit recognition of emotions was required. Reaction times (RT) for emotional vs. neutral images were longer for both humans (p = .02) and animals (p = .08) in CT-group. For CC-group, differences were only for animals (p = .002). Major ERP-differences between CC and CT-group were around 200 ms widespread on the scalp, prominent in the central and frontal areas of the right hemisphere, and also around 300 ms in the posterior regions. There were also inter-group differences for human vs. animal conditions and for neutral vs. aggressive conditions (implicit emotion recognition).

Poster 106

RESTING EEG-CHARACTERISTICS AND HUMAN WORKING EFFICIENCY
Sergii A. Kryzhansovski, Igor G. Zyma, Sergii V. Tukaev, Andrii O. Chernyinski, & Natalia G. Piskorska
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Descriptors: EEG, short-term memory, sensomotor task

The aim of this study was to find the human rest EEG-characteristics, which can enable us to make assumptions about the efficiency and the features of further adaptation to various types of the cognition activity. EEG of 48 healthy 18 – 22-year-old volunteers were registered during resting wakefulness and performing the sensomotor (n = 21) and short-term memory (n = 27) tasks with eyes closed. We used audio stimuli in both tests. Spectral power density (SPD) of all frequencies from 2 to 25 Hz (2 Hz step) was estimated for each state. We found that sensomotor reaction time strongly negatively correlated with right parietal EEG-frequencies of 11 – 12 Hz SPD (r = –.6).

Poster 107

DOES ERROR DETECTION SYSTEM IMPACT TO LIE PROCESSING? AN ERP STUDY
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Descriptors: deception, error detection, ERP

The brain’s detection of deception is one of the intriguing issues for neuroscience research. Its behavioral manifestations are complex and contemporary powerful neuroscience methods of lie detection are however weak and not reliable. A possible way of progress in this direction is related to a possibility of discovering the fundamental brain mechanisms corresponded to lying processes. The error detection system (Betchevina N.P. 1968, 2005) is sensitive to involuntary incorrect actions, however, the deceptive action in relation to subjective knowledge about the true is incorrect. The issue concerning involvement of an error detection mechanism in such voluntary incorrect actions remains scantly explored. In present study we recorded event related potentials (ERP) while subjects performed “True-False” analog card game with voluntary deceptive and truthful responses. 13 subjects participated in present study. The ERP (band-pass 5 – 30 Hz, digitized at 250 Hz) was recorded from 19 scalp sites in accordance with extended 10 – 20 system. All electrodes were referenced to linked ear lobes. Impedance was kept below 5 KOhm. Amplitudes of extracted ERP components were subjected to two-way ANOVA analysis. The amplitude of negative deflection of ERP locked to responses with latency over 200 ms was higher for deceptive ones in comparison with truthful responses. This finding could be considered as evidence supporting the idea of involvement of an error detection mechanism in the brain’s processing of deception.

Poster 108

THE P300 BCI IS MORE THAN AN ODDBALL AND MORE THAN A P300 BCI
Sergei L. Shashkin, Ilya P. Ganin, & Alexander Ya Kaplan
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Descriptors: BCI, ERP, attention

One of the most popular BCI paradigms was developed by Farwell & Donchin (1988) as a variation of the oddball task, and is usually called P300 BCI. Recently, it was noted that, in addition to P300, an earlier posterior negative component also differentiated target vs. nontarget responses in P300 BCI (e.g., Krusienski et al., 2008). No studies, however, have directly compared this component in P300 BCI and oddball paradigms. We made such a comparison using the BCI2000 system (Schalk et al., 2004) in 10 healthy adults. In a BCI P300 paradigm, the amplitude of the first large posterior negative component (N1; peak latency in our settings in the range of approx. 200 – 300 ms) of the target-nontarget difference curves was larger.

Poster 109

ELECTROPHYSIOLOGICAL CORRELATES OF REFERENCE MEMORY IN A TIME DISCRIMINATION TASK: AN ERP AND ERD/ERS STUDY
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University of Padova

Descriptors: time perception, reference memory, ERD/ERS

In the present study we investigated Event Related Potentials (ERPs) and Event Related Desynchronization/Synchronization (ERD/ERS) responses in brain activity during a time discrimination task, in which stimulus interval length was modulated. ERP was recorded in 12 subjects (21 – 27 years) from 32 electrodes. The task consists on two successively presented pairs of visual stimuli. The first stimulus (standard interval) lasted either 500, 1000 or 2000 ms; the second stimulus (comparison interval) could have duration of the 30% shorter or longer than the standard one. Participants were required to compare the duration of the two stimuli and to determine whether the comparison one was shorter or longer than the standard. ERPs and ERD/ERS changes in the delta, theta, alpha and beta EEG frequency bands were examined. ERPs data showed a negative slow wave during the comparison interval in centro-frontal sites, which, only for intervals longer than the standard, terminates before the end of the stimulus, after a duration equal to the memorized standard one. A P150 was found at the offset of the comparison interval in parietal sites, which linearly increased with the absolute interval length. In addition, an increase of theta power for durations longer than the standard was found in parietal sites, at the offset of the comparison interval. The ERS increase was supposed to reflect the retrieval of the memorized interval. ERD/ERS together with ERPs results provide further insight on the involvement of a specific memory process (reference memory) in time perception tasks.

Poster 110

MOTHERS EEG ACTIVITY DURING BABIES CRYING AND NURSING
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Descriptors: eeg, emotion

In a previous study, we found an increase of theta and a decrease of alpha relative power while listening to classical music and an opposite pattern during listening to a baby’s crying recording. The present work was conducted to explore changes in brain electrical activity (EEG) during own baby’s crying and nursing in first time mothers. EEG was recorded in 8 healthy mothers, between 21 and 38 years old, with babies of 3 months or less, in 10 locations referred to the ipsilateral earlobes, according to the 10 – 20 International System. 20 segments (2 sec each) with opened eyes were recorded during: baseline (BL), while the baby was crying because of hungry (BC) and while nursing (NU). Signals were analyzed by means of the Fast Fourier Transform, obtaining absolute and relative power in theta, alpha and beta EEG frequency bands for each EEG band. Theta1 AP was higher during NU and BC than BL in T4. Delta AP difference was higher during NU than BC in T4 and P3. AP difference was higher during BC than NU in T3 for alpha2 and beta 1. rTRA was higher during NU than BL between C4-P4 theta2, F3-C3 alpha2 and F3-C3, F4-P4 and C4-P4 in beta2. Theta1 AP difference was higher in right temporal region in agreement with the emotional involvement in both conditions vs BL. CR in contrast to NU could have act as a disorganizer emotional stimuli, increasing beta1 in left temporal zone. Nursing induced an increment in temporal coupling between different areas of left and right hemisphere.

Poster 111

QUALITATIVE AND QUANTITATIVE EEG ABNORMALITIES IN ALCOHOL DEPENDENCE VIOLENT OFFENDERS
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Descriptors: EEG, offender, alcohol dependence

Resting eyes closed electroencephalogram was studied in a group of violent offenders evaluated at Psychiatric Department of the Legal Medicine Institute in Cuba (14 with alcohol dependence diagnosis, and 13 without psychiatric diagnosis). Characteristics of the EEG visual inspection and the use of frequency domain quantitative analysis techniques (narrow band spectral parameters) are described. Both groups were compared to Cuban normative database. High incidences of electroencephalographic abnormalities
were found in both groups of violent offenders. The most frequent were: electrogenesis alterations, attenuated alpha rhythm and theta and delta activities increase in the frontal lobe. In the quantitative analysis theta and delta frequencies were increased and alpha activity was decreased in both groups. Differences appear for the topographical patterns present in both groups. EEG abnormalities were more severe in alcohol dependee group than in control group. The results provides a strong lead for examining the electrophysiological differences between offender groups, the neurotoxic effect of drugs on the brain and to establish possible relations between the deficiency in information processing capacity of central nervous system how one of possible mechanisms related to increase the likelihood of criminal act in offenders with this diagnosis. 

**Poster 112**

FRONTAL ALPHA AND BETA EEG POWER ASYMMETRY AND IOWA GAMBLING TASK PERFORMANCE
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Descriptors: EEG, alpha, IGT
Frontal electroencephalographic (EEG) alpha asymmetry may index the activation of lateralized affect and motivation systems in humans. Resting EEG activation was measured and its relationship to Iowa gambling task (IGT) performance was evaluated. No effects were found for power asymmetry. However, beta power, an alternative measure of resting EEG activation asymmetry, was associated with the number of risky decisions made in the early portion of the task. IGT deck selection patterns show three styles of responding, high, random, and low. Interestingly, high performers' power asymmetry contradicts expectations of IGT performance that were based on lateralized frontal emotion and motivation systems.

**Poster 114**

PREDICTION OF TRANSITION TO SCHIZOPHRENIA IN AT-RISK INDIVIDUALS BASED ON EEG SPECTRAL POWER AND NEGATIVE SYMPTOMS
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Descriptors: quantitative EEG, prediction of schizophrenia, negative symptoms
Patients in an “at risk mental state for schizophrenia” (ARMS) can be detected based on specific as well as unspecific prodromal signs. Since only about 40% of ARMS identified by ultra high risk studies develop frank psychosis it is important to identify further factors contributing to the prediction of beginning psychosis. Quantitative EEG (along with neuroimaging and neuropsychological evaluation) may provide information on vulnerability in addition to clinical assessment. We examined a sample of 13 neuroleptic-naive ARMS who developed psychosis and 15 that did not during a follow-up period of at least 4 years from the “Baseline prediction and early detection of psychosis” study. Psychopathology was rated with the Scale for the Assessment of Negative Symptoms (SANS) and EEGs were recorded using a 10–20 configuration. Logistic regression analysis was used to predict transition to schizophrenia based on SANS score and EEG spectral power over the fronto-central scalp area controlling for confounding factors (age, gender, medication, cannabis use and daytime of EEG recording). Neither SANS score nor EEG power scores alone were predictive of a transition to schizophrenia.

**Poster 115**

IMPLICIT PROCESSING OF FACIAL FEATURES: EVIDENCE FROM HUMAN ELECTROPHYSIOLOGY
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Descriptors: face processing
In this study, we used ERPs to investigate neural correlates of face processing. More specifically, we utilized a masked priming paradigm to investigate implicit processing of the eyes and mouth in upright and inverted faces, using a prime duration of 50 ms. Three types of prime-target pairs were used: 1. congruent (e.g., open eyes only in both prime and target); 2. incongruent (e.g., open eyes only in prime and open mouth only in target) and 3. dual (both mouth and eyes open in the prime only followed by either type of target, i.e., either eyes or mouth but not both, open). The identity of the faces changed between prime and target. Participants pressed one button to indicate whether the target face’s mouth was open, and an other if the eyes were open. The behavioral results indicated a congruent priming effect for both upright and inverted faces. In addition, we found an enhanced negativity at about 200 ms after target presentation. The amplitude of the N200-like component depended on the relation between prime and target, being smaller when the stimuli were congruent in both upright and inverted faces. This N200-like component was followed by a P300 component, which was influenced by the three conditions, with incongruency and dual producing a smaller positivity than congruency in both upright and inverted faces. Moreover, when the stimuli were presented upside down, the N200 and the P300 effects took place about 30 ms later. The functional significance of these ERP effects is discussed in relation to unconscious perception and configural face processing.

**Poster 116**

HOW LEARNING TYPE AND REWARD MODULATE THE ERP CORRELATES OF ERROR PROCESSING
Nicola K. Ferdinand, & Axel Mecklinger
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Descriptors: error-induced learning, learning type, reward
An important electrophysiological marker of error monitoring is the error-related negativity (ERN), an event-related potential (ERP) component visible after subjects commit an error or receive negative feedback. Interestingly, earlier studies showed that not only negative stimuli, but also the way it is processed, influences error monitoring: The ERN is more pronounced for subjects that learn better from negative feedback (negative learners) than for subjects that learn better from positive feedback (positive learners). Additionally, the ERN is larger when learning incentives like monetary rewards are given. A functionally similar negativity, the N2b, is elicited by perceived errors (deviant events). The aim of the present study was to explore whether the N2b, in a similar way as the ERN, is modulated by learning type and incentives. We conducted a sequence learning experiment with deviants inserted into a repeating sequence. A neutral and a rewarded condition were realized with groups of positive and negative learners. This allowed us to examine ERP correlates of committed errors (ERN) and perceived errors (N2b). Surprisingly, in contrast to previous studies we did not find ERP differences in error monitoring between positive and negative learners. However, our results show that ERP differences between correct and erroneous responses and between regular and deviant stimuli are larger when incentives are given during learning. This might imply that the error monitoring system is engaged more strongly in conditions in which errors are more important and rewards are expected.

**Poster 117**

THE FUNCTIONAL SIGNIFICANCE OF THE PARIETAL ODDBALL N2 OBTAINED IN AUDITORY EXPERIMENTS
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Descriptors: oddball paradigm, n2p, p3b
Recently a number of studies reported a negative parietal event-related potential to auditory oddball stimuli in the N2 latency range (N2p), however, a functional characterization of this component is still missing. Because a common feature of most studies reporting an N2p was that the eliciting oddball stimuli were well-identifiable members of a behaviorally significant stimulus category, it seems possible that N2p reflects identity-based processing of the stimulus (as opposed to a rule-based evaluation of the task-relevant feature). In the present study, this hypothesis was tested by varying the plausibility of reducing the task-rules to a stimulus identification-based stimulus-response association. A sequence of tone-pairs was presented. Participants responded according to the direction of within-pair pitch change (50% going lower ~ 50% higher). On oddball trials (10%), the spectral width of the second tone of the pair was changed. In the “identity” condition, the magnitude of pitch change was always seven semitones; in the “feature rule” condition it was six or eight semitones (randomly). Whereas the “identity” condition should foster identity-based processing, the variability and use of less frequent musical intervals should give better support to rule-based processing of the task-relevant feature-dimension. Reactions were delayed in oddball trials. N2p and N2b were only elicited in the “identity” condition, whereas P3b was present in both conditions. These results support the hypothesis that N2p is related to the identity-based processing of the stimulus.

**Poster 118**

WAVELET-BASED EEG ARTIFACT CORRECTION OF EEG
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Descriptors: eeg correction, wavelet, multiscale analysis
Electroencephalogram (EEG) is profoundly affected especially at frontal sites by electrooculogram (EOG) artifacts originating by eye movement, blinks or eyelid movements. This is even more dramatic with children who cannot prevent themselves to blink or to move their eyes. Therefore, EEG correction techniques are of primary importance in the study of brain electrical sources related to cognitive processes in children. Different approaches have been used to correct EEG artifacts, all estimating for each EEG channel the proportion of ocular contamination and by subtracting EOG scaled by the estimated proportion from the original EEG signals. The proportion of ocular contamination is usually estimated from the temporal correlations between the amplitude variations of the EEG and the EOG channels. We developed an alternative approach based on the correlations between the different frequency sub-bands obtained by a multi-scale analysis (discrete wavelet transform) of the EEG and the EOG channels. The technique was utilized for the detection and spectral
characterization of transient (artifact) and background processes (true EEG). The EEG is estimated in the wavelet space, using an appropriate weighted mixture of raw signal and the EOG channel where the artifact is modeled. This is combined with an unusual shrinkage technique to avoid discontinuities in the reconstruction of the EEG. EEG obtained in children and corrected by these two different approaches (temporal or multi-scale) will be compared in order to assess the reliability and effectiveness of EOG correction methods.

**Poster 119**

EEG INVESTIGATION OF SPATIAL CREATIVE THINKING COMPONENTS

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Descriptors: EEG, spatial creativity

The aim of the study was to reveal EEG correlates of creative thinking components - fluency, flexibility and originality (Guilford, 1950; Torrance, 1974) during performance of figural Torrance test (1974). Twenty-one healthy subjects took part in our EEG study. In FLUENCY task volunteers drew as many pictures as possible. In FLEXIBILITY task volunteers drew pictures from different classes (animals, flowers, equipment). In ORIGINALITY task volunteers drew any original, creative pictures. In CONTROL task volunteers drew lines without any system. EEG was recorded from 19 scalp electrodes (10–20). We calculated spectral power in B1 (13–18 Hz), B2 (18.5–30 Hz), G (30.5–40 Hz) bands, used ANOVA for analyzing the interaction, and obtained significant EEG power differences.

**Poster 120**

THE N200 IS SENSITIVE TO CONCEALED INFORMATION AND ADDS TO THE DETECTION EFFICIENCY OF SKIN CONDUCTANCE RESPONSES

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Descriptors: guilty knowledge test, N200, response monitoring

Previous studies on the Guilty Knowledge Test (GKT) demonstrated that event-related brain potentials (ERPs) and skin conductance responses (SCRs) can be used to reliably detect concealed knowledge. However, the contribution of memory- and task-related processes to this response pattern remains unclear and it has not been tested whether SCR measures provide incremental validity in addition to ERPs. We implemented variations of the GKT in two experiments while simultaneously measuring SCRs and ERPs. Participants were required to conceal knowledge of a specific playing card (probe) while viewing a randomized sequence of probes and irrelevant items. In experiment 2, another playing card was merely memorized but not specifically instructed to be concealed. Task relevance was manipulated by requiring participants to press a different response key for rare targets (experiment 1) or catch items (experiment 2). We found that P300 amplitudes were specifically enhanced for items requiring a deviant behavioral response but they were not sensitive to concealed knowledge. In contrast, N200 amplitudes differed between memorized and irrelevant items in both experiments. SCR measures reflected a combined influence of task relevance and probe recognition and they provided incremental validity above N200 amplitudes. These results suggest that the P300 mainly reflects task relevance in the given experimental setting while the N200 amplitude is sensitive to previously encoded information and potentially linked to response monitoring processes.

**Poster 121**

ELECTROPHYSIOLOGICAL CORRELATES OF DIRECTED ATTENTION TO FACE FEATURES

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Descriptors: face, N170

Decades of research has shown that the N170, a negative-going component recorded from electrodes occipital-temporal cortex, is consistently of larger amplitude and of shorter latency in response to faces versus objects. More recently, a number of studies have shown that individuals with psychiatric disorders, including autism, exhibit atypical N170 responses to face stimuli. However, these studies have not accounted for the possibility that atypical face viewing patterns might account for some, or all, of the observed processing differences. In the current experiment, we used simple visual stimuli (e.g., a small spinning square) to direct normal adult participants to look at a particular area of the screen. Then, faces were presented such that the participant was viewing either the eye or mouth region when the face was presented and the N170 recorded, with object stimuli included as comparison stimuli. Results indicate that there were no differences in the amplitude of the N170 component when participants viewed the eye versus the mouth region, F(1, 12) = 1.80, p = .20. However, N170 latencies were significantly shorter in response to viewing the eye region versus the mouth region, F(1, 12) = 6.44, p = .026; but not for viewing the top versus the bottom of objects, F(1, 12) = .38, p = .55. These results suggest that location of initial visual focus on full face stimuli affects the latency of the face-sensitive N170 component.

**Poster 122**

BRAIN POTENTIALS ELICITED BY GARDEN-PATH ARITHMETIC EXPRESSIONS

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Descriptors: garden path effect, arithmetic, P600

It has been shown that ‘garden-path’ sentences elicit the P600, which may reflect structural reanalysis occurring at a critical word indicating that the preceding ambiguous sentence structure was complex. We carried out an experiment where ‘garden-path’ (temporarily ambiguous and eventually complex structure), ‘main-path’ (temporarily ambiguous and eventually simple structure) and control (un ambiguously simple structure) arithmetic expressions were presented. The second operators serve as the critical element disambiguating expression structures in ‘garden-path’ and ‘main-path’ expressions. Results showed that by comparing second operators in ‘garden-path’ to control expressions, two posterior late positive components (LPC) within 350 – 500 and 650 – 900 ms were elicited. The first LPC could have been a P300, reflecting detection of error in the previously preferred analysis. The second LPC was analogous to the P600, which may reflect structural reanalysis in ‘garden-path’ arithmetic expressions. Additionally, a central LPC within 350 – 500 ms was elicited by second operators in ‘main-path’ relative to control expressions. It is likely that a P300 represented a confirmation of correctness in the previously preferred analysis. The present study suggests that processing of both ‘garden-path’ arithmetic expressions and language sentences may have common neurophysiological processes.
ERP-P3 FOR PICTURES VARIES IN AMPLITUDE ACCORDING TO STIMULUS CONTENT

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Descriptors: ERP-P3, pictures, stimulus probability

It has been demonstrated by using a simple oddball task that P3 amplitudes vary as a function of stimulus probability. Using a discriminative reaction time task, this study explored whether ERP-P3 varies according to picture content. In the Stop-Cars condition, pictures in five categories: cars, people, electronics, flowers, and landscapes, were presented randomly at probabilities of 0.5, 0.3, 0.1, 0.0, and 0.0, respectively. Participants were asked to react to every stimulus that was not a car. In the Stop-Images condition, simple geometric shapes replaced the car stimuli, with all other procedures being identical. ERPs for stimuli of electronics, flowers, and landscapes that were presented equiprobably were analyzed. Two types of P3s were observed in the waveforms. The first component (early P3) observed about 380 ms after stimulus onset had a parietal maximal and seemed equivalent to P3 (P3b). The second component (late P3) observed about 520 ms after the stimulus onset was more anterior distributed. In the Stop-Cars condition, early P3 amplitudes were largest for flowers, followed by that for landscapes and electronics. Neither early P3 elicited by flowers, nor that elicited by landscapes were different between the two conditions. However, the stimulus of electronics in the Stop-Images condition yielded a large early P3 that was similar to that yielded by stimuli of flowers. These results suggest that in a discriminative reaction time task, the P3 amplitude for complex pictures is sensitive to the content of picture rather than to the probability.

INFLUENCE OF AROUSAL STATE ON MOVEMENT-RELATED BRAIN ACTIVITY

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Descriptors: movement-related potentials, arousal, skin conductance

Voluntary movements are preceded by pre-movement cortical activity associated with the planning and readiness for action. Previous studies have suggested that movement-related brain activity is affected by higher cognitive functions such as attention and motivation. In this study, we investigated the effect of arousal on pre-movement activity by examining the Readiness Potential (RP) under conditions of high and low physiological arousal. Eighteen participants performed a Readiness Potential paradigm in which they executed self-paced voluntary movements approximately every 4 – 5 s. The arousal state was manipulated by the experimenter through interaction with participants during rest breaks. 64 channels EEG, skin conductance level and heart rate were recorded. Skin Conductance level was significantly different between high and low arousal conditions, showing that the experimental manipulation effectively altered arousal state. The RP amplitude was significantly higher under conditions of low arousal compared with high arousal, with no change in the RP scalp topography. Moreover, arousal level differently modulated the early and the late component of the RP. Results exclude the hypothesis of a positive linear relationship between Readiness Potential and arousal. Therefore neural mechanisms associated with increasing arousal are unlikely to directly influence the premotor pathways important for the preparation and readiness for action.

RESPONSE ACTIVATION AND INHIBITION IN CHOICE RESPONSES: A LAPLACIAN ERP ANALYSIS

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Descriptors: response activation, response inhibition, Laplacian ERP

Recent studies using laplacian-transformed EEG showed that manual choice responses involve a negativity recorded over the contralateral primary motor cortex (M1), representing the central motor command to the involved hand. This activation is accompanied by a positivity over the ipsilateral M1, preventing activation of the non-involved hand. This pattern is preceded by activation recorded over the supplementary motor area (SMA), which is thought to reflect a hierarchically organized control system upstream of M1. We further explored this pattern by comparing Laplacian estimations derived from four different choice responses in a stop-signal task. Participants were required to respond with the left or right hand to primary go signals (white arrows) that occasionally changed to blue or pink. Blue (ignore) signals could be ignored in favor of the go response, whereas the ongoing response should be stopped when presented with a pink (stop) signal. We compared EMG-locked responses on go trials, on unsuccessful stop trials, and fast and slow responses to ignore stop trials. The Laplacian results showed that the negativity (i.e., activation) over the contralateral M1 did not differentiate between the four response types. However, the ipsilateral inhibition of M1 varied with response speed and was greatly reduced for slow responses. Interestingly, SMA activation was absent preceding slow responses. This pattern of findings supports the notion that the positivity over the ipsilateral M1 represents a control function that prevents choice errors, guided by the SMA.

ACC THETA OSCILLATION AND THE FEEDBACK-ERN

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Descriptors: ERN, ICA, decision-making

The feedback-error related negativity (ERN) is a medial frontal negative deflection which peaks at around 300 ms, elicited by informative feedback about the correctness of a response when the subject does not know which response is correct. The feedback ERP does not just index error or conflict detection, but may play a role in reward related learning. The putative generator of the feedback-ERN is the anterior cingulate cortex (ACC), that a region also known as the generator of the ERN. In another study, we found that the ERN consists of more than one component using independent component analysis (ICA). In the present study, ICA is applied to multichannel EEG data from an experiment in which subjects engaged in a probabilistic reinforcement learning task which we manipulated. Behaviorally, all subjects quickly adapted their decision-making to maximize rewards. Cluster-analysis applied to the normalized scalp topographies and power spectra of the ICA data identified two classes of contributing components, an ACC cluster and a Pe cluster. Time-frequency analysis revealed that ACC cluster responses to losses, compared to wins, were associated with enhanced power and phase coherence in the theta (4 – 7 Hz) frequency band. These findings suggest that the neural mechanisms of feedback processing may differ between wins and losses while the theta oscillation may reflect the difference.

THE USE OF HIGH RESOLUTION EEG TECHNIQUES TO IMPROVE THE ESTIMATION OF CORTICAL ACTIVITY AND CONNECTIVITY

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Descriptors: surface laplacian, high resolution EEG, connectivity estimation

In the last decade, the possibility to noninvasively estimate cortical activity and connectivity has been highlighted by the application of the techniques known as high resolution EEG. These techniques include a subject’s multi-compartment head model (scalp, skull, dura...
Poster 131
WHAT DO WE MEASURE – CREATIVITY OR TASK COMPLEXITY?
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Descriptors: creativity, task complexity, EEG
When investigating creative thinking, even if we use a test-control approach, it is difficult to balance tasks by their complexity level, and some differences can be obtained because of different tasks’ complexity levels. We carried out an EEG study in order to reveal and separate correlates of creative task performance and the noncreative factor of task difficulty (subjective complexity). Fifty right-handed healthy subjects took part in our EEG study. We found that creative and non-creative verbal tasks of the same SCL differed in their EEG spectral power correlates.

Poster 133
CONTINUOUS RATING AND PSYCHOPHYSIOLOGICAL MONITORING OF EXPERIENCED AFFECT WHILE WATCHING EMOTIONAL FILM CLIPS
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Descriptors: valence & arousal, film clips, facial emg
Subjective rating on the dimensions of valence and arousal is common for affective sounds, pictures and movies alike. Usually the rating is done after presentation, which may be insufficient for dynamic stimuli. We modified an existing software to continuously rate stimuli (‘EMuJoy’) such that the axes of valence and arousal were superimposed as thin crosshairs on the playing clip and rating could be done while watching, using a PC mouse. Sixty subjects watched 14 clips that evoked joy, sadness, disgust, anger, and fear as well as a neutral scene. Facial EMG, EKG and skin conductance (SC) were recorded during presentation. All data were analysed using time-aggregated values for all clips and considering temporal course for the most effective clip for each emotion. Joy could clearly be distinguished from the negative emotions due to its valence, while sadness had a significant lower arousal rating than anger, disgust and fear. Facial EMG distinguished between positive and negative emotions and differentiated disgust from anger and fear. Fear was accompanied by stronger electrophysiological reactions than anger. SC decreased during presentation for all negative emotional stimuli and only increased during abrupt changes in plot typical for disgust and fear. While the standard deviation of inter-beat-intervals initially decreased for all emotions, it only re-increased for the joyful clip. These changes became only apparent when looking at the temporal course. We thus conclude that continuous rating and analysis of the course of change may provide new insights for emotion research.

Poster 134
PERSONALITY, EMOTION, FEELINGS & PHYSIOLOGY: HOW PERSONALITY MODERATES THE EFFECT OF EMOTION INDUCTION ON PHYSIOLOGY AND FEELINGS
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University of Marburg
Descriptors: positive emotion, personality, cardiovascular
How does personality influence the effects of emotions on cardiovascular variables? We evoked positive feelings of warmth/liking (and the opposite) in subjects which were engaged in a romantic partnership. Forty heterosexual couples were studied in a virtual ball game (“Cyberball”), in which one of the partners was instructed to play with his or her partner plus another unknown couple on a computer. Cyberball allows researchers to experimentally modulate social inclusion and exclusion. Variables in this experimental design included Emotion (positive/negative), Group (experimental/control) and Gender, in addition to certain personality traits used as covariates. Traits like affiliation, harm avoidance, positive emotionality, and achievement orientation influenced physiological variables (ECG, skin temperature, skin conductance) and subjective feelings of warmth/liking. Personality specifically moderated the impact of emotion induction and resulting effects on physiological parameters. For example, participants high in affiliation showed larger P-Q times, which marks a higher vagal influence, in the negative experimental group compared to negative participants. For example, participants high in affiliation showed larger P-Q times, which marks a higher vagal influence, in the negative experimental group compared to negative participants.

Poster 135
EMOTIONS IN MOTION: THE PERCEPTION OF DYNAMIC AND STATIC EMOTIONAL FACIAL EXPRESSIONS INVESTIGATED BY ERPS AND FMRI CONSTRAINED SOURCE ANALYSIS REVEAL DIFFERENT SPATIO-TEMPORAL NEURAL NETWORKS
Sina A. Trautmann1, Judith Dominguez-Borrias2, Carles Escera2, Thorsten Feur1, & Manfred Herrmann1
1University of Bremen, 2University of Barcelona
Descriptors: dynamic vs. static faces, fmri constrained source analysis, disgust
The aim of the present study was to examine emotion-specific event-related components and to apply discrete regional source models based on corresponding fMRI activation patterns complemented with additional fitted sources. Data were obtained during the perception of static and dynamic emotional face stimuli. Healthy women (N = 19) passively watched videos and photos of different facial expressions (neutral, disgust, happiness). ERP data of static facial expressions showed a stronger deflection of the N170 in right posterior regions for emotional compared to neutral faces. LPP over centro-parietal areas for emotional compared to neutral faces could be shown for static and dynamic modality. For static facial expressions, predominantly additionally fitted regional sources showed distinct source signals for emotional compared to neutral stimuli. Aside from posterior regions, the source model of static faces revealed a potential emotional modulation of the insula indicated by enhanced source signal for disgust compared to neutral face processing between 300 and 350 ms. Dynamic emotional stimuli compared to neutral ones yielded increased source signals in posterior, inferior frontal and medial frontal regions, hence, a topographically more distributed network. The data support the view that (1) a combined fMRI and EEG approach of studying emotional perception enhances our knowledge about the time course of activation of different sources and reveals sources in regions not identified by fMRI procedures, and that (2) static emotions, compared to dynamic emotions, recruit different neural networks.

Poster 136
CIGARETTE SMOKING REDUCES NEGATIVE AFFECT IN ADOLESCENT SMOKERS: CONCORDANCE ACROSS SELF-REPORT AND PSYCHOPHYSIOLOGICAL MEASURES
Jennifer C. Veilleux, Jon D. Kassel, Margaret C. Wardle, Adrienne J. Heinz, Justin Greenstein, Daniel P. Evatt, Ashley Braun, Linda Roesch, Eisuke Segawa, & Michael L. Berbaum
University of Illinois, Chicago
Descriptors: adolescent, nicotine
Whereas most adult smokers report that smoking cigarettes reduces negative affect (NA), the extent to which NA reduction occurs in adolescent smokers is unclear. Many adolescent smokers also attribute their smoking to affect regulation, yet there is little research that empirically supports this claim. Hence, the current study compared changes in emotion (as measured by the Positive and Negative Affect Schedule, acoustic startle eyeblink latency and amplitude, and skin conductance) and craving in adolescents (N = 198, mean age 15.7, 54.7% girls). Changes in emotional response were assessed from pre-post smoking and compared to the same smokers in a non-smoking condition and to a group of never-smokers. Participants attended 2 sessions, approximately 6 weeks apart, wherein smokers were randomized to smoke at one of the two sessions. Using SAS PROC MIXED, results revealed that, relative to non-smokers or the no-smoke condition, smoking a nicotine cigarette significantly: (1) increased startle onset latency, (2) decreased skin conductance level, (3) decreased self-reported NA and craving. Smoking exerted a near-significant reduction on startle eyeblink amplitude. Overall, results suggest that even among young, light (12.5 days smoked in the past 30 days, 3.4 cigarettes smoked per day) smokers, cigarette smoking reduces NA as assessed via both self-report and psychophysiology.

Poster 137
THE CLOSED CIRCLE OF EMPATHY: OBSERVING OUTGROUPS DOES NOT RESULT IN SENSORIMOTOR MU SUPPRESSION
Jennifer N. Gutsell, & Michael Inzlicht
University of Toronto
Descriptors: empathy, prejudice, EEG
Empathy facilitates prosocial behavior and social understanding. Here, however, we suggest that empathy is bounded to the ingroup because the neural system underlying empathy is less responsive to outgroups than ingroups. Generally, we empathize with others by simulating their bodily states in shared neural networks for experience and perception. Observing others’ emotional expressions activates motor areas responsible for the same expressions, which then elicits the assumed physiological states and emotions - the foundation for empathy is laid. As an indicator of this simulation process we measured motor neuron activity during actual actions and the observation of others’ actions. We defined motor neuron activity as the suppression of EEG oscillations in the mu frequency (8 – 13 Hz) over sensorimotor cortex (mu suppression at electrodes at scalp locations C3, Cz and
C4). During EEG recording, 31 White participants watched videos of ethnic ingroup and outgroup members performing an action and then performed the action themselves. Supporting our hypothesis, participants showed mu suppression when performing the action and when observing outgroup members. Importantly, they did not show mu suppression when observing ingroup members. Moreover, individual level of prejudice predicted mu suppression in response to outgroup members. These findings provide evidence from brain activity for the concept of bounded empathy: Empathy may be restricted to close others and, without active effort, may not extend to outgroups, making them likely targets for prejudice and discrimination.

Scientists and philosophers have highlighted many similarities in the way humans convey emotional messages through voice and music. Some have speculated that these emotional messages recruit similar perceptual processes and affect listeners in the same way. We investigated this proposition in a functional magnetic resonance imaging (fMRI) study during which participants listened to musical excerpts and spoken sentences composed of pseudowords. Musical excerpts and the pseudospeech could vary in emotional connotation from neutral to sad or from neutral to happy. In two different tasks, participants tracked either pitch or emotion changes in these stimuli by using a joystick. Subtracting the low-level pitch task from the emotion task revealed an area in the medial prefrontal cortex that was activated for both music- and voice-emotion judgments, which prior research has implicated in the ability to infer others’ emotional and mental states. However, contrasting stimuli rated as neutral, happy or sad indicated differential effects for music and voice. Thus, it seems that although the mechanism of extracting emotional information from these two types of stimuli is comparable, its effect on the listener is not. Moreover, differential responses to emotional messages conveyed in music and voice may point to the different roles these two media play in human communication.


descriptors: emotion, predictability, startle reflex

Anticipation of aversive stimuli can yield two types of emotional states: fear and anxiety. One characteristic of aversive stimuli that differentiates these emotions is whether the stimuli are predictable or unpredictable, such that fear is elicited by predictable aver- siveness and anxiety is elicited by unpredictable aversiveness (Davis, 1998; Grillon et al., 2004). When empirically examining predictability, it is important to include conditions where the aversive stimuli are either completely predictable or unpredictable. However, in most studies the predictable condition contains aversive stimuli that are more predictable than the unpredictable condition, but their occurrence is not certain. Therefore, we examined fear and anxiety-potential startle in 51 participants who anticipated no (N), predictable/certain (P), and unpredictable (U) aversive stimuli. This study also examined whether the effects of predictability were similar for two types of aversive stimuli (shocks and unpleasant noises). Startle blink reflex was measured using the orbicularis oculi muscle and elicited using a 95 dB acoustic white noise probe. Results indicated that completely predictable shocks (but not unpleasant noises) potentiated fear, while unpredictable shocks and unpleasant noises potentiated anxiety. Our results support predictability as an important feature of aversive stimuli that can differentiate fear and anxiety. However, not all aversive stimuli will induce fear when completely predictable.


descriptors: affective chronometry, emotion regulation

The role played by individual difference variables in the processing of emotional stimuli and in their subsequent emotional outputs (e.g., facial expressions) has been relatively unexplored. Emotion regulation is one such individual difference variable and describes efforts undertaken to modulate the experience of emotions, often with the goal of downregulating negative emotion. We examined the role that emotion regulation strategies play in the types of emotional expressions elicited by a standard set of emotional pictures, and in the time course of those emotional expressions. Sixty-three participants (32 women) were recruited and we assessed two major methods of emotion regulation: cognitive reappraisal and expressive suppression. Participants viewed 36 emotionally salient pictures (12 positive, 12 neutral, and 12 negative) while electromyographic recordings were made of their zygomaticus major muscle activity (i.e., the “smiling” muscle along the cheek). Self-re-
Using fMRI, 24 participants viewed happy, angry, and neutral affective primes presented under subliminal and supraliminal conditions followed by an investment task where they had to decide between risky, high-payoff stocks and safe, low-payoff bonds. Our results indicate that both subliminal and supraliminal presentations of affective primes influence financial investment decisions and anticipatory neural activation in the nucleus accumbens. As predicted, participants showed greater nucleus accumbens activation and made more risky investment decisions after happy versus neutral face primes. Furthermore, this effect was stronger for subliminal versus supraliminal affective primes. In conclusion, our results demonstrate that affective primes, even when they are not consciously perceived, can influence investment decisions and neural markers of anticipatory arousal. Our findings point to the role of unconscious affect in decision processes and suggest that neuroeconomics research may foster a more comprehensive model of decision making, one that incorporates emotion both consciously and unconsciously, and is able to dissociate the processes involved in decision making.

**Poster 144**

THE RELATIONSHIP BETWEEN CORTISOL CONCENTRATION, ANXIETY AND ROCK CLIMBING MOTOR PERFORMANCE

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Descriptors: stress, cortisol, motor control

Previous research indicates that cortisol concentrations can relate to subjective anxiety experience during rock climbing. This study examined whether cortisol concentrations might also relate to the quality of a climber’s motor performance. Seven climbers completed two identical horizontal climbing problems maintaining consistent heights (0.1 m and 2.40 m) on an indoor rock wall. A familiarization, to reduce learning effects, took place on the low route (low stress condition) and the two experimental trials were then completed in random order. Stress levels of climbers were identified through cortisol concentrations assayed from pre and post climb salivary samples and self-reported scores on a ten point anxiety thermometer scale. Motor performance variables were climbing time and distance traveled by the climber’s center of mass. As expected, movement performance was impaired in the higher, increased stress, condition with significant differences showing increased climbing time and distance traveled by the center of mass. Subjective anxiety rating was significantly higher in the high stress condition. Although cortisol concentrations were higher prior to the high stress condition, this difference was not significant. Regression analyses were significant, indicating strong relationships between cortisol concentration and subjective anxiety ratings, and also between climbing time and distance traveled by center of mass in both high and low stress conditions. It seems that cortisol concentrations may be related to subjective experience and motor performance during rock climbing.

**Poster 145**

AMYGDALA ACTIVATION TO FEARFUL FACES UNDER ATTENTIONAL LOAD

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Descriptors: faces, attention, amygdala

While some functional imaging studies have suggested an automatic activation of the amygdala to fearful faces, recent studies have shown the absence of amygdala activation to fearful faces under conditions that induced high perceptual load by means of a distracting task. The present functional magnetic resonance imaging study demonstrates activation of the amygdala to fearful vs. neutral faces even under high perceptual load, when the saliency of fearful faces is increased by manipulating the eyes of the faces. In particular, the removal of irides and pupils of eyes in half of the trials led to a differential activation to fearful vs. neutral normal faces, which was not observed when only normal faces were shown. These findings suggest a relative automaticity of the activation of the amygdala to fearful faces depending on attentional resources and salience of fearful eyes.

**Poster 146**

ACUTE SOCIAL STRESS MODULATES PASSIVE BUT NOT MOTIVATED VISUAL ATTENTION - A MEG STUDY

Ludger Elling, Janine Bayer, & Markus Junghofer
University of Münster

Descriptors: emotion & attention, stress, MEG

It is widely accepted that stressful experiences profoundly influence cognitive and emotional functioning. However, the ability of stress to modulate emotional perception and emotional learning remains to be determined. Recent studies demonstrated the impact of stress on several processes of sensation, cognition and neurocircuit states. According to this, we expected acute stress to modulate passive as well as motivated attention to task-irrelevant emotional pictures. In particular, we predicted a non-specific enhancement of passive attention in the C1, P1 and N1 time range, and enhanced sensoric processing of emotional pictures in the EPN time interval (120 – 300 ms). Healthy subjects were exposed to a potent and a weak social evaluative stressor, while being presented with emotional slides. Event Related Fields were recorded with whole head 275 sensor MEG. Peripheral, endocrine and self-assessment data were used to verify the stressor and stratify our sample. As a main effect of stress, we observed markedly enhanced occipital cortical activity in the expected time range. With respect to correlates of emotional processing, however, no modulation whatsoever emerged. We discuss our data in terms of external attraction for attention and competition for processing resources.

**Poster 147**

ENGAGING IN A COGNITIVE TASK INHIBITS NEGATIVE EMOTION

Saea Iida, & Hideki Ohira
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Descriptors: emotion regulation, unpleasant emotion, IAPS

In the present study, we investigated whether or not engaging in a cognitive task can inhibit subsequent negative emotion automatically. For this purpose, we measured self-report (PANAS) and physiological responses (HR and SCL) to three cognitive tasks. Forty students participated in this study, and were divided into three experimental groups (the n-back group, the go/no-go group, and the WCST group) and one control group. Participants underwent four stages within one session: baseline (10 min), cognitive task (5 min), emotion induction task (10 min), and recovery (10 min). At the baseline stage, all participants were asked to stay calm. At the cognitive task stage, all participants were presented with the same stimulus sequence, but participants in three experimental groups were asked to engage in one of three cognitive tasks, and participants in the control group were asked to view the stimulus sequence passively. At the emotion induction task, all participants were asked to evaluate the unpleasantness of affective pictures. At the recovery stage, all participants were asked to stay calm again. We collected self reports of unpleasant emotion between the stages, and measured physiological responses through the whole session. Results showed that, compared with the control group, the three experimental groups showed inhibited negative-emotion-related responses in self report and physiological responses after and during the emotion induction task, respectively. These results suggest that engaging in cognitive tasks can be used to regulate our unpleasant emotion automatically.

**Poster 148**

THE HEART OF THE MUSIC: MUSICAL TEMPO AND CARDIAC RESPONSE

Robert J. Ellis, John J. Sollers III, Bradley M. Havelka, & Julian F. Thayer
Ohio State University

Descriptors: heart rate variability, phasic heart rate, music

Purpose: Empirical investigations of heart rate (HR) responses to music date back over 125 years. Most have examined differences in mean HR in response to music, with inconsistent results. Two less-frequently investigated measures (HR variability and phasic HR) that index beat-to-beat changes in HR (rather than mean HR) may provide better windows into cardiac response to music. HR variability is a sensitive measure of parasympathetic nervous system activity; higher resting levels of HR variability have been consistently linked with greater health, emotional well-being, and cognitive flexibility. Phasic HR is considered to index adjustments in attention and emotional processing. METHODS AND RESULTS: We varied the tempo (60, 90, 120 beats per minute) of computer-generated (MIDI) performances of ragtime piano music. Experiment 1 examined HR variability to 2.5-min excerpts of music, and revealed significant differences in HR variability but not mean HR. Experiment 2 examined phasic HR responses to 12–16-s excerpts of music, and revealed that phasic responses increased in magnitude as tempo increased, suggesting that tempo differentially affects HR within a few moments of music onset. Additionally, intersubject differences in phasic HR were related to baseline levels of HR variability, suggesting that HR variability indexes the potential for cardiac flexibility.

**Poster 149**

EMOTIONAL AND PSYCHOPHYSIOLOGICAL RESPONSES TO FOOD STIMULI

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Descriptors: emotion, psychophysiology, food

Emotional and psychophysiological responses under the visualization of food stimuli were studied using self-report and physiological (facial EMG, SCR and HR) measures. Participants (N = 56), viewed three visual stimuli categories (neutral objects, high caloric and low caloric food) that were presented with equal probabilities, and had to to evaluate the images using the Self Assessment Manikin. Subjects reported more valence to the visualization of low caloric food and demonstrated more activation when they
visualized the high caloric food stimuli. No differences were found for the EMG (co-rrugator and zygomatic), SCR and HR response. Subjects were then divided in two groups (higher disgust sensitivity and lower disgust sensitivity). Contrarily to the SAM evaluation, no differences were found in psychophysiological responses in function of the stimuli category. These findings suggest that the category of the stimuli is relevant for the emotional response but not for significant psychophysiological differences. Results will be discussed according to the theoretical models.

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VISUAL SCANPATHS AND PUPIL RESPONSES TRIGGERED BY EMOTIONAL FACIAL EXPRESSIONS ARE DIFFERENTIALLY AFFECTED BY TASK DEMANDS

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Descriptors: facial expression, emotion, eye tracking

Previous studies showed differences in visual scanpaths when viewing happy versus fearful facial expressions: whereas subjects fixated more often on the mouth region for the former, they showed enhanced gaze preferences for the eye region of the latter. In the current study, we wanted to examine to what degree these gaze orientations depend on picture presentation time and type of task. Fearful, happy and neutral faces were presented to 24 participants either for 150 or 2000 ms. Three different tasks had to be accomplished in separate blocks: emotion classification, gender discrimination and passive viewing. A high speed eye tracking system was used to measure eye movements as well as pupil responses after picture onset. Across all tasks and presentation times, participants showed a strong bias to shift their gaze towards the eye region. However, this response pattern was modulated by facial expression and was strongest for fearful and neutral faces. Post stimulus pupil dilatation - an index of sympathetic nervous activity - was largest for fearful faces when participants were explicitly required to identify the depicted emotion. No such modulation was found for the gender discrimination or the passive viewing task. These findings indicate that reflective gaze orientation towards the eyes is modulated by the facial expression irrespective of task demands. Differential sympathetic activity, however, is selectively enhanced when the emotional expression is required to be processed explicitly. The hypothesized role of the amygdala in mediating these effects will be discussed.

Poster 151

EMOTIONAL BEHAVIOR IN SUBCLINICAL PSYCHOPATHY

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Descriptors: emotion, startle, psychopathy

The unique interpersonal qualities of individuals who fall on the so-called 'psychopathic spectrum' have been regularly documented since Cleckley's observations. The literature reflects the importance of understanding individuals who have high and low levels of psychopathic personality traits for research, clinical and risk assessment purposes through bringing forth the position that psychopathic traits can fall on a continuum. The purpose of this study was to investigate the association between psychopathic personality traits in the general population and deficits in emotion modulated psychophysiological responses as well as deficits in emotionally influenced decision making. Results indicated that individuals with higher levels of Fearless Dominance, as measured by the Psychopathic Personality Inventory, Revised had attenuated fear responses (r = − .26, Chi-square = 5.266, p < .05), but there were no significant abnormalities in responses to other emotional conditions. There was no association between psychopathic personality traits and emotionally influenced decision making as measured by the Iowa Gambling Task suggesting that at subclinical levels, psychopathic personality traits have a negligible influence on an individual's use of somatic markers to guide behavior.

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CARDIOVASCULAR AND EGG INDICATORS OF ANGER AND CONTROL/NO CONTROL STATES

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Descriptors: anger, control, psychophysiology

Psychophysiological responses during states of anger can be confounded with reactions associated with the perception of control. The aim of the study was to identify psychophysiological markers of anger in combination with levels of control during a laboratory task. Forty participants were split into four experimental groups: anger/no control, anger/control, neutral/no control and neutral/control. Anger (anger state vs. neutral state) was manipulated via an experimenter effect (i.e., rude vs. polite experimenter). Participants were exposed to a computer-based problem-solving task where the keyboard either the worked correctly (control) or malfunctioned (no control). Various psychophysiological variables (blood pressure, cardiovascular impedance and frontal EEG asymmetry) were obtained in addition to subjective data. Self-report measures indicated that the manipulation of anger and control was successful. Systolic blood pressure increased significantly during the anger/no control state only. Cardiovascular impedance measures were not sensitive to the experimental conditions. The frontal polar site showed the expected right-brain activation in the anger/no control condition. In conclusion, systolic blood pressure and frontal polar brain site are indicators of anger in combination with the perception of a state of no control, suggesting that emotion and motivation interact with each other intensifying psychophysiological reactions.

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EFFECTS OF NICOTINE AND BUPROPION ON P3-INDEXED DISTRACTION BY AFFECTIVE AND SMOKING-RELATED PICTURES

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Descriptors: smoking, pharmacotherapy, emotion

While nicotine replacement therapy (NRT) and bupropion SR (BUP) are the two most widely used and studied drug treatments for smoking cessation, little is known about the psychobiological mechanisms associated with the efficacy of these two medications. Thus, 37 smokers were randomly assigned to NRT, BUP, or placebo (PLA) during smoking abstinence. The ability of negative, positive, neutral, and smoking-related pictures to attenuate P3 responses to occasionally occurring target digits immediately subsequent to picture offset was assessed. Post-quit Day 3 and Day 24 change scores of P3 amplitude from pre-quit/pre-drug baseline revealed a significant Treatment × Distactor Picture Type × Electrode (4 midline levels: central through occipital) interaction, F(18, 306) = 2.68, p = .001. Follow-up analyses revealed that, relative to PLA, BUP enhanced P3 amplitude to target digits preceded by emotionally negative pictures and targets preceded by smoking pictures. That is, BUP reduced distraction by negative and smoking-related pictures as indexed by reduced P3 attenuation. In contrast, relative to PLA and BUP, NRT reduced distraction by emotionally positive pictures at the occipital electrode. While the finding that BUP reduced distraction by negative and smoking-related stimuli is consistent with the reported ability of BUP to reduce smoking urges and negative affect, the failure of NRT to produce similar effects suggest that the two smoking cessation drugs differ in the means by which they help smokers refrain from smoking.

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ATTENTIONAL REDEPLOYMENT AS AN EFFECTIVE EMOTION REGULATION STRATEGY IN DEPRESSION

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Descriptors: emotion, ERP, attention

Recent studies have shown that cognitive reappraisal can be used as an effective emotion regulation strategy in healthy controls, leading to decreased amygdala activity and to less pronounced late positive potentials (LPP) in the EEG. In contrast, depressive patients fail in effective top-down control of negative emotions by reappraisal strategies (Johnstone et al., 2007). A recent study (Dunning and Hajcak, 2009) showed that cues leading the visual attention to a non-emotional focus within unpleasant images can also reduce the LPP. Therefore, attentional reorientation might be another emotion regulation strategy, which might be effective in depressive patient. To test this hypothesis we measured the even-related potentials (ERPs) in 20 depressive patients and 20 healthy controls during emotional picture processing. The instruction to look at a non-emotional part within the pictures lead to a significant reduction in the LPP (and even earlier in time course) compared to the instruction to look at the hot spot of the emotional pictures. Interestingly, we found this reduction not only in healthy controls but also in depressive patients. Our study suggests that simply instructing subjects to look at the non-emotional part of a picture/scene might be a useful emotion regulation strategy, not only for healthy controls but also for depressive patients.

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SLEEP DEPRIVATION POTENTIATES PHYSIOLOGICAL REACTIVITY TO NEGATIVE AFFECTIVE STIMULI IN HEALTHY YOUNG ADULTS

Peter L. Franzen, Daniel J. Buysse, Denise N. Duryea, Annette Wood, & Greg J. Sniegle
University of Pittsburgh

Descriptors: sleep deprivation, emotional reactivity, pupil dilation

We used pupil dilation as an objective, physiological indicator of emotional reactivity responses to standardized affective picture and sound stimuli in two tasks. Using a within-subjects crossover design, healthy young adults 18–25 years old were tested under two experimental conditions separated by 1 week: sleep deprivation (SD; following a night of total SD) and rested wakefulness (RW; following a night of normal sleep). For the sound task (n = 8), negative, neutral, and positive sounds (14 each) were randomly presented for 6 s followed by an 8 s ISI. Pupil dilation was significantly larger in response to negative compared to non-negative sounds during both SD (F(1, 7) = 10.4, p
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ATTENTIONAL RESOURCES AND NEGATIVITY BIAS
Yu-Xia Huang, & Yue-Jia Luo
Beijing Normal University

Descriptors: emotion, attention, late positive component

The current study aimed to explore the relationship between attentional resources and the emotional negativity bias. A cue-target paradigm was used to manipulate attention. In the valid cueing condition subjects could obtain sufficient attention resources, while in the invalid cuing condition resources were relatively insufficient. It was noteworthy that both attention levels in the current experiment were far more beyond attention scarceness. Positive, neutral and negative pictures from the International Affective Picture System and the Chinese Affective Picture System were transformed into upper and lower adjacent patchworks of the normal scene and its inverted copy. Seventeen undergraduate students participated in the study. They were instructed to pay attention to the structure of the patchworks and to judge whether the normal scene was located in the upper or lower part of the whole patchwork. Significant interactions between emotion and attention were found in LPC difference waves. In the insufficient attention condition, there was no obvious difference between ‘positive minus neutral’ and ‘negative minus neutral’. In contrast, the LPC amplitude of ‘negative minus neutral’ was significantly larger than that of ‘positive minus neutral’ when the attention resource was relatively inadequate. This study suggests that when enough attention resources are available, positive information can be processed in the same way as negative information. The processing superiority of negative events is more likely to take effect in situations that attention resource is not adequate.

Poster 157
DECISION-MAKING IN THE ULTIMATUM AND DICTATOR GAMES
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Descriptors: decision-making, feedback negativity, skin conductance

In the Ultimatum Game a proposer splits an amount of money and offers a share to a receiver. The receiver decides whether to accept the share or to reject it. Rational choice theory predicts that human receivers always accept all offers. However, unfair offers are rejected in 50% of trials if the share offered is 20% of the total amount. We used the Ultimatum and Dictator games to examine the affective correlates of decision-making in psychophysiological and subjective emotional parameters. We measured event-related potentials and skin conductance responses of receivers during both games. In addition, participants provided subjective emotional ratings towards offers. Participants showed increased feedback negativity, skin conductance responses, and negative emotional ratings to unfair offers. Furthermore, the decision to reject offers in the Ultimatum Game was related to participants’ increased negative emotional reactions, to their increased activity in the autonomous nervous system, and to their increased feedback negativity. The findings suggest that emotion is a very important factor in economic decision-making.

Poster 158
EMOTIONAL PROCESSING AND AUTONOMIC RESPONSES IN PATIENTS WITH AUTONOMIC HYPERACTIVITY
Satoshi Umeda1,2,3, Neil A. Harrison4,5, Marcus A. Gray6, Christopher J. Mathias3,6, & Hugo D. Critchley6
1Keio University, 2Institute of Cognitive Neuroscience, University College London, 3Autonomic Unit, National Hospital for Neurology and Neurosurgery, University College London, 4Institute of Cognitive Neuroscience, University College London, 5Brighton and Sussex Medical School, University of Sussex, 6Neuromuscular Medicine Unit, Imperial College London at St Mary’s Hospital

Descriptors: autonomic hyperactivity, emotion

Previous functional imaging studies provide evidence for neural integration of human emotions and autonomic bodily responses. However, it remains unclear how primary autonomic disorders influence emotional processing. The present functional MRI study investigates how heightened bodily reactivity shapes excessive emotional responses. We recruited patients with autonomic hyperreactivity (postural tachycardia syndrome, POTS) and age-matched normal controls. Participants were scanned while heart rate recording when judging emotional pictures, consisting of five emotion-specific categories of faces and scenes. The POTS patients showed an excessive rise in heart rate from onset of each stimulus presentation, when compared to controls. The results of the fMRI data showed much greater deactivation within ventromedial prefrontal cortex (VMPFC, BA11) and right dorsolateral prefrontal cortex (BA9) in the patients compared to controls. In contrast, greater activation in midline structures; precuneus (BA7), anterior prefrontal cortex (BA10), and rostral anterior cingulate cortex, were found in the patients compared to controls. Further investigations showed that globus pallidus (GP); pons, and VMPFC were significantly correlated with higher state anxiety in the patients. Overall findings suggest that hyperreactive bodily states trigger disruptive emotional status by increased attenuation of activity within VMPFC impacting on GP function. Our study highlights the possible neural mechanisms for understanding emotional disturbance in autonomic hyperreactivity disorders.

Poster 159
AFFECTIVELY-MODULATED STARTLE REFLEX PATTERNS ARE INFLUENCED BY USE OF HORMONAL ORAL CONTRACEPTION
Keith W. Burton, Lindsey Kucera, Jeanine Sellman, Dawn Tompkins, Sarah Wolfsdorf, & Ashley Warren
University of Illinois, Springfield

Descriptors: startle reflex, ovarian hormones

Ovarian cyclic hormones have previously been shown to influence emotions (e.g., premenstrual dysphoric disorder), yet few studies have examined how these hormonal changes influence basic emotion processing. This study examined the influences of menstrual cycle phase (luteal vs. follicular) and use of hormonal oral contraception on several measures of emotional experience and physiology. Twenty-seven participants were tested during luteal or follicular phases of their menstrual cycle, nine of whom were using oral contraception. Participants viewed 36 emotionally salient images (12 positive, 12 neutral, and 12 negative) and reported their experiences of emotional valence and arousal after each. During image presentation EMG recordings were made of corrugator supercilii, zygomaticus major, and orbicularis oculi startle reflex activity. Corrugator and zygomatic EMG patterns and emotional valence and arousal ratings were unaffected by menstrual cycle phase or contraception use. The traditional linear valence pattern of startle reflex modulation (negative > neutral > positive) was observed in those not using oral contraception, but a quadratic pattern (negative > positive > neutral) of startle reflex modulation was observed in those using oral contraception.

Poster 160
OCCUPATIONAL EXPOSURE TO A CONDUCTIVE ENERGY DEVICE: EFFECTS ON CARDIOVASCULAR PARAMETERS
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Descriptors: stress, autonomic, electromuscular interference

Conductive energy devices (CED) are popular for incapacitating individuals for short periods of time. The impact of these devices on cardiovascular parameters during exposure is relatively low and unchanged during this period of time. These data suggest that while exposure in humans is relatively contraindicated, having these controversies is difficult. A primary reason is obtaining direct measures of electrical activity of the heart (e.g., electrocardiogram) during exposure is made impractical given the voltage, frequency and capacitance of the discharge of CEDs. Recent advances in pulse oximetry offered the promise of obtaining derived heart rate from a measure unaffected by the CED itself. In the occupational setting, law enforcement officers undergoing training for the use of CED volunteered to participate in data collection involving pulse oximetry (continuous), temperature, respiration, and ECG (discontinuous) before, during and after exposure to the device discharge. Discharge was typically 5-10 ms in duration. Heart rate increased dramatically in the minutes leading to exposure. Heart rate, derived from pulse oximetry obtained from the earlobe, was relatively unchanged over the 5-10 ms discharge in 50/55 participants; there was no evidence of missed beats. Heart rate variability showed increased sympathetic power in the period leading to discharge and shortly thereafter while parasympathetic power was relatively low and unchanged during this period of time. These data suggest that while anticipation of exposure to CEDs is a potent stimulator of the heart, exposure to the actual discharge shows relatively little impact on these parameters.

Poster 161
INTEROCEPTIVE SENSITIVITY MODULATES IMPLICIT MEMORY OF EMOTIONAL WORDS
Natalia S. Werner, Isabella Peres, & Rainer Schandy
Ludwig Maximilian University of Munich

Descriptors: interoception, emotion, memory

The ability to perceive bodily signals ("interoceptive sensitivity") has gained in importance in theories of emotion. Consistent with these theories, numerous studies have shown that individuals with a higher sensitivity to bodily signals experience emotions more intensely. The present study explored the influence of interoceptive sensitivity on implicit memory performance of emotional information. It was predicted that participants with high interoceptive sensitivity show a bias to emotional material. In our study, we exposed 30 participants with high interoceptive sensitivity and 30 participants with low interoceptive sensitivity to positive, negative and neutral words. During word presentation, heart rate and skin conductance
responses were measured. After a subsequent filler task, participants were asked to complete primed and unprimed word stems. Implicit memory was assessed in terms of accuracy for completion. The results demonstrate that participants with high interoceptive sensitivity recalled significantly more positive and negative words, whereas no differences were found between the groups for neutral words. Participants with high and low interoceptive sensitivity did not differ with respect to physiological measures, which have previously been shown to mediate memory. Our findings suggest that the perception of bodily signals enhances unconscious recall of emotional words. We assume that this effect is modulated by better access to “somatic markers” which arise in emotional situations and support emotion processing.

A NOVEL PARADIGM FOR EXAMINING ADOLESCENTS’ NEURAL RESPONSE TO PARENTS’ AFFECT

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Descriptors: adolescent development, affect regulation, brain function

Affect in the family environment is critical to healthy functioning and risk for psychopathology during adolescence. Because functional magnetic resonance imaging (fMRI) paradigms for studying affect-related brain function typically rely on static images of strangers, which have little ecological validity, we developed an fMRI paradigm using dynamic, personally relevant stimuli: video clips of participants’ parents expressing neutral, pleasant, dysphoric, and aggressive affect during an actual parent-adolescent interaction. Eleven healthy adolescent girls underwent fMRI in a 3T Siemens Allegra scanner. Stimuli were obtained from an earlier assessment in which participants and their parents discussed a conflict-elicitng topic and a future vacation. Data were analyzed in SPM2. When viewing parents expressing neutral affect compared with a stranger, adolescents exhibited reactivity in the anterior cingulate, prefrontal cortex, striatum, and insula. During parents’ affect, adolescents exhibited reactivity to parents’ affect in a set of regions including the striatum, anterior cingulate, insula, medial prefrontal cortex, and dorsolateral prefrontal cortex. Adolescents’ depressive symptoms were related to medial prefrontal reactivity during parents’ pleasant affect and inversely related to insula reactivity during parents’ dysphoric affect. This paradigm appears to be feasible and potentially valuable for investigating adolescents’ affective responses to the family environment.

ABERRANT SOCIAL AND CEREBRAL RESPONDING IN A COMPETITIVE REACTION TIME PARADIGM IN PSYCHOPATHS

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Descriptors: psychopathy, reactive aggression, prefrontal lobe

Emotional and interpersonal deficits are core features of psychopathy. In this study we investigated behavioral and neural responding of psychopathic individuals during a painful physical provocation task. Ten subjects from a forensic psychiatric institution participated in a functional magnetic resonance imaging study using an interactive competitive reaction time paradigm, involving putative mutual physical punishment for slow reaction time. Prior to scanning, subjects were clinically screened for psychopathy and completed several self-report scales of aggression and psychopathy. For retaliation trials, the comparison between high and low pain intensity adjustments revealed activations in an association circuitry (hypothalamus, inferior orbitofrontal cortex). The intensity of physical aggression showed a positive correlation with hypothalamic activation. Medial prefrontal areas, associated with emotional control and conflict management, found in healthy volunteers, were inactive in psychopathic subjects. During observation the opponent, activations in the dorsal and ventral medial prefrontal cortex were strongly modulated by impulsivity and antisocial behavior but showed no relation with the callous unemotional features of psychopathy. The present study supports the notion that reactive aggression is rather related to antisocial behavior and anger management than to emotional and interpersonal characteristics of psychopathy.

ANXIETY’S DOUBLE-EDGE: A MEG STUDY

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National Institutes of Mental Health

Descriptors: MEG, threat, saccades

Background: Anxiety is mostly recognized as an impediment to cognitive performance. However, opposite effects are also noted. Anxiety associated with the threat of shock modulates top-down attentional control that determines orienting behavior. This modulation can serve to enhance rapid responses to potentially dangerous stimuli, but can interfere with ongoing cognitive processes. The neural mechanisms underlying this double-edged influence of anxiety on cognition remain unclear. Our goal was to examine these mechanisms. Methods: Using magnetoencephalography (MEG), seventeen healthy adults performed a saccade eye-movement task in a threat (electric shock) and a safe condition. The saccade task permitted us to assess both rapid, prepotent (prosaccades) and controlled, non-prepotent behavioral responses (antisaccades). Results: As expected, threat, relative to safe, conditions facilitated prepotent responses (reduced prosaccade latency) and impeded controlled responses (lengthened antisaccade latency). The threat vs. safe contrast differentiated the neural modulation by anti- and prosaccades of the dorsal stream (prefrontal and parietal regions) and the ventral stream (occipitotemporal region) of attentional systems, superior colliculus and rostral anterior cingulate cortex (ACC). Conclusion: Anxiety by threat of shock facilitated stimulus-bound responses and hindered controlled responses by influencing information processing via the dual attentional system, conflict monitoring via ACC, and saccade inhibition via superior colliculus.

THE EFFECTS OF FACIAL FEEDBACK ON SPONTANEOUS EYEBLINKING WHILE RECEIVING PLEASANT-UNPLEASANT VISUAL STIMULI

Yasuko Omori, & Yukiko Tatsuhira
Jin-ai University

Descriptors: spontaneous eyelink, facial feedback, pleasant-unpleasant visual stimuli

The purpose of this study was to investigate the effects of facial feedback on spontaneous eyelink rates during pleasant-unpleasant visual stimuli. While spontaneous eyelinking
condition than those in the sad one. Therefore, it is suggested that spontaneous eyeblinking occurred frequently during pleasant stimuli, which was remarkably notable when the neutral rates sorted in descending order were: neutral condition, happy one and sad one. Eyeblinks regarding manipulated facial expressions. They repeated two sessions, with a 6-second duration of each stimulus. Eyeblinks were identified with the video recordings of the participants' faces, and heart rates were measured with ECG recordings. The results of the blinking rates sorted in descending order were: neutral, happy one and sad one. Eyeblinks occurred frequently during pleasant stimuli, which was remarkably notable when the neutral expression was manipulated. Furthermore, heart rates were significantly lower in the neutral condition than those in the sad one. Therefore, it is suggested that spontaneous eyeblinking can be used as a reliable physiological index to exhibit emotions in terms of facial feedback.

Poster 168
AFFECTIVE MODULATION OF STARTLE EYE-BLINK TO EMOTIONAL PICTURES OF VARYING AROUSAL LEVEL IN BORDERLINE PERSONALITY DISORDER PATIENTS WITH AND WITHOUT COMORBID SUBSTANCE USE AND CONTROLS
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Descriptors: borderline personality disorder, emotion, startle reflex
Affective dysregulation is theorized to be a central feature of Borderline Personality Disorder (BPD), yet limited research has directly assessed this feature. Bilateral startle eyeblink data were collected to measure affective responses during presentation of, and recovery from, emotional pictures varying in valence (positive, negative) and arousal (low, medium, high) and neutral pictures. Participants included 33 BPD patients with comorbid substance use disorder (BPD-SUD), 13 BPD patients without SUD, and 45 healthy controls. Startle data were averaged across 3 & 5 s trials and 7 & 9 s trials to create picture and recovery trials respectively. There was a significant affect × arousal × group interaction, with the BPD and control groups exhibiting significantly greater startle magnitude during high arousal negative trials compared to high arousal positive valence trials; the BPD-SUD group showed no differences between affect or arousal conditions. The startle response affect × arousal × group interaction was not moderated by picture versus recovery condition. The results will be discussed in relation to theories of affective dysregulation and the role of substance use in BPD.

Poster 169
EMOTIONAL MODULATION IN PSYCHOPSYCHOLOGICAL DISORDERS
Alfonso Salgado¹, & Almudena Duque²
¹Pontificia University of Salamanca, ²Complutense University of Madrid
Descriptors: stress disorders, emotion, cardiac reactivity
Some theoretical models (Everly, 1989; Farmer and Crespo, 1993; Salgado et al., 2006) propose that automatic defensive processing is one of the factors involved in the genesis of psychophysiological disorders associated with stress, so these types of subjects usually present more autonomic and somatic reactivity than normal subjects. Differences between normal subjects and patients with different psychophysiological disorders -with cardiovascular implications- were examined in terms of cardiac reactivity and startle eyeblink during emotional picture viewing. IAPS slides (CSEA, 2006) were used, and they were selected in accordance with the Spanish version (Moltò et al., 1999) Groups were compared in cardiac maximum deceleration, cardiac maximum acceleration and startle eyeblink. Greater cardiac acceleration and cardiac deceleration were observed in subjects with psychophysiological disorders, suggesting effects on cardiac reactivity. However, no significant differences were observed in startle eyeblink. Theoretical and applied implications for these results are discussed.

Poster 170
AUTOMATIC AND CONTROLLED PROCESSING IN STRESS DISORDERS
Almudena Duque¹, & Alfonso Salgado²
¹Complutense University of Madrid, ²Pontificia University of Salamanca
Descriptors: stress disorders, emotion, cardiac reactivity
Lang's theoretical and experimental model was applied to establish emotional stimulus differences between subjects with psychophysiological disorders and normal subjects. Pleasant, unpleasant and neutral stimuli were selected from IAPS (Spanish version, Moltò et al., 1999). A white noise burst was used (500 msec/60 dB) to measure startle reflex while subjects viewed the pictures. Emotional modulation was measured in cardiac reactivity and startle eyeblink, registering EMG changes from the orbicularis oculi. In addition, differences in affective valence, arousal and dominance ratings were estimated employing the Self Assessment Manikin (SAM, Lang et al., 2001). Successive MANOVAs were conducted. Significant differences were observed in autonomic changes and startle eyeblink for different types of stimuli. The same results were observed in controlled processing. Two different patterns were revealed in emotional modulation of the cardiac reactivity and startle eyeblink when both samples of subjects were compared. When controlled processing of pictures were analyzed, there were no significant differences between groups. Theoretical and applied implications for these results are discussed.

Poster 171
VOICE PARAMETERS, HEART RATE CHANGES, AND SKIN CONDUCTANCE RESPONSES IN ANIMAL FEAR
Anders Flykt¹, Tanja Bänziger¹,², & Sofie Lindeberg¹
¹University of Göteborg, ²University of Geneva
Descriptors: fear, animals, voice
Participants fearful of snakes or spiders viewed color photographs of snakes, spiders, and rabbits presented on a computer screen. Arrow-shaped probes were sometimes superimposed on the animal pictures, and the task of the participants was to say “upp” (up) if the arrowhead was pointing upwards or “ner” (down) if the arrowhead was pointing downwards. Participants were asked to answer quickly without jeopardizing the accuracy of their answers. The probes were presented 2-3 s after stimulus onset asynchronies (SOAs) of 300 or 600 ms from the picture onsets. Excerpts from voice, also ECG and SC were recorded. The results showed effects of exposure to the fear animal when probed at SOA 600 ms, but not at 300 ms. The results question that fear is activated fast, or if it is activated fast, the results question if a fear response follows its course once initiated.

Poster 172
HEART RATE VARIABILITY CHANGES AT COMPUTER SIMULATION OF AGGRESSIVE ENVIRONMENT
Lusineh Stepanyan, Anna Stepanyan, & Vilena Grigoryan
Yerevan State University
Descriptors: heart rate variability, aggression, stress index
Dynamic changes of heart rate variability were investigated in teenagers with different levels of aggressiveness. Computer simulation of aggressive environment was achieved by the use of “aggressive” computer games. The Bus-Durkee and Eysenck questionnaires, as well as drawing a non-existing animal and Wagner's Hand tests were used to determine the level of aggressiveness. Participants were divided into two groups: examinees with high or low level of aggressiveness. Then, the influence of aggressive computer game play was investigated. A Lusher test was used to determine the anxiety level before and after the experiment. Heart rate variability and a stress index were obtained from the electrocardiogram. This allowed us to consider the development of favorable emotional state for this group of examinees. Among teenagers with a low level of aggression, authentic changes of heart rate variability are not observed. This testifies about minimal emotional effort during aggressive gameplay.

Poster 173
MAGNETOCORTICAL CORRELATES OF THE AFFECT MODULATED LPP
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Descriptors: arousal, late positive potential, magnetoencephalography
An enhanced late positive potential (LPP) for high arousing emotional pictures has been consistently observed in affective ERP research. The scalp topography of the affect modulated LPP can be recorded with MEG. A slow magnetic field wave over right and left tempo-parietal sensors between .4 and .65 seconds after stimulus onset was observed. Further, this slow magneto cortical response was enhanced for high arousing pleasant and unpleasant compared to low arousing neutral pictures. Minimum norm source reconstruction using a quasi realistic head model indicated that cortical activity was arousal modulated in right and left lateral and medio-temporal brain regions. Further, right supramarginal gyrus activity was also modulated by emotional picture category. However, although an arousal modulation was observed, high arousing unpleasant pictures provoked the greatest slow wave magneto cortical responses. The current findings are discussed in the light of previous LPP studies using EEG.
REduced preferential processing of emotional stimuli following emotion-mediated response conflict
Marco Steinhauser, Tobias Flaib, & Harald Schupp
University of Konstanz

Descriptors: cognitive control, emotion, response conflict

Theories on conflict control assume that the detection of response conflict leads to increased conflict resolution on the subsequent trial. For emotion-mediated response conflicts, it has been suggested that conflict resolution acts by suppressing activity in the amygdala. However, many studies have shown that emotional stimuli are preferentially processed already in early sensory pathways. Based on these findings, the present fMRI-study investigated whether emotion-mediated response conflict is also resolved by reducing prefrontal activity by processing of the acoustic stimuli. To investigate differential processing between emotional words while ignoring simultaneously presented face distractors. These included neutral, as well as emotional facial expressions which were either congruent or incongruent to the target word. Preferential processing of emotional stimuli was measured as enhanced BOLD-activity when comparing emotional to neutral face distractors. Results indicate that enhanced processing of emotional faces in early visual pathways is eliminated following response conflict. This suggests that emotion-mediated response conflict is resolved by reducing preferential sensory processing of emotional stimuli.

The role of Alexithymia in moderating rapid facial responses to facial emotions
Yong Peng Why, & Denise LiJuan Liu
National University of Singapore

Descriptors: alexithymia, facial electromyography, facial emotions

Individuals with alexithymia have been observed to have limited or incongruent facial expressions during therapy. This current research examines the relationship between alexithymia and Rapid Facial Responses to animated faces displaying sadness, anger and happiness. Alexithymia was measured using the two subscales of the Toronto Alexithymia Scale (Difficulty Identifying Feelings and Difficulty Describing Feelings) and faces from the Facial Expressions of Emotions – Stimuli and Tests (FEEST, Younger et al., 2002) were used to create animated faces displaying sadness, anger and happiness at 25%, 50%, 75%, and 100% intensities. Corrugator supercilii (frowning) and zygomaticus major (smiling) electromyographic activity were measured. Results indicate that participants high in Difficulty Identifying Feelings had attenuated corrugator activity that was non-specific to emotion or intensity of the facial expressions presented. Participants high in Difficulty Describing Feelings had corrugator activity that was non-specific to facial emotions presented. Such three-way interactions (sub-scale of Alexithymia, emotion and intensity) were not present for zygomatic activity. The findings provide support that individuals high in Difficulty Identifying Feelings had paucity in facial emotional expressions while those high in Difficulty Describing Feelings have incongruent facial expressions.

Frontal EEG asymmetry in initial response to affective pictures is associated with sustained negative affect
Christine L. Larson, & Jordan S. Robinson
University of Wisconsin, Milwaukee

Descriptors: frontal EEG asymmetry, emotion modulated startle

A growing body of work suggests that individuals who show sustained responses to negative stimuli in the first few seconds following stimulus offset are more likely to be anxious or depressed. Sustained negative affect has also been linked with relative right-frontal resting EEG asymmetry, a pattern linked with both anxiety and depression. In the present study we examined whether EEG asymmetry during affective challenge is associated with sustained negative affect, as evidenced by continued potentiation of blink reflexes following picture offset. Participants completed a picture viewing paradigm during which both EEG and emotion-modulated startle blink data were recorded. Visual stimuli consisted of 126 IAPS pictures, 42 each of positive, negative, and neutral images. Images were presented for 6 s, with acoustic startle probes presented at four time points: 1.5, 4.5, 7.5, and 9 s post-stimulus onset. Frontal asymmetry during the first three seconds of both unpleasant and pleasant pictures was associated with sustained blink potentiation following the offset of negative pictures. Specifically, individuals who showed stronger potentiation to negative pictures at both 7 and 9 seconds following picture offset (compared to both of the mid-picture probes) exhibited more relative right frontal EEG activation (less right-sided alpha power) at a number of frontal electrode sites, most strongly F7-F8 (z-scores, m = -1.98 to -2.62). These data indicate that frontal asymmetry during initial reactivity to affective stimuli is linked with prolonged maintenance of negative emotion.

The valence of emotional animal vocalizations modulates electrophysiological correlates of the human orienting response
Anna S. Hasting, Marion Scheuermann, Elke Zimmermann, & Sonja A. Kotz
Max Planck Institute for Human Cognitive and Brain Sciences, University of Veterinary Medicine, Institute for Zoology, Hannover

Descriptors: emotional vocalizations, orienting response, cross-species

Since Darwin (1892) it is postulated that emotional expressions contain universals that are retained across species by evolutionary mechanisms. In the auditory modality, behavioral studies gathered evidence that humans are able to distinguish the emotional valence of vocalizations of dogs, cats or macaques above chance level. Furthermore, a recent fMRI study showed that emotional animal vocalizations activate the same neural network as human emotional vocalizations. However, to date it is unclear whether this cross-specific perception of emotion is actually based on phylogenetic relation, or whether it is rather a result of the anxiety induced by unfamiliar sounds. To investigate the relative contribution of these factors, we presented affiliative and agonistic vocalizations of four different species as novel in a three-stimulus oddball paradigm. 24 vocalizations per category were recorded from human babies, chimpanzees, dogs and tree shrews, thus varying the degree of phylogenetic relation and familiarity with respect to the human recipient. Participants engaged in a target detection task on a tone deviating in frequency from the standard tone and were uninformd about the occurrence of the novels. Event-related potentials to the novels showed the typical pattern of an orienting response comprising N1, P3a and P3b components, whose characteristics varied depending on species and emotional context. These time-sensitive data provide first indications of temporally differentiated effects of phylogenetic relation and acoustic familiarity on emotional perception in man.

Differences in the central processing and voluntary regulation of emotions in alexithymia - an EEG study
Olga Pollatos
Ludwig Maximilian University of Munich

Descriptors: alexithymia, emotion regulation, IAPS

Emotion regulation and the ability to voluntarily suppress feelings, especially negative feelings, is an important tool in social life and social interactions. Empirical data suggest that there are deficits in voluntary suppression of feelings in many psychiatric disorders. Data on alexithymia and suppression of negative feelings are rare and suggest that there are problems in voluntary regulation of feelings in alexithymia as compared to controls. We present EEG data using IAPS pictures showing that...
participants with high vs. low scores of alexithymia have differences in the central processing of emotional stimuli, especially in the modulation of central processing. In the used task participants were asked to either attentively watch or to suppress upcoming feelings during the presentation of negative pictures as compared to neutral ones. Differences between both groups of participants were significant during the N200 and P300 time intervals. EASI source reconstruction suggests that activity in underlying brain structures and activity patterns differ between participants with high vs. low scores of alexithymia. These results highlight potential mechanisms involved in social difficulties in alexithymia.

Poster 180
ALEXITHYMIA, PERIPHERAL REACTIVITY AND EMOTION REGULATION DURING A SOCIAL STRESS TASK
Ellen Matthias
Ludwig Maximilian University of Munich

Descriptors: alexithymia
Dealing with social stress is an essential ability to successfully cope with many critical social situations. Social difficulties and differences in the experience of social stress as well as differences in peripheral reactivity are described in alexithymia. We chose a public speaking task to induce social stress and assessed peripheral reactivity as well as subjective unpleasantness and externally rated signs of social stress in subjects differing in their degree of alexithymia. Our data suggest that reactivity as assessed by EDA and heart rate during social stress and recovery time is related to the degree of alexithymia. Additionally, although subjects with high scores of alexithymia described a higher degree of unpleasantness and stress during the chosen task, there was an inverse correlation between externally rated social stress and alexithymia. These results indicate differences in the reactivity to social stress, perceived distress and socially communicated aspects of stress in alexithymia.

Poster 181
AUTOMATIC PROCESSING OF PHONOTACTICALLY ILL-FORMED SYLLABLES INDEXED BY MISMATCH NEGATIVITY (MMN)
Johanna Steinberg1, Hubert Truckenbrod2, & Thomas Jacobsen1
1University of Leipzig, 2Centre for General Linguistics (ZAS)

Descriptors: phonology, speech processing, mismatch negativity
In this MMN study, the effects of language-specific phonotactic restrictions on pre-attentive auditory speech processing were investigated using event-related potentials. In German grammar, the occurrence of the velar [+ back] and the palatal [-back] dorsal fricatives is limited by the phonotactic restriction of Dorsal Fricative Assimilation (DFA), which demands a vowel and a following dorsal fricative to agree in articulatory backness [+ back], e.g. “Koch” (cook) or “echt” (real). Combinations of a front vowel and the following velar dorsal fricative within a syllable lead to phonotactically incorrect sequences. For passive oddball stimulation, three phonotactically correct Vowel + Fricative syllables and one phonotactically incorrect syllable violating DFA were used. Stimuli were contrasted pair-wise in reversed oddball blocks such that they shared the initial vowel while differing regarding the fricatives (Oddball contrast 1: [o + coronal sibilant] versus [o + velar dorsal fricative]; Oddball contrast 2: [e + coronal sibilant] versus the incorrect sequence [e + velar dorsal fricative]). The phonotactic violation coincided with the change of the fricatives and had to be processed additionally. Significant stronger MMN responses to the incorrect deviant were observed compared to the MMN elicited by the analogously constructed correct deviant. As our data showed, the phonotactic violation of DFA affected the pre-attentive processes in terms of a modulation of the MMN amplitude. This indicates that implicit phonotactic knowledge is activated and applied even pre-attentively.

Poster 182
FAILURE IN PHONOLOGICAL MONITORING? ERP EVIDENCE OF LATE, RATHER THAN EARLY, DIFFERENCES BETWEEN DYSLEXIC AND CONTROL READERS’ PHONOLOGICAL TASK RESPONSE
Nicola Savill, & Guillaume Thierry
Bangor University

Descriptors: ERP, dyslexia
This study used event related potentials (ERPs) to examine when dyslexic readers show sensitivity to the phonological and orthographic properties of visual pseudoword stimuli whilst performing a task with high phonological demand. We compared responses of dyslexic and non-dyslexic adults to pseudoword-word pairs, for which phonological similarity (homophonnic match/mismatch) and orthographic similarity (orthographic neighbour/non-neighbour) had been manipulated. Participants responded whether word targets sounded the same as the previously presented pseudoword. ERPs time-locked to target word onset showed main and interactive effects of phonological and orthographic similarity on N2 and P300 modulations with no significant group differences, suggesting that both groups’ early sensitivity to the stimuli’s relative phonological and orthographic properties were intact. However, analysis of later modulations—within the P600 range—showed a significant group x similarity-priming interaction with respect to amplitude change: Whilst the control group showed clear stimuli differentiation—with largest P600 amplitudes to homophonnic mismatching, non-neighbouring stimuli pairs and weakest to matching, neighbouring pairs—the dyslexic group’s P600 response was significantly attenuated. As P600 modulations are associated with linguistic monitoring and reanalysis, it is suggested that poor phonological task performance typically found with adult dyslexic readers may be more related to inefficient engagement with phonological processing, rather than poor sensitivity per se.

Poster 183
SEMANTIC VIOLATIONS AND ANIMACY VIOLATIONS ELICIT DIFFERENT BRAIN RESPONSES
Jakub Szewczyk1, & Herbert Schriefers2
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Descriptors: language perception, animacy, P600
Many linguistic and psycholinguistic theories treat animacy as a special “grammatical” semantic feature, because animacy is invoked in grammatical distinctions in many languages. The present experiment employs the ERP technique to examine when animacy information has a special status in syntactically canonical and unambiguous sentences. Participants were presented with 120 short stories in Polish. They were constructed in such a way that for half of them an animic direct-object-noun in the story’s final sentence was high anic, for the other half an animate noun. The critical noun occurred in (1) a congruent condition – semantically congruent with the preceding context (tested by a cloze test); or (2) a semantic violation condition – introducing a semantic violation while still being congruent with respect to the animacy/animacy expectation induced by the story; or (3) an animacy violation condition – introducing a semantic violation which in addition violated the animacy/animacy expectation induced by the story. The critical nouns in both the semantic violation condition and in the animacy violation condition (conditions 2 and 3) elicited an N400 effect relative to the congruent condition. In addition, both types of violations elicited a P600 effect, relative to the congruent condition. The P600 effect for animacy violations had significantly higher amplitude than that of semantic violations.

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ELECTROPHYSIOLOGICAL MARKERS OF BOTTOM-UP AND TOP-DOWN INFLUENCES ON TEMPORAL ORDER PERCEPTION IN SPEECH
Shin-Yi Fang, & James S. Magnuson
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Descriptors: temporal order
How does a listener tell ducks from foks? Temporal order processing is a crucial but surprisingly poorly understood aspect of speech perception and spoken word recognition. Many seemingly trivial distinctions may depend on bottom-up (auditory and phonetic sensitivity) and top-down (language-specific phonology and vocabulary) details. In this study, we used a passive auditory oddball paradigm to measure electrophysiological responses to temporal and phonological change. We compared a standard phonological sequence (/ap/a/) to multiple deviants where the two internal segments were manipulated; reversed-order (/ata/), same-onset (/ap/a/), same-offset (/ak/a/), or unrelated (/a/). Items were repeated in random order with a ratio of 60:10 standard:each deviant type for a total of 900 trials. The difference waveform (deviant-standard) showed a negativity between 200 – 300 ms after deviance point with distribution similar to the MMN except for same-onset. All conditions showed an N400-like posterior negativity 400 – 500 ms post deviation. The MMNs were strongest in the first half of the trials and were weak or absent in the second half. The N400 was weak in the first half, and became strong in the second half. This suggests that temporal order deviants were initially perceived as variants of the standard, but with repeated exposure, all items began to be lexicalized. This suggests this paradigm may be useful for understanding bottom-up and top-down contributions to the perception of temporal order.

Poster 185
ELECTROCORTICAL SIGNATURE OF EMOTION VERB PROCESSING
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Descriptors: semantics, verbs, EEG
Motion verbs elicit patterns of anterior electrocortical activity that are assumed to reflect the involvement of the motor cortex in the representation of their meaning.
However, little is known about other semantic categories such as verbs that refer to emotional actions. In order to explore how these verbs are represented, we compared brain activation.

We conclude that semantic processing of emotion-related verbs is reflected in anterior brain activation.

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MULTIPLE VARIABLES IN PICTURE NAMING STUDIED USING PARAMETRIC MEG ANALYSIS

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2University of Cambridge

Descriptors: picture naming, MEG, parametric analysis

We investigated MEG responses in a picture naming paradigm using multiple linear regression. We reduced an initial set of 14 variables to a final set of 4 predictor variables: Visual Complexity (VC), Semantic Features (SF), Action-Features (AF), and Name Frequency (NF). Participants overtly named objects presented as line drawings on a computer screen. Regression coefficients were obtained for each of the 4 predictor variables at each latency and each sensor. Data for individual participants were interpolated to a standard sensor geometry, and source estimates were computed in a standardized boundary element model. Statistical analysis was performed in sensor space using the SPM5 approach based on random field theory. In contrast to previous studies, we found evidence for a contamination of MEG data by preparatory articulatory activity. Distributed source analysis localized this activity to orbito-frontal and anterior-temporal brain structures. Localization results for those brain areas should therefore be interpreted with care. The VC variable affected posterior brain areas around 90 and 140 ms. SF and AF activated bilateral perisylvian cortical areas between 150 and 300 ms. NF showed effects as early as 130 ms, and activation of left pre-central areas around 260 ms. These data provide evidence for overlapping visual, semantic and phonological processes within the first 300 ms of picture naming. They also demonstrate the value of parametric analysis techniques for the investigation of effects of multiple intercorrelated variables in the same set of participants.

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LISTENING TO RELAXING MUSIC PRIOR TO A SOCIAL STRESSOR: EFFECTS ON THE PSYCHOLOGICAL AND PHYSIOLOGICAL STRESS RESPONSE

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The experience of stress and its biological consequences may dramatically influence health. Music has been suggested to beneficially impact health via stress-reducing effects. However, the exact mechanisms through which music impacts the psychological and biological stress system are poorly understood. Sixty healthy female volunteers (m = 25.37 ± 5) were exposed to a laboratory social stress test after having been randomly assigned to one of three different conditions prior to the stressor: 1) relaxing music ("Miserere", Allegri), 2) water sound and 3) rest (R) (i.e. without acoustic stimulation). Psychological stress perception (VAS) salivary cortisol, as well as salivary alpha-amylase were continuously measured in all subjects. The stressor caused significant changes in perceived stress, cortisol and alpha-amylase in all three groups over time. The three conditions significantly differed regarding cortisol responses (p = 0.025). Contrary to our expectations, the music intervention did not result in a significant attenuation of perceived stress and cortisol, whereas the WS condition did. In the recovery phase, listening to music resulted in lower amylase levels compared to the other two conditions (p = 0.005). Listening to music prior to a significant stressor does not influence the subsequent psychological and endocrine, but the sympathetic stress response. Listening to water sound seems to be effective in responding to a stressor with an attenuated stress response. These findings bear potential implications for the scientific study of the effectiveness of music interventions.

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INTERACTION BETWEEN THE TASK AND THE BACKGROUND: A VISUAL MISMATCH NEGATIVITY STUDY

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Descriptors: visual perception, visual mismatch negativity, and task-background interaction

The trial-related changes in the visual background elicited a posterior negative event-related potential component in the 120—200 ms latency range. We identified this component as the visual mismatch negativity (vMMN). The background change was either the color or orientation of the elements of textures with oblique line segments. Participants responded to a changing shape on the center of the visual field. This task-relevant change was either the orientation or the color of the shape. Reaction time increased in sequences with identical dimension of background and task change (color change of the shape and irrelevant color change in the background; orientation change of the shape and irrelevant orientation change in the background). This effect was independent of the temporal proximity between the irrelevant and relevant changes. However, the opposite pattern emerged in the vMMN, i.e., this ERP component was larger when the change of the background and the task-relevant change were different (color change of the shape and irrelevant orientation change in the background; orientation change of the shape and irrelevant color change in the background). According to our expectations, the music intervention did not result in a significant attenuation of perceived stress and cortisol, whereas the WS condition did. In the recovery phase, listening to music resulted in lower amylase responses (p < 0.025). Contrary to our expectations, the music intervention did not result in a significant attenuation of perceived stress and cortisol, whereas the WS condition did. In the recovery phase, listening to music resulted in lower amylase levels compared to the other two conditions (p = 0.005). Listening to music prior to a significant stressor does not influence the subsequent psychological and endocrine, but the sympathetic stress response. Listening to water sound seems to be effective in responding to a stressor with an attenuated stress response. These findings bear potential implications for the scientific study of the effectiveness of music interventions.
MAPPING THE CORTICAL HUBS IN THE TINNITUS DISTRESS NETWORK

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Descriptors: tinnitus, MEG, cortical hubs

Tinnitus is the conscious perception of a phantom sound in the absence of any physical source. Approximately 5% of the population experience such a tinnitus for more than 6 months and about 1% report the ongoing perception of the sound as bothering, leading sometimes to severe psychological distress. Until now, most of the research in tinnitus has concentrated on the auditory cortices. Some experimental work and theoretical considerations, however, have also suggested the involvement of non-auditory cortices that might form a large-scale cortical network. We aimed to investigate this network using magnetoencephalographic recordings of chronic tinnitus patients and healthy controls in the resting state. A beamforming technique was applied to reconstruct the brain activity at source level and the directed functional coupling between all voxels was analyzed by means of Partial Directed Coherence. Within a cortical network, hubs are brain structures with a rich functional connectivity to other brain regions. By mapping the cortical hubs in tinnitus and controls we report fundamental group differences in the global networks, mainly in the gamma frequency range. The prefrontal cortex, the subgenual cortex and the parieto-occipital region were core structures in this network. The information flow from this global network to the auditory cortex correlated positively with the strength of tinnitus distress.

INDUCED GAMMA BAND RESPONSES: NEURONAL ORIGIN OR EYE MOVEMENT ARTIFACT?

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Descriptors: induced gamma band, microaccel, EEG

Findings of induced gamma band responses (iGBRs) in the human electroencephalogram (EEG) were challenged by the work of Yuval-Greenberg et al. (2008) who stated that iGBRs are an artifact caused by microaccelades (MSs). According to Yuval-Greenberg et al., MSs are accompanied by short spike potentials (SPs) (with a steep gradient), which are the true source of iGBRs. In our present study we recorded EEG-signals and eye movements while participants performed a familiar-unfamiliar task (for details see Busch et al., 2006), which allowed us a clear identification of MS-related SPs in the EEG data. In order to remove the SPs, we applied a method based on spline interpolation at the affected data points in each contaminated trial. A wavelet-analysis of the resulting data revealed an ongoing narrowband oscillation in the gamma band range (30 – 80 Hz) at posterior sites after SPs removal. We also replicated previous findings stating that familiar objects elicit a higher iGBRs compared to unfamiliar objects. These specific characteristics of the remaining iGBR are corresponding with intra-cranial recordings in animals as well as with extra-cranial recordings in humans (Fries et al., 2008). Moreover, a narrow-band and ongoing oscillation makes an underlying electromyogenic artifact very unlikely. Accordingly, we conclude that the artifact free iGBR has a neuronal source and consequently is a reliable tool for investigating cognitive processes.

ENCODING OF MULTIPLE TIME SCALES OF ACOUSTIC REGULARITIES AS A FUNCTION OF EXPECTANCY AS REVEALED BY HUMAN EVOKED POTENTIALS

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University of Barcelona

Descriptors: auditory processing, regularity encoding, event-related potentials

Acoustic regularity encoding has been traditionally linked to the mismatch negativity (MMN) event-related potential (ERP), elicited to any auditory event violating a rule, and recently, to another ERP component termed Repetition Positivity (RP), which increases in amplitude with stimulus repetition. Here we aimed to explore the effects of stimulus expectancy in human auditory system automatic responses, by means of amplitude changes of the MMN and RP components to multiple time scales of stimulation history. ERPs to standard and deviant stimuli differing in frequency were studied in 19 healthy subjects using a fixed oddball sequence design embedding multiple acoustic regularities defined as: Repetition, consisting of trains of 2, 6, and 12 simple tones of the same frequency (standards), each train followed by a frequency deviant; Run, consisting of two successive Repetition sequences; and Switch, consisting of two successive Run sequences, with the second one switching roles between standard and deviant frequencies. Another sequence was used to control for deviant refractoriness effects by replacing standards with random tones. Our results show an increase of the controlled MMN amplitude (135 – 155 ms) for deviants and an increase of RP for standards (80 – 180 ms) with an increased number of previous standard repetitions. A simple linear model, taking into account both local and global aspects of stimulation history, revealed that standard and deviant stimuli ERP amplitudes in the controlled MMN time range (135 – 155 ms) increased linearly as a function of stimulus expectancy.

TEMPORAL CHANGES IN BRAIN ACTIVITY ELICITED BY CONDITIONED AND UNCONDITIONED STIMULUS IN AN ASSOCIATIVE LEARNING PARADIGM

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Descriptors: associative learning, erps, habituation

Classical theories on associative learning predict higher effective strength between conditioned stimuli and unconditioned stimuli, as well as an enhancement of early attentional processes during the course of conditioning. The aim of the present study was to examine temporal changes in brain activity associated with the presentation of conditioned and unconditioned stimuli in a differential conditioning paradigm. In this task, a red square was followed by an aversive visual stimulus (IAPS slide) (A+) and a yellow square was followed by a blank screen (B –). Event-related potentials (ERPs) elicited by the two types of stimuli were recorded from 32 electrodes. In the experiment participated nineteen right-handed volunteers (mean age 22 years). A late positive complex (LPC) was observed between 500 and 700 ms after stimulus onset and was more prominent at electrode Pz. Statistical analyses revealed that LPC amplitudes elicited by A+ stimuli were progressively diminishing over time, whereas ERP amplitudes elicited by B- stimuli remained stable at central, parietal, and occipital electrodes (p’s < .05). Thus, the present findings revealed that habituation effects were present only for A+, but not for B – following repeated exposition to affective stimuli. Our data suggest that differential classical conditioning could be a useful tool for examining brain correlates of learning processes involved in affective disorders, such as phobia or chronic pain.

AGE-RELATED DECLINE IN THE DIMENSIONALITY OF ERROR-RELATED EEG ACTIVITY: AN INDEPENDENT COMPONENT ANALYSIS

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Descriptors: executive functions, errors

Recent studies report an amplitude reduction of error-related potentials (Ne/ERN and Pe) in elderly participants. It is not clear whether this a result of true functional alterations or if the reduction is due to artifacts in common analysis procedures, i.e. the averaging procedure. The amplitude reduction might well result from a larger latency jitter
in the single-trial ERPs in the elderly. In the present study we investigated the component structure of the single-trial ERP after a response in two age groups with two qualitatively different tasks by means of Independent Component Analysis (ICA) and non-linear measures like the Hurst exponent. The first task was a modified flanker task and the second a mental rotation task. In both tasks the response deadline was adapted with respect to the error rate. This should prevent speed-accuracy trade-off and yield comparable error rates in both age groups. Further, nested in the two age groups, two different instruction types (“respond as precise as possible” and “respond as fast as possible”) were given to the participants. This manipulation should balance the possibility that the age groups might systematically use different response strategies. ICA yielded in both age groups one single component accounted for most of the variance in erroneous and correct responses. Further, the results indicate a true age-related decline in component activity accounting for error-related activity. In addition the component structure in general, the dimensionality of the signal was significantly altered in elderly subjects.

**Poster 9**

**EXECUTIVE FUNCTIONS AND CONTROL OF AGGRESSION: AN ERP STUDY**

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Descriptors: aggression, executive functions, ERP

Research suggests that there is a relation between executive control and aggression. Recording ERPs in the Taylor aggression paradigm (TAP) we found an enhanced frontal negativity in participants of high trait but low experimental aggression, possibly indicating executive control of the impulse to react aggressively. To test this hypothesis 32 healthy high trait aggressive participants completed a combined flanker/stop task, providing measures of executive functions, and the Taylor aggression paradigm (TAP), comprising a provocation and an outcome phase. In the provocation phase of the TAP we observed an enhanced frontal negativity during less aggressive provocation in participants with high experimental aggression. We suggest that this finding reflects reduced aggression control during high provocation in these subjects. The error related negativity to errors in the flanker task was larger for less aggressive participants, which also showed similarly high stop-N2 components for successfully stopped reactions and forced errors implying that less aggressive participants have increased action monitoring and inhibitory processes relative to participants with experimental aggressiveness. These findings further strengthen the proposed link between executive functions and control of aggression.

**Poster 10**

**IMAGINING THE UNKNOWN: ERP INVESTIGATIONS OF SEMANTIC KNOWLEDGE EFFECTS AND THE TIME COURSE OF VISUAL IMAGERY**

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Descriptors: visual imagery, semantic knowledge effect, ERP

Previous research on knowledge scale effects in object recognition has revealed knowledge-induced modulations not only of semantic analyses but also of early perceptual processes. In event-related brain potentials these effects are reflected in the N400 time window (associated with meaning access) and in the P100 component (associated with early stages of visual analysis). The present study investigates whether comparable knowledge scale effects could also be observed in visual imagery. It has often been argued that perception and imagery share common brain regions and processes. However, while the neural basis of imagery is well-investigated, little is known about its time course. Here, we employ event-related brain potentials to investigate the temporal dynamics of imagery of objects associated with in-depth or minimal semantic knowledge. In a learning paradigm the amount of knowledge about existing but rare objects was manipulated while perceptual factors were held constant. In a subsequent test session participants saw the pictures or formed visual images of the objects. Replicating previous results, in-depth semantic knowledge was associated with amplitude modulations in the N400 and P100 time window when object pictures were presented. During object imagery the same N400 and a similar but weaker P100 effect were observed. Behaviourally, the formation of mental images was enhanced in the in-depth compared to the minimal knowledge condition. These results suggest that imagery is a function of the visual system and that semantic knowledge facilitates visual imagery.

**Poster 11**

**ON THE NEURAL CORRELATES OF EYE GAZE ADAPTATION**

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Descriptors: face perception, eye gaze, high-level adaptation

Recent research shows a strong effect of adaptation on gaze perception: Adaptation to faces with eye gaze constantly diverted in one direction subsequently impairs the perception of that gaze direction. In a previous study on the neural correlates of this effect, N170 amplitudes to test faces were strongly attenuated when these were presented following adaptation to faces irrespective of gaze direction. ERP modulations as a function of gaze direction adaptation, however, were found only later (250 – 350 ms). In the present study, we used a new paradigm to study the exact nature of both the gaze direction-invariant N170 attenuation effect and the direction-specific effects in later time windows. We computed the ability to classify left, direct, and right gaze direction before and after adaptation to direct gaze (control condition) or to eye gaze diverted to the right (adaptation condition). The behavioral results clearly replicated earlier findings of impaired perception of eye gaze directed to the adapted side. The ERP analysis confirmed an insensitivity of the N170 to gaze adaptation, and suggests that reported attenuations were a result of adaptation to generic face information irrespective of gaze direction. Occipito-temporal ERPs ~ 250 – 350 ms showed direction-specific modulations with most positive amplitudes in response to stimulus gazing in the direction of adaptation. A similar, yet polarity reversed, effect was observed in the parietal P3 component, which may be a neural correlate of adaptation-induced novelty detection.

**Poster 12**

**ALCOHOL DOSE EFFECTS ON FEAR CONDITIONING WITH VARYING LEVELS OF THREAT INTENSITY**

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Descriptors: alcohol, startle, fear conditioning

Use of alcohol to reduce stress predicts subsequent problems with alcohol (Schröder & Perrine 2007). Recent research has been guided for decades by the Stress-Response Dampening (SRD) model, which proposed that alcohol reduces emotional response to aversive stimuli generally, across drinkers and blood alcohol concentrations (BACs). Research has not consistently supported this thesis. In order to clarify the nature of SRD effects, the current project parametrically varied BAC and included a novel manipulation of threat intensity to examine the main and interactive effects of these factors on stress response. Ninety-trial experiments were assigned to one of four BAC groups (target BACs of 0%, 0.04%, 0.075%, or 0.11%) and viewed a series of 66 cues, in alternating shock and no-shock blocks. During shock blocks, shocks were administered at the termination of each cue and the intensity of the shock (light, moderate, or intense) was indicated by cue color. Fear-potentiated startle (FPS; startle during shock cues relative to no-shock cue) was used to index stress response to each shock cue. FPS increased with increasing shock cue intensity. A significant main effect of BAC was observed with FPS decreasing as BAC increased. Shock intensity moderated this BAC effect such that the BAC effect on FPS was strongest at the highest shock intensity. These results suggest that the stress response is attenuated at higher BACs and that this alcohol dose response effect is more robust when the stress-eliciting stimulus is highly potent.

**Poster 13**

**PSYCHOPHYSIOLOGICAL VARIABLES AS PREDICTORS OF TREATMENT OUTCOME FOR ANXIETY DISORDERS**

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Descriptors: anxiety disorders, treatment outcome, autonomic responses

The present study was aimed at testing whether a psychophysiological assessment protocol prior to a cognitive-behavioral treatment for anxiety disorders would provide reliable predictors of treatment outcome. A group of 22 anxiety patients (8 specific phobia, 5 social anxiety, 5 generalized anxiety, and 4 panic) completed the ADIS clinical interview and a set of questionnaires (BDI, STAI-T, and PSWQ) before and after treatment. The psychophysiological protocol included three reactivity paradigms: cardiac defense, the startle probe paradigm with pleasant, neutral and unpleasant pictures, and mental imagery with personalized clinically relevant scenes. In addition to eye-blink startle, heart rate and skin conductance were recorded throughout the three paradigms. Results showed: (a) significant negative correlations between tonic levels of both heart rate and skin conductance, and treatment outcome such that patients with higher tonic levels had poorer prognoses; and (b) significant positive correlations between heart rate and skin conductance indices of reactivity and treatment outcome, such that patients with greater reactivity had better prognosis. These results underscore the importance of using a psychophysiological assessment protocol within the standard clinical evaluation of anxiety disorders.

**Poster 14**

**SOURCE ESTIMATION OF THE N2, ERN, AND FERN IN A TACTILE TIME-ESTIMATION TASK**

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Descriptors: ERP, source localization

The N2, error-related negativity (ERN), and feedback-related negativity (fERN) are event-related brain potentials (ERP) sharing similar scalp topographies and possible
functional concordances. The N2 is elicited by stimuli that call for response inhibition in a context of frequent responding, the ERN by action slips, and the fERN by reward prediction errors after receiving feedback. To investigate the question as to whether these components represent the same functional phenomenon and have the same neural generator we recorded EEG from participants engaged in a modified tactile time-estimation task combined with a stop-signal paradigm. In addition to the analysis of scalp topographies, current density reconstructions were computed using the sLORETA-weighted accurate minimum norm inverse solutions algorithm. Realistic head models as well as an individualized solution space were estimated from structural T1-weighted images. The ERN, the fERN and the N2 all exhibited comparable negative fronto-cortical scalp topographies. Consistent with previous observations, the fERN amplitude was augmented with unexpected as compared to expected feedback stimuli. Similarly, the N2 exhibited larger amplitudes with increased difficulty of the time-estimation procedure. The ERN, on the other hand, was not strongly affected by task characteristics. All three potentials were predominantly generated by the dorsal anterior cingulate cortex. However, source estimations of the N2 additionally revealed activations in the inferior-frontal region.

Poster 15
ERROR-RELATED NEGATIVITY PREDICTS ACADEMIC PERFORMANCE
Jacob B. Hirsh, & Michael Inzlicht
University of Toronto
Descriptors: ERN, self-regulation, post-error slowing
Activity in the Anterior Cingulate Cortex (ACC) has been linked to the processes of error detection and conflict monitoring, along with the subsequent engagement of cognitive-control mechanisms. The error-related negativity (ERN) is an electrophysiological signal associated with this ACC monitoring process, occurring approximately 100 ms after an error is made. The magnitude of the ERN has recently been related to a number of real-world behavioral outcomes related to self-regulation and cognitive control. The current study extended this research by examining the relationship between the ERN and academic performance. Undergraduate students completed a color-naming Stroop task while their neural activity was recorded via electroencephalogram. Results indicated that a larger ERN following errors was significantly correlated with better academic performance as measured by official student transcripts. This relationship was mediated by increased post-error slowing on the Stroop task, indicating improved behavioral regulation. A greater ability to monitor performance and engage cognitive control mechanisms when needed thus appears associated with improved real-world performance in the academic domain.

Poster 16
WHAT CAUSES THE ERRORLESS LEARNING BENEFIT? EVIDENCE FROM FEEDBACK-RELATED BRAIN ACTIVITY
Benjamin J.G. Ernst, & Marco Steinhauser
University of Konstanz
Descriptors: errorless learning, feedback-related negativity
It has been shown that learning is improved when errors due to guessing are prevented. This errorless learning benefit is attributed to the fact that errors are learnt which impairs subsequent performance. The goal of the present study was to investigate the mechanisms underlying the errorless learning benefit by considering behavioral data and the feedback-related negativity (ERN), an event-related potential peaking shortly after feedback indicating a wrong choice. We examined whether the errorless learning benefit requires that guessing is avoided or that the execution of an erroneous response is avoided. To this end, participants learned German-Swahili word pairs during a learning phase. Whereas an errorful learning condition required that participants responded to multiple-choice items, an errorless learning condition required that the same items were passively inspected only. In both conditions, immediate feedback about the correct response was provided which could be used for learning the word pairs. In both conditions, the learning phase was followed by a test phase in which learning success was assessed. As a result, better performance was achieved in the errorless learning condition, indicating an errorless learning benefit. Moreover, a marked FRN was found for negative feedback during errorful learning. Crucially, however, an even stronger FRN was found for feedback during errorless learning. This indicates that participants made a covert choice during errorless learning and that the errorless learning benefit merely reflects the absence of an overt response.

Poster 17
WHEN HYPER BECOMES HYPO: PANIC DISORDER AND AMYGDALA ACTIVATION TO MASKED STIMULI
Cristina Ottaviani, Valeria Nucifora, Daniela Cevolani, Raffaele Agati, Rosita Borlimi, Gianni Brighatti, & Marco Leonardi
University of Bologna
Descriptors: amygdala, backward masking, panic disorder
Previous functional neuroimaging studies have demonstrated amygdala activation in response to fearful faces even if they are presented below the threshold of aware visual perception. However, chronic hyperarousal in panic disorder (PD) may diminish the emotional response reflected in reduced amygdala activation. The aim of the present study was to test if amygdala reactivity to fearful stimuli is weakened in PD when fearful stimuli are presented below the level of awareness. A sample of 13 PD patients (7 female, male:mean age = 28.1 (SD 2.7) and 15 healthy volunteers (9 female, 8 male; mean age = 26.2 (SD 3.3) were presented human faces with fearful vs. neutral expressions (17 ms) using a backward masking procedure during a 3T fMRI scanning. Awareness was confirmed by a forced-choice fear detection task. Whereas controls showed a significant bilateral activation within the amygdala for fearful masked faces, patients failed to respond, t(2, 26) = 2.40, p = .02; for the left amygdala and t(2, 26) = 2.88, p = .01 for the right amygdala. This cognitive activity of worry can be responsible for the inhibition of the limbic system and interfere with the evaluation of threatening visual stimuli, thus becoming maladaptive.

Poster 18
TACTILE CAPTURE OF AUDITORY LOCALIZATION: AN EVENT-RELATED POTENTIAL STUDY
Patrick Bruns, & Brigitte Röder
University of Hamburg
Descriptors: multisensory, auditory localization, posture change
The well-known ventriloquist illusion arises when sounds are mislocalized toward a synchronous but spatially discrepant visual stimulus. A similar effect of touch on audition has also been reported. Recently, we demonstrated that this audio-tactile ventriloquist effect predominantly operates in an external coordinate system, i.e. auditory localization was biased toward the external location, rather than toward the side of the anatomical hand to which the tactile stimuli were applied. Using ERPs, the present study investigated the neural correlates of this audio-tactile ventriloquist effect. ERPs elicited 260 ms following stimulus onset suggest a biasing of cortical activity towards the external side of the tactile stimulus. This effect was only seen for trials in which a ventriloquist illusion was elicited. Moreover, this effect was reduced when participants adopted a crossed hands posture, which corresponds to the behavioral finding of a reduced audio-tactile ventriloquist effect when external and anatomically-centered reference frames were in conflict.

Poster 19
AMYGDALA-DEPENDENT ASSOCIATIVE LEARNING IN HUMANS IS MODULATED BY THE BDNFVAL66MET POLYMORPHISM
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Descriptors: fear conditioning/ extinction, BDNF, polymorphism
The Brain derived neurotrophic factor (BDNF) is critically involved in neuroplasticity as well as the acquisition, consolidation and retention of hippocampal- and amygdala-dependent learning. A common A/G single nucleotide polymorphism (BDNFVal66met) in the pro-domain of the human BDNF gene is associated with abnormal intracerebral trafficking and reduced activity-dependent BDNF release specifically in neuronal cells. We studied the effect of this functional polymorphism in an aversive differential fear conditioning, and a 24-hours delayed extinction paradigm in fifty-seven healthy participants. Pictures of male faces were used as stimuli and fear learning was quantified by fear potentiated startle responses (FPS) and skin conductance responses (SCR). A post-acquisition interview was used to assess whether participants could correctly report the conditioning contingencies. Aware BNDF met-carriers show a behavioral deficit in amygdala-dependent associative learning as indicated by an absence of FPS responses in the last acquisition block, p = .004. This deficit is maintained in the first block of extinction, (p = .05). No genotype differences were found in conditioned SCR discrimination. These data present evidence for the involvement of BDNF signaling in human amygdala-dependent learning and may have important implications for the genetic risk of developing affective pathologies. We suggest that the BDNF metallele may have a protective effect that is mediated via reduced synaptic plasticity in the amygdala induced by negative life experience.

Poster 20
OXYTOCIN BUFFERS CORTISOL RESPONSES TO STRESS IN INDIVIDUALS WITH IMPAIRED COPING ABILITIES
Rainer Duesing, Markus Quirin, & Julius Kuhl
University of Osnabrück
Descriptors: oxytocin, cortisol, coping
Oxytocin facilitates stress regulation but little is known about individual differences in these effects. The present study investigates whether the effect of intranasal oxytocin on stress-contingent cortisol release differs between individuals with high vs. low efficiency in coping with stress. In a double-blind study thirty-seven healthy male students with either high or low coping abilities (action- vs. state-oriented individuals, respectively)
were randomly assigned to receive intranasally 24 International Units oxytocin or placebo. Cortisol was measured at several times before and after a social stressor (public speaking). Individuals with impaired coping abilities show an reduced cortisol response to stress after oxytocin but an increased cortisol response after placebo application. The results suggest that healthy individuals with low stress coping abilities benefit from intranasal oxytocin application. The findings are discussed with respect to their relevance for neuropharmacological treatment of psychiatric disorders with impaired coping abilities such as depression, anxiety or borderline disorder.

Poster 21
THE PERCEPTION OF HIV RISK: AN ERP ANALYSIS OF INTUITIVE PROCESSES
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Descriptors: risk perception, intuition, affect
Recent models of health risk perception emphasize the role of intuitive affective processes, assuming that risk perception comprises more than cognitions about probabilities and expected consequences. The present study attempted to demonstrate that health risk perception processes conform to two key features of intuition: speed and affective evaluation. As a new approach to shed light on intuitive processes in health risk perception, event-related potentials (256 channels) were measured while participants (N = 40) judged the risk of HIV-infection (Human Immunodeficiency Virus) of 120 persons based on their physical appearance. ERP potentials differentiated between high- and low-risk stimuli around 350 ms post-stimulus, too early to reflect elaborate processing. ERPs showed strong right hemisphere activations in response to high-risk stimuli and left hemisphere activations around 350 ms post-stimulus in response to low-risk stimuli. These findings cannot be explained by several confounds, such as familiarity and attention, and are in line with previous research in affective neuroscience. As a new approach to shed light on intuitive processes in health risk perception, event-related potentials (256 channels) were measured while participants (N = 40) judged the risk of HIV-infection (Human Immunodeficiency Virus) of 120 persons based on their physical appearance. ERP potentials differentiated between high- and low-risk stimuli around 350 ms post-stimulus, too early to reflect elaborate processing. ERPs showed strong right hemisphere activations in response to high-risk stimuli and left hemisphere activations around 350 ms post-stimulus in response to low-risk stimuli. These findings cannot be explained by several confounds, such as familiarity and attention, and are in line with previous research in affective neuroscience.

Poster 22
EFFECT OF DIFFERENT FORMS OF CONTINGENCY AWARENESS ON SUBJECTIVE, ELECTRODERMAL, AND NEURAL CORRELATES OF FEAR CONDITIONING
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Descriptors: fear conditioning, contingency awareness
In classical conditioning, a conditioned stimulus (CS) is paired with an unconditioned stimulus (UCS). Contingency awareness, i.e. the cognitive representation of the CS-UCS relationship, has been shown to influence the conditioned responses (CR). However, there are different ways to achieve contingency awareness (i.e. instruction vs. learning) that may influence CR but have not been studied in detail yet. We conducted a differential fear conditioning experiment with transcutaneous electrical stimulation as UCS and geometric figures as CS. One figure was always paired (CS+/UCS+), whereas the other (CS–) was never paired with the UCS. Nineteen subjects did not notice the contingencies between CS and UCS (unaware), whereas 19 subjects did (learned aware). The third group of 19 subjects was informed about the contingencies in advance (instructed aware). Analyses of subjective ratings and electrodermal activity revealed CR in the two aware groups only. Regarding neural activity in the contrast CS+ > CS–, the unaware group showed significant thalamus activity and a trend in the amygdala. The instructed aware group showed enhanced activations in the insula and prefrontal structures (e.g. anterior cingulate). The learned aware group showed differential responses in the same regions and additionally in the amygdala, hippocampus, thalamus, ventral striatum, occipital, and orbitofrontal cortex. Thus, learned and instructed aware participants showed similar subjective and electrode responses but differed with respect to the underlying neural activity.

Poster 23
DOES BARO-AFFERENT FEEDBACK RESPOND TO PROCESSES OF CLASSICAL CONDITIONING?
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Descriptors: classical conditioning, visceral afferences, baroreflex
Classical conditioning of visceral functions is a well known phenomenon. However, it has not been described for baro-afferent feedback. This circuitry plays a crucial role in the regulation of the cardiovascular system, especially the interbeat-interval (IBI). Its afferent signals (US) originate from baroreceptors located in large arteries proximal to the heart. An increased loading of baroreceptors causes increased baro-afferent feedback and ultimately a longer IBI (UCR). In the first part of this experiment we established an association in 20 participants (15 w, age 20–27) between the baro-afferent signal (US) and a formerly neutral acoustic stimulus (CS+) by repeated simultaneous presentation. The acoustic stimulus was paired 40 times with the early cardiac cycle phase (R-wave + 230 ms). As a control condition, a second acoustic stimulus (CS–) was presented 40 times along with the late cardiac cycle phase (R-wave + 530 ms). The success of this conditioning process was assessed in the second part of the experiment by randomized presentation of both stimuli and a third neutral acoustic stimulus right at the R-wave. The CS+ leads to a significantly reduced IBI (CR), but neither the CS– nor the neutral stimulus had an impact on the heartbeat. This finding may indicate an out-of-phase trace conditioning process and requires further discussion.

Poster 24
HAPPY END: THE OFFSET OF ANGRY FACIAL EXPRESSIONS ACTIVATES THE HUMAN REWARD SYSTEM
Matthias J. Wieser, Andreas Mühlberger, Antje B.M. Gerdes, Monika C.Frey, Peter Weigl, & Paul Pauli
University of Würzburg
Descriptors: emotion, facial expressions, dynamics
Research on face processing has mostly used still pictures of facial expressions. In everyday life, however, emotional expressions are changing dynamically, and recent studies have shown enhanced processing of dynamic facial expressions. Dynamic information such as the onset and the offset of the same emotional expression may be processed differentially due to its different signaling character: Whereas the offset of a happy expression might signal potential threat, the offset of an angry expression might signal stress relief. To investigate the neural correlates of these dynamic features of facial expressions, video clips showing onsets and offsets of happy and angry facial expressions were presented to 18 participants while brain activity was measured by means of fMRI. The offset of the happy expressions and the onset of the angry expressions showed strong common activations in the left amygdala and insula, while both offset of the angry and onset of the happy expressions induced significant activations in the left dorsal striatum. Interaction analysis indicated that the offset of an angry facial expression and to a minor part the onset of a happy facial expression were associated with activity in the left ventral striatum. This difference was confirmed by strong ventral and dorsal striatum activations in response to the offset of angry facial expressions. In sum, our study highlights the significance of dynamic changes of facial emotional expressions, which result in different activities in emotion and motivation-related brain areas.

Poster 25
ALCOHOL INTOXICATION: SELECTIVE REDUCTION OF ANXIETY IN THE FACE OF UNCERTAIN THREAT
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Descriptors: alcohol, anxiety, predictability
Research indicates that fear and anxiety are distinct, separable processes. Experimental procedures administering predictable vs. unpredictable shock elicit fear vs. anxiety, respectively. Our lab has recently demonstrated that alcohol selectively reduces anxiety but not fear. To further specify which stimulus characteristics are most relevant to anxiety elicitation and anxiolytic effects of alcohol, we developed a novel paradigm to vary threat probability while holding temporal precision of threat constant. Intoxicated (.08% BAC) and placebo participants viewed a series of visual cues. Shock probability varied across blocks. High probability (100%) shock cues matched predictable shock cues eliciting fear in earlier research, while lower probability (20% & 60%) shock cues were designed to elicit anxiety. Inter-trial intervals (ITIs) modeled anxiety in anticipation of uncertain, distal shock. Startle potentiation (SP) relative to matched cue and ITI in no-shock blocks indexed affective responses. All shock cues produced robust SP. Alcohol reduced SP monotonically during shock cues as a function of shock probability. Sustained SP was observed during ITIs in shock blocks despite no imminent threat in this period. Alcohol significantly reduced SP during ITIs in all shock blocks. This builds on research suggesting that fear and anxiety are discrete affective responses, and indicates that threat probability as well as temporal uncertainty elicits anxiety. Due to high rates of comorbidity between anxiety disorders and alcoholism, this work has important clinical relevance.
SYMPATHY MODULATES N170 RESPONSE TO FEAR VS. NEUTRAL FACIAL EXPRESSIONS

Laura C. Gravens, Philip A. Gable, & Eddie Harmon-Jones
Texas A&M University

Descriptors: emotion, sympathy, ERP

The emotion of sympathy underlies much prosocial behavior and has even been found to cause altruistic behavior (Batson, 1990). The current experiment sought to extend research on sympathy by examining rapid neural responses to faces of other individuals who were in a distressed state. Participants were first told they would view pictures of individuals who had been in an experiment on electric shock (fearful facial expression) or in a control condition of the same experiment (neutral expressions). Then, to manipulate sympathy, participants were instructed to imagine what the individuals in the pictures were going through (high sympathy); or they were instructed to try to remain objective while viewing the pictures (low sympathy). Participants then viewed pictures of faces displaying neutral or fearful expressions. Event-related potentials were extracted from the occipito-temporal regions and analyzed at approximately 170 ms after stimulus onset. Within the high sympathy condition, a significant facial expression (fear vs. neutral) X sex of expressor (male vs. female) interaction emerged. It indicated that N170 amplitude was greatest to male faces expressing fear. No significant effects emerged in the low sympathy condition. Thus, as predicted, N170 amplitude was increased by sympathy for individuals in distressed states. Possible interpretations of the sex of expressor effect will be considered.

Poster 29

ASYMMETRICAL FRONTAL LATE POSITIVE POTENTIAL (LPP) RELATES TO LOCAL VS. GLOBAL ATTENTIONAL PRECEDENCE FOLLOWING DESIRE VS. SADNESS PRIMES

Philip A. Gable, & Eddie Harmon-Jones
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Descriptors: emotion/motivation, local-global attention, late positive potential

Decades of research has suggested that positive affect broadens attention, whereas negative affect narrows attention. This past research failed to consider the importance of motivational intensity. Recent research revealed that positive affects low in approach motivation broaden attention but positive affects high in approach motivation narrow attention. The present research was designed to test whether negative affects low in approach would also broaden attention and whether frontal LPP asymmetry is related to attentional precedence. Previous research has suggested that relatively greater left cortical activity is associated with local attentional bias and relatively greater right cortical activity is associated with global attentional bias. The current experiments examined LPPs to pictures evoking desire, sadness, or neutral affect, and then assessed the relationship of asymmetrical LPPs to local vs. global attentional bias following the affective picture primes. Results revealed that desire pictures caused greater relative left frontal LPP amplitudes, which predicted more local bias following desire pictures. In contrast, sad pictures caused greater relative right frontal LPP amplitudes, which predicted more global bias following sad pictures. These results provide the first evidence that asymmetrical LPPs over frontal cortical regions are associated with attentional biases induced by emotions of desire and sadness.

Poster 30

ASYMMETRICAL FRONTAL LATE POSITIVE POTENTIAL (LPP) IN PTSD

Vanessa Rocha-Rego, Mirtes G. Pereira, Mateus Joffily, Letícia Oliveira, Adriana Fiszman, Carla Marques-Portella, Mauro Mendelowicz, Ivan Figueira, & Eliane Volchan
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وضوع: emotion/motivation, local-global attention, late positive potential

PTSD and Immobility: A Posturographic Study

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Federal University of Rio de Janeiro

Descriptors: stabilometry, immobility, PTSD

Employing psychometric measures, previous studies from our group revealed the occurrence of peritraumatic tonic immobility in humans and indicated an association with symptoms severity of post traumatic stress disorder (PTSD). Here we investigated the postural profiles of PTSD patients taking into account the reports of peritraumatic immobilization. Victims of urban violence with PTSD (n = 18) and trauma exposed controls (n = 15) stood on a force platform which recorded the displacement of center of pressure. Experimental session consisted of four consecutive blocks (60s duration each): (i) audiotaped neutral script presentation; (ii) blank interval; (iii) audiotaped traumatic script presentation (iv) blank interval. Reports of immobility during the experiment were documented through standardized questions. Area of sway was calculated for each block. Amplitude of body sway during the experiment was estimated by adding the areas of the 4 blocks. The area of sway in patients increased significantly during the presentation of traumatic script compared to controls. On the other hand, in patients, the intensity of reported immobility was inversely correlated with the total amplitude of body sway (r = -0.55, p < 0.01). These findings suggest that subjective reports of peritraumatic postural immobilization in PTSD patients may have a somatomotor substrate.

Poster 31

LOOKING FOR A CARDIAC MARKER OF PERITRAUMATIC TONIC IMMOBILITY IN PTSD

Carlos E. Norte, Gabriela G.L. Souza, Camila M. Franklin, Alessandra A. Lima, Carla Marques-Portella, Ivan Figueira, & Eliane Volchan
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Descriptors: heart rate variability, immobility, PTSD

Violence-related trauma has increased dramatically in recent years potentially raising the risk for Posttraumatic Stress Disorder (PTSD). During the trauma, the defensive cascade is activated and the victim can display reflexive motor inhibition (tonic immobility), the last-ditch defense under life threat. Previously, our group showed that peritraumatic tonic immobility is a strong predictor of the severity of PTSD symptoms. Additionally,
PTSD patients reporting this reaction responded very poorly to standard pharmacologic treatment. The objective of the present work is to investigate a potential cardiac marker of tonic immobility. Nineteen PTSD patients underwent a symptom provocation session. Electrocardiographic recording while listening to a personalized trauma-related script was analyzed. The square root of the mean of the sum of the squares of differences between successive adjacent interbeat intervals was computed as a measure of heart rate variability. Reports of immobility during the experiment were documented through heart rate variability. We found that heart rate variability was negatively correlated between successive adjacent interbeat intervals was computed as a measure of heart rate variability. Patients who reported increased immobility exhibited the lowest indices of heart rate variability during the symptom provocation. This finding suggests that decreased heart rate variability may be a putative candidate for a cardiac marker of peritraumatic tonic immobility.

### Poster 33

**CORTISOL CORRELATES WITH TONIC IMMObILITY SYMPTOMS AS A RESPONSE TO LIFE THREATENING SITUATIONS IN HEALTHY SUBJECTS**

Thais M. Gameiro, Ana Carolina F. Mendoça-de-Souza, Nastassja L. Fischer, Camila M. Franklin, Gabriela G.L. Souza, Evandro S.F. Coutinho, Ivan Figueira, & Elaine Volchan

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**Descriptors:** cortisol, immobility reactions, fear responses

The activity of the Hypothalamo-Pituitary-Adrenocortical (HPA) system is known to be related to both stress in the face of threat. Glucocorticoids are the main product of HPA axis and have been implicated in fear responses. Higher basal levels of these hormones in animals were found to be related to more fear parasympathetic responses, like freezing and tonic immobility. Here we investigated if basal cortisol levels would be related to the degree of immobility felt during a real life threatening situation. We tested 15 trauma-exposed healthy subjects. Saliva samples were collected between 2 pm and 5 pm in the laboratory. To assess the occurrence of peritraumatic tonic immobility we employed the Tonic Immobility Scale (TIS) a 10-item seven-point likert scale. Final scores on the TIS were considered to indicate immobility symptoms felt during or immediately after the trauma. We used non-parametric correlations to test the relationship between cortisol levels and immobilization during a traumatic event. Immobility self-reports were significantly related to basal levels of cortisol (r = -.58, p = .02). The result showed that, in a sample of healthy subjects there is a positive correlation between cortisol basal levels and immobility symptoms felt as a response to real life threatening situations. These findings suggest that in humans, as observed in animals, glucocorticoids are importantly related to immobility responses in the face of danger.

### Poster 34

**RESILIENCE AND HUMANITARIANISM IMPACT ON MORNING SECRETION OF CORTISOL AND DHEA IN PEACEKEEPERS**

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**Descriptors:** cortisol, DHEA, resilience

Peacekeeping duty has evolved in ways that individuals are faced with many psychological challenges. However, the shared experience and sense of purpose that arises from being part of an organized structure may mitigate the potentially traumatizing effects of exposure to the negative elements of peacekeeping. Here we evaluated cortisol and DHEA levels in 24 healthy peacekeepers from the Brazilian army after deployment. Saliva samples were taken 0, 30, 45 and ±60 min after awakening. The extent to which individuals found activities related to their duties to be positive/rewarding was evaluated through a self-reported questionnaire (Positive Humanitarian Subscale). The Resilience Scale measured positive psychological outcome after serious risk experiences. Correlation analysis revealed that the positive humanitarianism was inversely associated with morning cortisol activity (r = -.48).

### Poster 35

**THE LATE POSITIVE POTENTIAL AS A BIOMARKER FOR ANXIETY-RELATED ATTENTIONAL BIASES**

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**Descriptors:** late positive potential, anxiety, memory

The late positive potential (LPP) reflects attention to emotion and is greater in response to emotional versus neutral stimuli. Thus, the LPP is ideal for examining the time course of affective processing and its impact on other cognitive processes such as memory. For example, anxiety is characterized by threat biases, including attention biases, behavioral disengagement, and disrupted memory for emotional material. Changes in the LPP should reflect such threat biases, but few studies have examined links among anxiety, the LPP, and memory. The present study (N = 25) predicted that high trait anxiety (HTA) will be associated with an attentional bias to unpleasant pictures as measured by increased LPP amplitudes in three time windows (early 350 – 500, middle 550 – 750, and late 750 – 1000 ms). In addition, this bias will be reflected in decreased LPPs later in the processing stream, reflecting attentional disengagement. Finally, as LPPs decrease, memory for emotional pictures will also decrease. As predicted, HTA was associated with increased LPPs in the early window (r = .47).

### Poster 36

**CHANGES IN THE LATE POSITIVE POTENTIAL PREDICT ATTENTION TRAINING EFFECTS ON THE THREAT BIAS**

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**Descriptors:** attention bias, affective processing

Anxiety is characterized by an attention bias towards threat. This bias can be increased or decreased via attention training, but such training may only succeed when affective processing of threat is altered. The late positive potential (LPP) is ideal for capturing attention to threat because its magnitude is greater for emotionally arousing versus neutral stimuli. Few if any studies have used the LPP to examine attention training and anxiety-related attention biases. Participants were a non-clinical sample of 37 adults trained to attend selectively to anger or happy faces using the dot probe task. The attention bias score was the reaction time to probes in the location of happy – angry faces (higher scores indicate faster responses to angry faces). Before and after training, EEG was recorded while emotional faces were viewed. The LPP was quantified in an early (300 – 500 ms), middle (550 – 750 ms), and late window (800 – 1000 ms). There were no significant changes in the attention bias score or LPPs due to training. However, when participants were divided into two groups based on whether their LPPs to each face type increased or decreased after training a significant change in attention bias emerged. Those in the attend-happy group who showed a post-training decrease in early-window LPPs to angry faces showed reduced attention bias scores, F(2, 26) = 5.10, p < .05.

### Poster 37

**THE LATE POSITIVE POTENTIAL AS A BIOMARKER FOR GENDER DIFFERENCES IN AFFECTIVE PROCESSING RELATED TO EMOTION REGULATION**

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**Descriptors:** late positive potential, emotion

The late positive potential (LPP) reflects attention to emotion: it is enhanced to emotional versus neutral stimuli. In one study, boys vs. girls showed larger LPPs in response to negative stimuli, which in turn was related to maternal report of emotion regulation (ER). Thus, the LPP might be a useful biomarker for affective processing style and be sensitive to gender differences. However, no studies have examined links between the LPP and complex ER behaviors, particularly in children. The present study (N = 39) explored whether girls and boys showed distinct patterns of affective processing during passive viewing of positive, negative, and neutral pictures measured via the LPP (divided into early 300 – 600 ms, middle 600 – 1200 ms, and late 1200 – 2000 ms windows) and whether the LPP was associated with observed ER (frustration and persistence during a challenging task). Overall, boys and girls did not differ in LPPs to emotional pictures or persistence and frustration. For boys viewing negative pictures, as early window LPPs increased persistence increased (r = .47, p < .05), whereas as middle window LPPs increased frustration increased (r = -.36, p < .05). In contrast, for girls viewing positive pictures, as late window LPPs increased, frustration decreased (r = -.55, p < .05). Findings suggest gender differences in the implications of affective processing for ER such that boys’ early attention to negative stimuli may underlie the ability to persist even while frustrated, whereas girls’ later-developing attention to positive stimuli may underlie the ability to control frustration.

### Poster 38

**AND THEY ALL LIVED HAPPILY EVER AFTER: FACTORS INFLUENCING RECOVERY FROM NEGATIVE EMOTION IN YOUNG CHILDREN**

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**Descriptors:** emotion regulation, recovery, temperament

Recovery from negative emotions is an important facet of emotion regulation but little is known about the factors that moderate recovery. In the first study, 4- to 6-year-olds watched two blocks of three film clips. Each block consisted of a happy scene (PE1), a negative emotion (sad, fear) scene (NE), and a second happy scene (PE2) that resolved the
previous negative scene. Self-reports and expressions of negative emotion increased from PE1 to NE along with heart rate and skin conductance, thereby indicating negative emotion elicitation. With the exception of skin conductance, all measures decreased from NE to PE2 which demonstrated children recovered. Although there was no difference in the pattern of recovery from each negative emotion, higher effortful control was associated with recovery. But was the resolution necessary? In a second study the presence of a resolution was manipulated. In one series, PE2 resolved the previous fearful scene and in the second series it did not. As in Study 1, fear was again elicited. Recovery was also observed in self-report, expressivity, and heart rate regardless of the resolution presence. Again, higher levels of effortful control and surgency predicted recovery from fear. Taken together, the findings of these studies contribute to our understanding of how children recover from negative emotions. How children react to and ultimately recover from negative emotions may be related to risk for later psychopathology. Also, understanding how children recover from negative emotions may help to better understand the role positive emotions play in emotion regulation.

**Poster 39**

**EXTENDING THE SCOPE OF SOCIAL NEUROSCIENCE TO EXPLORE THE RELATIONSHIP BETWEEN VAGAL TONE AND EVENT-RELATED POTENTIALS IN RESPONSE TO AN AFFECTIVE PICTURE TASK**

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**Descriptors:** ERP / (N1, EPN, LPP), vagal tone, international affective picture system (iaps.)

The present study is the first to investigate the relationship between vagal tone level and event-related potentials (ERP) in adults. Several studies have shown a relationship between vagal tone and individual differences in a variety of psychophysiological, affective and social outcomes. This suggests that vagal tone can be related to how people process relevant affective social information in the brain. This study aimed to assess whether the ERP responses to affective information varied between high and low vagal tone groups. Two groups (n = 30, matched by age, gender and education level) were separated according to their vagal tone level. Differences in vagal tone were obtained with the Porges method, through respiratory sinus arrhythmia from ECG and respiratory activity of participants under resting conditions. ERPs were recorded while individuals performed an affective picture task (IAPS) that included positive, neutral, and negative emotional stimuli. Differences between the high and low vagal tone groups were observed at the negative category (N1), the early posterior negativity (EPN) for both positive and negative valences, and at the late positive potential (LPP) for all the categories. This would imply that a higher vagal tone is associated with a more accurate strategy to encode and discriminate affective relevant information in relation to a lower vagal tone. To our knowledge, this is the first report that inquires into the relationship between vagal tone level and the cerebral response in adults to affectively salient information assessed by ERPs.

**Poster 40**

**ERPS OF EMOTIONAL PROCESSING IN SCHIZOPHRENIA: N170 EVIDENCE OF STRUCTURAL PROCESSING AND EMOTIONAL DISCRIMINATION DEFICITS IN PROBANDS AND FIRST DEGREE RELATIVES FROM MULTIPLE SCHIZOPHRENIA FAMILIES**

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**Descriptors:** ERP / (N170 VPP), possible endophenotype of multiplex schizophrenia families, implicit attention test

In schizophrenia research, endophenotypes are receiving an increasing interest due to their usefulness in identifying the functional importance of genetically transmitted brain-based deficits in this disease. ERPs have been considered in that research and proven relevant. Recently, we reported the first N400 evidence of processing deficits (significantly reduced N400 amplitude for congruent categories) in probands and first degree relatives during a picture semantic-matching task. This suggested a probable contextual semantic deficit (Guerra, S, Iban˜ez, A, Bobes, A., Martin, M et al., In press). In order to explore in which ways ERP accounts of emotional processing could also be compromised, unaffected first-degree relatives of patients, DSM-IV diagnosed schizophrenia probands, and control subjects, matched by age, gender and educational level performed an implicit attention test (IAT) that involved the categorization of pleasant and unpleasant words, along with faces of anger and happiness, giving place to a congruent condition (when happy faces were implicitly associated to pleasant words) and an incongruent condition (otherwise). An N170 component present in relatives and control subjects was largely reduced in patients, not only for faces, but also for words, suggesting a deficit in structural processing of stimuli. Consistent with our previous report of N170 in a race-IAT, control subjects show N170 modulation by the association imposed by IAT blocks. However, this discrimination effect appears clearly reduced in both patients and relatives.

**Poster 41**

**EXPECTED VALUE MODULATES FEEDBACK CORRECT-RELATED POSITIVITY: AN ERP STUDY ON COGNITIVE PROCESSING OF MONETARY GAINS AND LOSSES**

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**Descriptors:** fERN, feedback error-related negativity, fcERP: feedback correct-related positivity, expected value and reinforcement learning

The feedback error-related negativity (fERN) has been referred to as similar to a negative deflection in the event related potential (ERP) that distinguishes between wins and losses. The reinforcement learning theory of the fERN postulates that the difference between actual and expected outcomes would be transmitted, like a training signal, from the midbrain dopamine system to the anterior cingulate cortex, generating the fERN. A growing body of evidence suggests greater modulation of fERN amplitude for wins vs. loss feedback, suggesting that the neural mechanism of feedback processing may differ between wins and losses. Furthermore, it has been suggested that the observed modulation of the fERN by valence of the feedback is due to the superposition of a positive-going deflection for the win trials, the so-called feedback correct-related positivity (fCERP). We used a roulette-like gambling task to study the effect of the expected value on the amplitude of fERN and/or fCERP. The results indicate that, although the ERP associated to the feedbacks distinguishes between wins and losses, changes in size and probability of rewards impacted the amplitude of fCERP. Furthermore, larger expected value of wins was associated with greater positivity following win feedback. No significant difference was observed when changes did not affect the expected value. These findings support the existence of two independent systems for the processing of positive and negative feedback, since only the positive feedback responses were modulated for the expected value of conditions.

**Poster 42**

**GESTURE INFLUENCES THE PROCESSING OF FIGURATIVE LANGUAGE IN NON-NATIVE SPEAKERS: ERP EVIDENCE**

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**Descriptors:** second language, video gesture, ERP N400 LPC

In spoken language, gestures and contextual cues are very closely connected. Gestures are used concurrently with words and help convey the meaning of spoken language. This is particularly evident in figurative language, in which a considerable amount of contextual information is required for understanding. Gestures should play an important role in second language acquisition and comprehension. In this study, two components of event-related potentials, the N400 and the Late Positive Complex (LPC), were evaluated in a task involving the observation of videos showing utterances accompanied by gestures. Spanish native speaker studying advanced (n = 15) and basic (n = 15) German as a second language participated. The utterance-gesture congruence and metaphoric meaning of content were manipulated during the task. As in previous reports, the N400 and LPC elicited by metaphors were highly sensitive to their gesture-context. Our report shows that the level of L2 proficiency affects the neuronal processing of semantic meaning constructed from the gesture type (congruent or incongruent) and the type of expression (literal or metaphorical). Also, our results suggest that semantic processing is robust in the early learning of a second language, although the amplitude modulation and latency might depend on the speaker’s proficiency level. This paves a new path for studying the electrophysiological correlates of multimodal, paralinguistic cues and figurative language in L2 learners.

**Poster 43**

**SOURCE ANALYSIS OF N400 WAVEFORM GENERATORS OBTAINED WITH A CROSS-MODAL PRIMING PARADIGM**

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**Descriptors:** event-related potentials, language, attention

The aim of the present study was to evaluate the distribution of current sources inside the brain that generate the N400 waveform obtained during the performance of a computerized version of the Peabody Picture Vocabulary Test- Revised (PPVT-R), which
was maximal in centroparietal and frontal derivations. Twenty-two healthy control subjects (mean age = 38.6 years) free of neurological, psychiatric, visual or audio-logical disorders were instructed to watch pictures and hear a word that matched or mismatched (.5 probability) the semantic content of the picture. Participants were instructed to judge silently whether the picture and the word were congruent or not (passive task) or to press a button after the auditory stimulus presentation if picture and word were incongruent (active task). An image of the underlying brain electrical activity for the individual scalp topography for each task in the first level of vocabulary of PPVT-R was estimated by the Bayesian Model Averaging (BMA) of different EEG inverse solutions, which were visualized using the Brain Electrical Tomography (BET) viewer software (La Habana, Neuronic S.A.). The activation was maximal in the superior and middle frontal gyri in the left hemisphere, the left middle temporal gyrus, and the angular gyrus bilaterally during the active task, but it was different with the passive one. Our results confirm the participation of brain areas that are related to the processing of language and attention, and the involvement of both hemispheres in the studied paradigm.

**Poster 44**

**INFLUENCE OF SEMANTIC KNOWLEDGE ON EPISODIC MEMORY PERFORMANCE IN SCHOOL-AGED CHILDREN WITH INFANT FEBRILE SEIZURES**

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Saarland University

Descriptors: memory development, event-related potentials, infant febrile seizures  
This event-related potentials (ERP) study examined semantic and episodic memory in school-aged children with a history of infant febrile seizures (a risk factor for hippocampal sclerosis) and age-matched controls. To date, it is unclear how semantic and episodic memory interact and whether this interaction is modified by ontogenetic development. The possibility that infant febrile seizures distort normal memory development is even more controversial. We focused on the N400 component, indexing the access to semantic knowledge, and its correlation with episodic memory processing as reflected in the early frontal and late parietal old/new effects. We used a semantic paired-associate learning task with related vs. unrelated pictures to induce different amounts of semantic processing at learning. Thereafter a recognition memory test was performed. The groups differed neither in reaction times and accuracy nor in the expected N400 effect during study. We found similar early frontal-central and late parietal old/new effects in both groups, the putative ERP correlates of familiarity and recollection. An additional ERP effect at around 400 ms varied between both groups. For controls, semantically related items were more positive-going than new objects, while the risk group showed more positive-going waveforms for unrelated relative to new items. Moreover, the late parietal effect correlated with the N400 effect only in the controls. These findings suggest that the risk group's episodic memory was supported to a lesser extent by pre-existing semantic knowledge than in normal controls.

**Poster 45**

**DEVELOPMENTAL ASPECTS OF FAMILIARITY AND RECOLLECTION: INSIGHTS FROM A CROSS-SECTIONAL EVENT-RELATED POTENTIAL STUDY OF RECOGNITION MEMORY**

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Descriptors: memory, development, erps  
Throughout childhood, familiarity-based remembering seems to develop earlier than recollection-based remembering. However, previous studies failed to demonstrate an early frontal old/new effect, an event-related potential correlate for familiarity, in children. Instead, they showed a frontal negativity (Nc) at 400 ms that is elicited by new and old items and by this insensitive to memory status. In infants, the Nc is thought to reflect novelty-induced attention processes. In our study, we examined the sensitivity of the Nc to generic novelty and how the Nc is modulated by memory status. Secondly, we analyzed age-related changes in strategic recollection, here operationalized by means of successful rejection of non-target events. In two runs of a continuous recognition memory task, children, adolescents, and adults saw pictures of familiar objects and unfamiliar non-objects, each item repeated once per run. Subjects judged the old/new status of the items separately in each of the runs, that is, in the second run, new items and items repeated from the first run (non-targets) had to be rejected as new. Relative to adolescents and adults, children were selectively impaired in rejecting non-targets. In children and adolescents the Nc to new items was larger for non-objects than for objects, and also attenuated for repeated stimuli, with both effects differing in scalp topography. This suggests that different portions of the Nc are modulated by generic novelty and by memory status. Only adults showed a late parietal positivity for non-targets indexing strategic recollection.

**Poster 46**

**EVIDENCE FOR AN ERP CORRELATE OF FAMILIARITY PROCESSING IN 7-10 YEAR-OLD CHILDREN**

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Saarland University

Descriptors: memory, development, erps  
According to dual-process models of recognition memory, retrieval can be based on familiarity and on recollection. Event related potential (ERP) studies revealed that the late parietal old/new effect, the putative ERP correlate of recollection, is highly similar for adults and children. However, the early mid-frontal old/new effect, the putative ERP correlate of familiarity, so far, has not been reported for children, even though some behavioral studies suggest that children in early school age use familiarity. In the present study we used a response-deadline procedure to examine whether children show familiarity processing (and its putative ERP correlate) if they are hindered to use recollection. In a fast response block participants were instructed to make old/new decisions for objects within a limited time. In the slow response block they had unlimited time, allowing recollection-based retrieval. The behavioral findings suggest that item recognition improves with age. ERPs showed similar old/new effects for children (age 7 to 10) and for adults. In the slow response block we found a late parietal old/new effect between 500 and 650 ms for both groups. In the fast response block there was an early fronto-central old/new effect between 350 and 500 ms for adults and for children. The data demonstrate that, under conditions where children are forced to make the old/new decision quickly and, in turn, recollection is hindered, they show an early mid-frontal old/new effect associated with familiarity-based retrieval.

**Poster 47**

**NEURAL NETWORK EVALUATION OF MULTI-MODAL STARTLE EYEBLINK MEASUREMENTS**

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Descriptors: neural networks, startle, deception  
Psychophysiological measurements like startle eyeblink can provide information about the state of an individual with respect to sensory, cognitive, and affective processing. A drawback to using such techniques, especially outside the laboratory, is the laborious process of feature extraction (e.g., “peak picking”). An alternate approach is to use existing data to train a neural network to classify novel responses as, say, indicative of psychopathology, modulated by attention or a prepulse, etc. No manual feature extraction is needed. In two pilot experiments, we measured startle eyeblinks using EMG and high-speed video in prepulse inhibition (PPI) and detection of deception paradigms. After training, the neural networks were able, based only on the response waveforms, to determine whether a trial had contained startle or prepulse+startle stimuli in 72% of EMG trials (15 participants) and 80% of video trials (4 participants). In a mock crime experiment, neural networks correctly classified 85% of participants (7 deceptive, 29 truthful) as having answered a crime-related question truthfully or untruthfully. With larger datasets, neural network performance should improve. Additionally, because neural networks operate on entire response waveforms, they can capture effects that would be missed by conventional feature extraction. Compared to conventional methods, the data-driven neural network technique represents a more efficient and flexible approach to the understanding and evaluation of the data generated in some psychophysiological studies.

**Poster 48**

**FICTION ATTENUATES FEAR: NEUROIMAGE EVIDENCE**

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Descriptors: emotion regulation, amygdala, fmri  
The role of the amygdala in emotional processing has been often demonstrated, especially for aversive stimuli. Here, we employed fMRI to investigate whether amygdala responses to mutilation pictures could be modulated by experimental context. 24 participants (13 male) took part in the study. They were scanned in a 1.5 T Siemens Vision while performing an emotion discrimination task. Participants viewed a display containing a neutral or an unpleasant picture. They had to respond to the stimuli as quickly and accurately as possible, pressing one of two keys if they judged the stimuli as emotional or neutral. Neutral pictures consisted of photographs of people, and unpleasant pictures consisted of photographs of mutilated bodies. Each trial began with a fixation cross (3s) at the center of the screen, followed by a picture (200 ms). The task was performed in two contexts: (1) fictitious, where participants were instructed that pictures had been obtained from movies and (2) real, where they were instructed that pictures had been obtained from day-life.
situations. Data analysis was performed using SPM5. In the real context, we found increased BOLD response in the right amygdala ($x = 34$, $y = -2$, $z = 124$) when participants viewed aversive pictures as compared to neutral pictures.

**Poster 49**

EMOTIONAL PROCESSING OF LOVED FACES: FAMILIARITY VERSUS AFFECT

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Descriptors: emotional processing, face processing, affect

Background: Neuroscience research on face processing has focused on the cognitive mechanisms of face recognition and emotional expression. Little research has been conducted on the emotional processing associated with the recognition of facial identity. The aim of the present study was to replicate previous findings concerning emotional processing of loved faces, using both central and peripheral physiological measures, and controlling for differences in familiarity. Method: Thirty-five volunteer female students viewed five photographs of faces in black and white and with neutral emotional expression corresponding to the following categories: boyfriend, father, control boyfriend, control father, and baby. Faces were presented for 4 seconds with a random intertrial interval of 8 – 12 seconds. Each photograph was presented 20 times in counterbalanced order using a Latin square procedure. Results: Loved faces produced larger responses of skin conductance, heart rate, zygomatic activity, and positive components of Event-Related Potentials (P300 and LPP) replicating previous findings; no differences were found as a function of familiarity (boyfriend versus father). Larger response for boyfriend than for father was shown for zygomatic activity. Discussion: The findings support the hypothesis that the neurophysiological mechanisms underlying the processing of loved faces include peripheral and central components that are specifically affective and independent of its cognitive components.

**Poster 50**

NEURAL CORRELATES OF CONCEPTUAL JUDGMENTS OF LYING AND TRUTH-TELLING: AN ERP STUDY

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Descriptors: lie, conceptual judgment, ERP

Extensive behavioral research has shown that people readily make accurate judgments about whether a statement is a lie or the truth. However, little is known about the neural correlates of such conceptual judgment. In this study, we used high-density ERP to provide information about the time course of the brain activities associated with the conceptual judgments of lies and truths. We found a significant amplitude divergence between conceptual judgment of lie and truth-telling in frontal left and posterior right ERP components peaked at about 400 ms after the presentation of the test stimuli. Judgments of lying elicited higher ERPs compared with that of truth-telling. Also, the amplitude difference between the anti-social lying and modesty lying appeared at 400 ms in the frontal left and posterior right sites. Judgments of anti-social lying evoked higher ERPs relative to those of modesty lying. As expected, there was no ERP difference between the two types of truth-telling. The late positive component as the 400 ms ERP component in the present study was thought to line with its role in pain inhibition. To further investigate the opioid mediation of this late positive component at about 200 – 300 ms after stimulus onset in the event related potential. The results showed significantly lower pain unpleasantness, and a significantly reduced P2 component in the placebo condition. Placebo analgesia was also related to a decrease in stress levels. The findings indicate that placebo analgesia is due to a reduced nociceptive signal to the cortex, or to reduced processing of the nociceptive signal in the cortex.

**Poster 51**

OBJECTIVE MEASUREMENT OF PLACEBO ANALGESIA BY EVENT RELATED POTENTIALS

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Descriptors: pain, placebo analgesia

Placebo analgesia refers to reduced pain report after administration of a placebo with information that it is a painkiller. This study investigated whether placebo analgesia could be observed as a reduced cortical response to pain, and whether placebo analgesia could be related to reduction in stress. Thirty-three participants (17 females) were exposed to phasic heat pain at 51°C before and after administration of capsules containing lactose with information that the capsules contained a powerful painkiller. In a control condition the participants were exposed to the same painful stimuli, but the capsules were not administered. The placebo and control conditions were separated by a minimum of 24 hours, and the order of the conditions was balanced. Pain report was recorded on a visual analogue scale, and cortical activity to painful stimulation was recorded by electroencephalography from 32 electrodes with linked ears reference. Only data from the Cz electrode are reported here. Phasic pain-related stimulation reliably generates cortical activity that can be observed as a positive component at about 200 – 300 ms after stimulus onset in the event related potential. The results showed significantly lower pain unpleasantness, and a significantly reduced P2 component in the placebo condition. Placebo analgesia was also related to a decrease in stress levels. The findings indicate that placebo analgesia is due to a reduced nociceptive signal to the cortex, or to reduced processing of the nociceptive signal in the cortex.

**Poster 52**

HOW FAST IS FEAR? AUTOMATIC AND CONTROLLED PROCESSING IN CONDITIONED FEAR

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Descriptors: fear potentiated startle, fear conditioning

The minimum latency of potentiated startle after delay and trace fear conditioning was investigated. Delay conditioning is hypothesized to be mediated by automatic processes, whereas trace conditioning, where there is a gap between the conditioned stimulus (CS) and the unconditioned stimulus (US), is hypothesized to involve controlled cognitive processes. Previous research has found that the latency of the conditioned fear reaction in humans is about 100 ms following delay conditioning. In delay conditioning a tone CS signaled an electric shock US presented 1000 ms after CS onset. In trace conditioning a 200 ms tone was followed by an 800 ms gap prior to US presentation. The CS and US were explicitly unpaired in two control groups. Fear-potentiated startle was assessed by 95 dB noise presented 10, 30, 100, 150, 500 and 1500 ms after CS onset. It was hypothesized that fear-potentiated startle should be observed at shorter intervals after delay conditioning compared to trace conditioning. The results showed increased startle in the delay paired group compared to the delay unpaired group 100 and 150 ms post CS onset. The trace paired group showed increased startle at 1500 ms after CS onset. These findings support the hypothesis that delay conditioning is mediated by automatic processing, whereas trace conditioning is dependent on controlled processing.

**Poster 53**

BRAIN CORRELATES OF STRESS-INDUCED ANALGESIA

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Central Institute of Mental Health

Descriptors: pain, stress analgesia, mechanical stimulation

Stress-induced analgesia (SIA) has been described as a reduced nociceptive response after stress exposure, which is mediated by descending pain-inhibitory circuits and may be an indicator of adequate pain control. We used functional magnetic resonance imaging to assess SIA in 21 healthy participants. Series of painful pressure stimuli midway between pain threshold and tolerance were applied to the left m. flexor digitii minimi at a frequency of 1 Hz. Stimulation was carried out in a block design, with 6 stimulation blocks each lasting 10 echo planar sequences and 7 rest blocks where no stimulation was applied. Mental arithmetic combined with noise was used as stressor. Verbal ratings as well as changes in blood pressure and heart rate confirmed that the stressor was perceived as stressful. The stress induction led to a significant increase in pain threshold and in pain tolerance as well as decreased pain and unpleasantness ratings. In the pre as well as in the post stress condition the pain matrix was activated. Post stress, pain inhibition areas such as the periaqueductal grey and the anterior insula were additionally activated. In the post versus pre comparison the anterior insula was significantly more activated in line with its role in pain inhibition. To further investigate the opioid mediation of this stress analgesia we extended our design to the administration of naloxone during functional imaging and will also report on these data.

**Poster 54**

INFORMATION PROCESSING BIAS FOR ANXIETY-RELATED STIMULI IS ASSOCIATED WITH AN AVERSIVE CONDITIONED ACTIVATION OF AFFECTIVE BRAIN FUNCTIONS IN A SAMPLE OF HEALTHY ADOLESCENTS

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Descriptors: aversive conditioning, adolescents, affective cognitive processing

Changes in conditionability of primary reinforcers have been shown to covary with activation of core brain regions involved in the processing of emotional and motivational stimuli in a number of mental disorders (e.g. anxiety disorders, drug addiction). The present study assessed to what extent Pavlovian aversive conditioning is related to affective information processing in a sample of healthy adolescents. A differential conditioning paradigm with an aversive sound, used as unconditioned stimulus, and pictures of male faces, used as conditioned stimuli, were employed in 14 year old healthy adolescents (N = 15). We used functional magnetic resonance imaging, and self-report
measures to assess the differential conditioned responses as well as an Affective Go-NoGo (AGN) task including positive and anxiety-related words. Increased activity after the conditioned stimulus (CS+) relative to the CS− in amygdala, insula, frontal cortex, and putamen during acquisition and in anterior cingulate, frontal cortex, thalamus, and putamen during extinction was found to be related to enhanced information processing for anxiety-related stimuli during the AGN task. These results provide evidence for the important role of affective cognitive processing in brain activation during aversive learning in adolescents and may be of theoretical and clinical significance for generation and persistence of mental disorders in adult age.

**Poster 55**

TREATMENT RELATED CHANGES IN BRAIN ACTIVATION IN PATIENTS WITH FIBROMYALGIA SYNDROME

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Descriptors: fibromyalgia syndrome, operant behavioral therapy, pain

Little is known about the effects of successful treatment on brain functions in chronic pain. The present study aimed to identify changes in brain activation following operant behavioral therapy (OBT) in fibromyalgia patients. Using functional magnetic resonance imaging, brain activation to painful mechanical stimuli was assessed in 10 patients with fibromyalgia (FMS) and 10 healthy controls (HC). The FMS patients were again scanned after treatment. Before treatment, brain activation compared to the HC showed higher activation in the bilateral insula, bilateral striatum, right orbitofrontal cortex (OFC) and left thalamus. OBT significantly reduced interference from pain and pain severity in the FMS patients. After treatment the FMS, brain activation compared to the HC showed higher activation in the left insula and the right OFC. The contrast of brain activation post- compared to pre-treatment correlated significantly with the amount of HC showed higher activation in the left insula and the right OFC. The present study aimed to identify changes in brain activation following operant behavioral therapy (OBT) in fibromyalgia patients. Using functional magnetic resonance imaging, brain activation to painful mechanical stimuli was assessed in 10 patients with fibromyalgia (FMS) and 10 healthy controls (HC). The FMS patients were again scanned after treatment. Before treatment, brain activation compared to the HC showed higher activation in the bilateral insula, bilateral striatum, right orbitofrontal cortex (OFC) and left thalamus. OBT significantly reduced interference from pain and pain severity in the FMS patients. After treatment the FMS, brain activation compared to the HC showed higher activation in the left insula and the right OFC. The contrast of brain activation post- compared to pre-treatment correlated significantly with the amount of HC showed higher activation in the left insula and the right OFC.

Post-treatment, the OFC showed higher activation in the left insula and the right OFC. The present study aimed to identify changes in brain activation following operant behavioral therapy (OBT) in fibromyalgia patients. Using functional magnetic resonance imaging, brain activation to painful mechanical stimuli was assessed in 10 patients with fibromyalgia (FMS) and 10 healthy controls (HC). The FMS patients were again scanned after treatment. Before treatment, brain activation compared to the HC showed higher activation in the bilateral insula, bilateral striatum, right orbitofrontal cortex (OFC) and left thalamus. OBT significantly reduced interference from pain and pain severity in the FMS patients. After treatment the FMS, brain activation compared to the HC showed higher activation in the left insula and the right OFC. The contrast of brain activation post- compared to pre-treatment correlated significantly with the amount of HC showed higher activation in the left insula and the right OFC. The present study aimed to identify changes in brain activation following operant behavioral therapy (OBT) in fibromyalgia patients. Using functional magnetic resonance imaging, brain activation to painful mechanical stimuli was assessed in 10 patients with fibromyalgia (FMS) and 10 healthy controls (HC). The FMS patients were again scanned after treatment. Before treatment, brain activation compared to the HC showed higher activation in the bilateral insula, bilateral striatum, right orbitofrontal cortex (OFC) and left thalamus. OBT significantly reduced interference from pain and pain severity in the FMS patients. After treatment the FMS, brain activation compared to the HC showed higher activation in the left insula and the right OFC. The contrast of brain activation post- compared to pre-treatment correlated significantly with the amount of HC showed higher activation in the left insula and the right OFC. The present study aimed to identify changes in brain activation following operant behavioral therapy (OBT) in fibromyalgia patients. Using functional magnetic resonance imaging, brain activation to painful mechanical stimuli was assessed in 10 patients with fibromyalgia (FMS) and 10 healthy controls (HC). The FMS patients were again scanned after treatment. Before treatment, brain activation compared to the HC showed higher activation in the bilateral insula, bilateral striatum, right orbitofrontal cortex (OFC) and left thalamus. OBT significantly reduced interference from pain and pain severity in the FMS patients. After treatment the FMS, brain activation compared to the HC showed higher activation in the left insula and the right OFC.

**Poster 56**

THE WHY OF ACTION MATTERS: EXTRINSIC MOTIVATION INCREASES THE NEURAL RESPONSE TO REWARD

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Descriptors: reward, fmri, emotion

Motivation does not only vary in quantity, but also in its orientation, being either primarily extrinsic (acting because it leads to a separable outcome, e.g., grades, money) or intrinsic (acting because it is inherently interesting or enjoyable, e.g., gain in knowledge, stimulation). So far, no study has investigated whether intrinsically or extrinsically motivated persons respond differently to reward on a neurobiological level although this might give new insights in pathological gambling. We investigated the relationship between extrinsic and intrinsic motivation toward gambling and the neural response to reward in a functional magnetic resonance imaging task on reward learning in 33 healthy, right-handed volunteers (19 females, 14 males; mean age 22.8 years). This task evokes increased activation in the reward network (orbitofrontal cortex, anterior cingulate cortex, amygdala, putamen) to rewarding trials. Participants also completed a questionnaire on gambling motivation, assessing intrinsic and extrinsic motivation as well as illusion of control. We observed a significant relationship between the orientation of motivation (extrinsic vs. intrinsic) and the neural response to reward. Extrinsic motivated people showed an augmented and intrinsically motivated persons a diminished neural response to monetary reward in the aforementioned brain network. This modulation of reward responsiveness by the motivational orientation might be highly relevant for the understanding of pathological gambling and might be an important target for psychological treatments.

**Poster 57**

MODULATION OF NEURAL RESPONSES TO REWARD AND PUNISHMENT BY BAD MOOD INDUCTION IN HEALTHY VOLUNTEERS

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Descriptors: mood, fmri, reward

Mood states are dispositions that alter the activity of the resting state brain networks. Increased activation in prefrontal and limbic brain regions at rest have been observed in healthy volunteers after sad mood induction. These brain regions are crucial for the processing of reward and punishment and due to the altered sensitivity to reward and punishment in depression, we assumed that the induction of sad mood would alter the activity in those regions during reward and punishment. Using a functional magnetic resonance imaging (fMRI) task on probabilistic reversal learning we assessed neural responses to reward and punishment in 35 healthy, right-handed volunteers. Participants were randomly assigned to negative (n = 17) or neutral (n = 18) mood induction through film clips. As compared to neutral mood induction, negative mood induction led to significantly greater activity in the medial orbitofrontal cortex (mOFC), the anterior cingulate cortex (ACC) and the dorsolateral prefrontal cortex (dPFC) in response to punishment. These brain structures have been associated with the identification of emotional stimuli and the generation of an emotional response (mOFC, ACC), thus strengthening the hypothesis that negative information are intensified by congruent mood states. Additionally, the increased neural response in the dPFC, a structure involved in the regulation of emotional states, might be interpreted as healthy mechanism to suppress the increased emotional response to punishment and thus to avoid further negative mood and sadness.

**Poster 58**

REDUCED PREPULSE INHIBITION IS SENSITIVE TO A WIDE RANGE OF PSYCHOPATHOLOGIES, BUT SPECIFIC TO NONE OF THEM

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Descriptors: prepulse inhibition, psychopathology, theory

Combining Graham’s (1975) protection theory of PPI with McGhie and Chapman’s (1961) theory of early information processing deficits in psychosis, Braff et al. (1978) investigated and confirmed prepulse inhibition (PPI) deficits in patients diagnosed with schizophrenia. Since then, hundreds of studies have replicated and extended this finding, with many researchers insisting that PPI deficits are a specific indicator of psychosis. This belief is maintained by some despite extensive findings of reduced PPI in various internalizing (e.g., Grillon et al., 1996), externalizing (e.g., Kumari et al., 2005), and autism spectrum disorders (Perry et al., 2007), among many others. This lack of discriminant validity has been explained away by some as PPI deficits indicating some form of psychosis within each of these disorders. Given that PPI is modulated by many different areas of the brain (e.g., midbrain, striatum, limbic and cortical areas) and several forms of psychopathology with no accepted association with psychosis are associated with abnormalities in these areas, PPI should be sensitive to many psychopathologies, but specific to none of them. Although this brain-based view has been promulgated by three of the most prominent PPI researchers (Swedlow, Braff, & Geyer, 2000), the psychosis-specific assumption remains dominant, severely limiting the application of PPI as a broad psychophysiological tool. The purpose of this review is to more formally challenge this assumption and to aid in the development of a more valid notion of the clinical implications of reduced PPI.

**Poster 59**

THE ASSOCIATIONS BETWEEN PREPULSE INHIBITION OF STARTLE AND DIMENSIONS OF OBSESSIVE-COMPULSIVE DISORDER: CLEARER RESULTS UNDER STRESS

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Descriptors: obsessive-compulsive disorder, prepulse inhibition, stress

Previous studies have shown that obsessive-compulsive disorder (OCD) is associated with reduced prepulse inhibition (PPI); however, given that OCD is comprised of several heterogeneous symptom dimensions with distinct neural correlates, this association may be specific to certain OCD subtypes. Additionally, given that OCD is more prominent under stressful conditions, we hypothesized that these associations would be stronger under stress. To test this, we measured OCD symptomatology with the OCI-R across various dimensions (hoarding, washing, checking, obsessing, ordering, and neutralizing) in 42 undergraduates and then measured their PPI (70 dB background, 85 dB prepulse, 100 dB startle stimulus; 6 prepulse and 6 startle-alone trials in each condition) both at baseline and while preparing for a stressful speech task. Baseline results showed that Ordering was associated with reduced PPI.

**Poster 60**

PREPULSE INHIBITION OF ACOUSTIC STARTLE IS DECREASED BY BOTH STRESS AND PAIN


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Descriptors: prepulse inhibition of acoustic startle, stress, pain

Although Grillon and Davis (1997) and Lieter (1989) respectively suggest that prepulse inhibition (PPI) decreases under stressful and painful conditions, these effects have yet
to be directly demonstrated in humans. To test this possibility, the present study measured PPI in 56 healthy undergraduates at baseline, during preparation for a stressful speech task (a one minute speech on a controversial topic), and immediately after an experimental pain stimulus (cold pressor task [CPT]; placing the hand in ice water until it becomes intolerable), and again during preparation for another speech task and after another CPT administration (i.e., a baseline-A-B-A design). A within-participants Analysis of Variance (ANOVA) revealed a significant main effect of condition.

**Poster 61**

**LATENT GROWTH CURVE MODELING PROVIDES A MORE PRECISE ACCOUNT OF STARLITE HABITUATION**

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**Descriptors:** startle habituation, latent growth curve modeling, methodology

Although some studies have shown that startle habituation—an index of information processing—is associated with psychopathology, these findings have been inconsistent. We propose that this may be due, in part, to the use of means-based techniques (e.g., t-tests, ANOVAs) to index habituation. Accordingly, we hypothesized that employing an advanced statistical technique specifically designed to index change over time (Latent Growth Curve Modeling [LGCM]) would provide a more powerful and detailed account of startle habituation. Habituation data from two samples (original: N = 53, 105 dB startle stimulus; cross-validation: N = 56, 100 dB startle stimulus; each had 8 trials) were quantified with the two most commonly used means-based techniques to quantify startle habituation (i.e., t-test [here, 4 trials per block] and ANOVA [here, 2 trials in each of the four blocks]) and LGCM.

**Poster 62**

**INVESTIGATING AND EXPLAINING HABITUATION OF PREPULSE INHIBITION OF ACOUSTIC STARLITE**

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**Descriptors:** startle, prepulse inhibition, habituation

To investigate the presence of, and reason for, habituation of prepulse inhibition (PPI), in a sample of 53 healthy undergraduates we examined PPI habituation with an advanced statistical technique specifically designed to measure change over time (latent growth curve modeling) across three different prepulse/background signal-to-noise ratios. Statistical technique specifically designed to measure change over time (Latent Growth Curve Modeling [LGCM]) would provide a more powerful and detailed account of startle habituation. Habituation data from two samples (original: N = 53, 105 dB startle stimulus; cross-validation: N = 56, 100 dB startle stimulus; each had 8 trials) were quantified with the two most commonly used means-based techniques to quantify startle habituation (i.e., t-test [here, 4 trials per block] and ANOVA [here, 2 trials in each of the four blocks]) and LGCM.

**Poster 63**

**THE N2 EFFECT IN TRUTHFUL AND DECEPTIVE RESPONSES TO AUTOBIOGRAPHICAL INFORMATION**

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Zhejiang Normal University

**Descriptors:** ERP, deception, frontal central n2

Although previous ERP-based lie detection studies have successfully utilized P300 to identify concealed information, relatively little is known about the executive function and the corresponding neural mechanisms underlying deception. Here, event-related potentials were recorded while twenty-one participants (eleven males) were performing a differentiation of deception paradigm (DDP) task which orthogonally manipulated response type (deceptive and truthful) and stimulus type (autobiographical and non-autobiographical information). Behavioral results showed that deception requires longer RT, larger response variance and more errors compared to truth. Analysis of ERP data had found that deception elicited an enhanced frontal-central N2, which peaks around 320 ms post-stimulus, relative to truth, F(1, 20) = 15.64, p < .05.

**Poster 64**

**POSTERIOR VERSUS FRONTAL EEG THETA ACTIVITY AS A BIOLOGICAL MARKER FOR DOPAMINERGIC EXTRAVERSION**

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**Descriptors:** EEG, theta, extraversion

In their psychobiological theory Deupe and Collins (1999) linked the agency facet of Extraversion (eA; i.e. assertiveness, dominance, ambition, positive emotionality) to functional properties of the mesocorticolimbic dopamine system, creating individual differences in incentive motivation and positive emotion. In a recent pharmacological study, we identified posterior versus frontal theta activity in the electroencephalogram (EEG) as a possible biological marker for eA, which was also sensitive to pharmacological manipulation of central dopamine activity using 200 mg Sulpiride. The present study aimed to replicate these results and extend our work by specifying the mechanisms (dose-response-curves, differences in the time course of drug effects) underlying those aE-related EEG effects. To this end, we measured the EEG intermittently for about five hours after healthy male volunteers extremely high or low in eA (N = 74) had received either placebo or 50 mg, 200 mg, or 400 mg Sulpiride. Conceptually replicating our earlier findings, we again observed (1) more posterior (versus frontal) theta activity in individuals high versus low in eA, and (2) aE-related differences in drug-induced changes. Based on the dose-response and time course data we will discuss possible mechanisms and their implications for psychobiological theories of extraversion.

**Poster 65**

**BARORECEPTOR CARDIAL REFLEX FUNCTION IS DEFICIENT IN FIBROMYALGIA SYNDROME AND CORRELATES WITH CLINICAL PAIN REPORTS**

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**Descriptors:** baroreflex sensitivity, fibromyalgia syndrome, pain

This study analyzed autonomic cardiovascular regulation in fibromyalgia syndrome (FMS) both at rest and under mental stress. Thirty-five FMS patients and 29 healthy controls performed an arithmetic task after a baseline period. Cardiovascular variables were assessed through electrocardiography, impedance cardiography and finger interstitial blood pressure. As an estimate of clinical pain severity, participants completed the McGill Pain Inventory. Results showed reduced baseline levels of baroreceptor cardiac reflex sensitivity, RR interval, stroke volume, left ventricular ejection time, and RR interval variability in all frequency bands in FMS. Blunted or aberrant responses to stress were found for baroreceptor reflex sensitivity, RR interval, diastolic blood pressure and left ventricular ejection time. Baroreflex sensitivity and blood pressure negatively correlates with clinical pain reports, both across the whole sample and in the two groups. This data suggest deficiencies in autonomic cardiovascular regulation in FMS in terms of reduced sympathetic and parasympathetic influences, as well as impairments in adjustment to acute stress. We conclude that a main source of dysautonomia in FMS is the aberrant functioning of the baroreflex, including an inhibition of the baroreceptor-mediated antinociceptive mechanism. In line with the reduced baroreflex function in FMS, one may assume deficient ascending pain inhibition arising from the cardiovascular system, which may contribute to the hyperalgesia characterizing the disorder.

**Poster 66**

**PHYSICAL EXERCISE LEVEL MODULATES RELATIONSHIPS BETWEEN BARORECEPTOR REFLEX SENSITIVITY AND COGNITIVE PERFORMANCE**

María Martín, José L. Mata, & Gustavo A. Reyes del Paso

University of Jaén

**Descriptors:** baroreceptor reflex sensitivity, cognitive performance, physical exercise

The baroreceptors are implicated in a negative feedback pathway to the brain by which cardiovascular activity modulates central nervous system (CNS) functions. We have previously shown that baroreceptor reflex sensitivity (BRS) negatively predicts cognitive performance during an arithmetic task. In the present study we evaluated this relationship controlling for a) the numeric aptitude of the participants measured by the Thurstone’s PMA, b) the degree of effort implemented in the task rated on a 10-pointVAS, and c) differences in physical exercise. Twenty-three exercise-trained and 20 sedentary students performed a serial arithmetic task. BRS was assessed by the spontaneous sequence method. Results of the stepwise regression analysis of the whole
sample showed that cognitive performance was predicted by a model with two predictors.

**Poster 67**

**EFFECTS OF PHYSICAL EXERCISE LEVEL ON THE DYNAMICS OF THE CARDIAC BAROREFLEX: A COMPARISON WHEN BLOOD PRESSURE IS RISING AND FALLING**

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Descriptors: baroreceptor reflex sensitivity, up and down sequences, physical exercise

The baroreceptor reflex is the main mechanism for short term regulation of blood pressure. In the analysis of baroreceptor reflex sensitivity (BRS) through the sequence method in the time domain, spontaneous cardiac sequences are sought in which systolic blood pressure (SBP) increases are accompanied by an increase in heart period (HP; up sequences), or in which a decrease in SBP is accompanied by a decrease in HP (down sequences). The regression line between the SBP and HP values produces an estimate of BRS in ms/mmHg. Up sequences are associated with vagal activation, and down sequences are associated with vagal inhibition. This study evaluated the effect of physical exercise on BRS assessed in up and down sequences. Twenty-three physically fit and 20 sedentary students performed a serial arithmetic task after a baseline period.

**Poster 68**

**MOOD IMPACT ON CARDIOVASCULAR REACTIVITY UNDER CONDITIONS OF UNFIXED TASK DIFFICULTY: THE MODERATING EFFECT OF TASK CONTEXT**

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Descriptors: cardiovascular reactivity, mood

Gendolla and colleagues demonstrated that mood effects on effort-related cardiovascular reactivity are context-dependent if task difficulty is fixed and clear (see Gendolla, Brinkmann, & Richter, 2007, for a review). However, for tasks with unfixed performance standards, they found stable effects: Negative mood resulted in higher cardiovascular reactivity than positive mood. Drawing on this finding, we investigated the moderating impact of task context on the mood-cardiovascular response relationship. Participants (N = 45) worked on an unfixed memory task in two (mood valence: negative vs. positive) x 2 (task context: demand vs. reward) between-persons design. As predicted, mood impact on cardiovascular reactivity was moderated by the task context. Negative mood resulted in higher PEP and SBP reactivity than positive mood if participants had rated task demand before performing the task. If participants had rated task reward before performance, the pattern was reversed. This finding extends previous research by demonstrating context-dependent mood implications under conditions of unfixed task difficulty.

**Poster 69**

**MOOD, HEDONIC INCENTIVE, AND EFFORT-RELATED CARDIOVASCULAR REACTIVITY**

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Descriptors: mood regulation, cardiovascular reactivity, resource mobilization

This experiment investigated the impact of mood (negative vs. positive) and hedonic incentive (pleasant vs. unpleasant) on effort-related cardiovascular reactivity during task performance. Cardiovascular and facial EMG reactivity of 40 participants were assessed during a baseline period, mood inductions, and a moderately difficult attention task with either pleasant or unpleasant consequences of success. For unpleasant sequences, we anticipated rather low cardiovascular reactivity in both positive and negative moods because in this condition incentive of success was negative and thus only low effort was justified. Given that resource mobilization is proportional to subjective task demand as long as success is perceived as worthwhile (Brinkmann & Self, 1989; Wright, 1996), we also expected relatively low cardiovascular reactivity in the pleasant-consequences/positive-mood condition, because subjective task demand should be perceived as lower in a positive mood compared to a negative mood. In contrast, we predicted stronger cardiovascular reactivity in the pleasant-consequences/negative-mood condition because here incentive of success was positive and justified the high effort required in a negative mood due to the high experienced demand. The results were as expected. Moreover, facial EMG reactivity indicated efficient mood manipulations. In summary, the findings further support the predictions of the mood-behavior-model (Gendolla, 2000).

**Poster 70**

**DYSPHORIA AND EFFORT MOBILIZATION: REFLECTING ON PERFORMANCE STANDARDS LEADS TO REDUCED CARDIOVASCULAR RESPONSE**

Kerstin Brinkmann, & Guido H.E. Gendolla
University of Geneva

Descriptors: depression, effort mobilization, performance standards

Previous research has shown that mental tasks without fixed performance standards elicit stronger cardiovascular reactivity in participants with manipulated negative versus positive mood and in subclinical participants with higher versus lower depression scores (Brinkmann & Gendolla, 2007). The present study (N = 29) extended this research by explicitly asking dysphoric and nondysphoric students to indicate their performance expectation and minimal performance standards just before performing a memory task without predefined standard. Effort mobilization during task performance was operationalized as sympathetically mediated cardiovascular response. Consistent with previous research, dysphoric participants did not show the positive normal discrepancy between self-efficacy expectations and minimal performance standards. In contrast to previous studies, however, the focus on performance expectations and standards reversed the effect on cardiovascular response: Compared to nondysphoric participants, dysphoric participants showed a weaker reactivity of pre-ejection period, as well as systolic, diastolic, and mean arterial pressure. Thus, this study presents evidence that focusing dysphoric participants’ attention on performance standards leads to disengagement from the task. Consistent with the notion that mood effects are highly context-dependent, the previous and present studies show that different task contexts (i.e., focus on task difficulty vs. focus on performance expectations and standards) lead to different patterns of effort-related cardiovascular reactivity.

**Poster 71**

**VISUOSPATIAL WORKING MEMORY PROCESSING OF FACIAL EMOTIONAL STIMULI: AN ERP STUDY**

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Descriptors: spatial working memory, emotion, ERP

Face-specific processing is gated by visual spatial attention, while maintenance of visuospatial information in memory has been shown to be accomplished through a sustained shift of spatial attention to a memorized location. With the aim to evaluate the effects of facial emotional content on spatial working memory processing, twenty healthy young adults performed a three-back task while recording EEG, using pictures with different facial emotional expressions -happy, fearful, neutral- or squares as stimuli. Behavioral results showed that response times were significantly shorter for trials correponding to fearful faces. Early ERP differences -starting from N170- were observed between facial emotional conditions, followed by a fronto-parietal positivity peaking at 220 ms. This positive waveform showed higher parietal voltage amplitude during happy facial condition, but its amplitude was higher for fearful facial stimuli at frontal regions. P220 was followed by a P3-like slow positive centro-parietal component which was significantly higher for happy and fearful facial series with respect to the neutral ones. Results are interpreted as part of the separation phenomenon between locations and objects in visual working memory, where intrinsically relevant stimuli could recruit additional cognitive processing resources.

**Poster 72**

**THE EFFECT OF NUMERICAL DISTANCE ON ERP COMPONENTS ELICITED BY NUMERICAL INCONGRUENCIES IN MENTAL ARITHMETIC OPERATIONS**

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Descriptors: arithmetic processing, numerical distance, ERP

Previous research has shown that incongruent solutions of simple multiplication problems elicit an arithmetic N400 effect whose amplitude seems to depend on the relatedness of the solution (errors that are either table-related or table-unrelated to the preceding operands). However, there is not enough information regarding the probable cost of different nearness between incongruent and valid solutions on arithmetic N400 effects. Fourteen healthy young adults (22 – 27 years-old) evaluated the correctness of successive single digit arithmetic problems (addition, subtraction and multiplication) while EEG was simultaneously recorded. Behavioral results showed a significantly higher amount of correct responses for subtraction and multiplication with respect to addition operations. Correct responses were higher for more distant incongruent results. A fronto-central negativity with maximum over 280 ms appeared for erroneous solutions, reaching greater voltage amplitude for
A NEW ODDBALL PARADIGM TO INVESTIGATE THE TIME COURSE OF CHINESE SINGLE SPOKEN WORD RECOGNITION

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Descriptors: spoken word recognition, N400, oddball paradigm

Recent studies about the time course of English spoken word recognition indicate that segmental information is used incrementally. The time course of Chinese spoken word recognition might differ from English, since in Chinese, a single character always corresponds to a monosyllable, and meaningful syllables mainly have one-to-one correspondence with morphemes. In the present study, we developed a new oddball paradigm to investigate the time course of Chinese single spoken word recognition. Forty-three pictures and 215 Chinese single spoken words were used in this study. In each trial, a picture was presented for 2 seconds with a Chinese character representing its name below it. Then a single spoken Chinese word was presented. The relationship between the spoken word and the name of the picture was varied. In the match condition the spoken word was exactly the name of the picture. The other four conditions were different types of mismatch: three partial mismatches (onset, rime and tone mismatch) and one complete mismatch (syllable mismatch). After 3 seconds, another picture was presented. Participants were asked to do a semantic categorization task: judge whether the first picture and the second picture were in the same semantic category or not. ERPs from 17 Mandarin native speakers were averaged according to the onset of the spoken words. Results showed that the syllable mismatch condition elicited earlier and stronger N400 than partial mismatch conditions, which implies that syllable level might be more important for Chinese single spoken words recognition.
expressions by the ingroup. Older people may be perceived as outgroup members by younger individuals, and hence be mimicked to a lesser degree. Because interactions in which mimicry occurs are perceived as more pleasant, and the mimicking interaction partner is perceived as more warm and approving, this may have a negative impact on interactions between younger and older adults. This study aimed to assess whether facial expressions by older people are mimicked to the same degree as expressions by younger people. Participants under the age of 30 saw facial expressions of anger and happiness, shown by the same movie actor under the age of 30 and when older than 60. Facial mimicry was assessed using facial EMG at the Corrugator Supercilii, Orbicularis Oculi, and Zygomaticus Major sites. Preliminary analyses suggest that overall, participants showed increased Corrugator Supercilii and decreased Zygomaticus Major activity when looking at the older actors and the reverse pattern when looking at younger actors. Whereas smiles by younger actors were mimicked, smiles by older actors were not. The implications of this for intergenerational interactions will be discussed.

Poster 79
CORRELATION BETWEEN PSYCHOLOGICAL REACTIONS TO A NEGATIVE EMOTIONAL VIDEO AND AMPLITUDES OF SKIN POTENTIAL RESPONSE COMPONENTS
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Descriptors: reduser-augmenter scale, differential emotions scale, skin potential response

The skin potential response (SPR) is a fast change in the electric potential on the palmar surface attributed to an autonomic sudomotor reaction. Positive fast and negative slow components of SPR (pSPR and nSPR) can be distinguished. They are thought to be associated with goal-directed and defensive reactions respectively (Edelberg, 1970) but their precise behavioral correlates are not clear. We studied the SPR in 21 healthy volunteers (10 males, 11 females, age 19–23 years) and compared individual pSPR and nSPR differences induced by fast deep inspiration with scores on the Reducer-Augmenter scale (RAS; Dragunovych, 1985) in high arousal states. Emotional arousal was induced by a negative emotional video and assessed by the Differential Emotions Scale (DES; Izard, 1993). pSPR and nSPR during the video were +5.5 ± 1.3 and −5.1 ± 1.1 mV. Augmenters had greater pSPR (R = .49).

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ALEXITHYMIA, EMPATHY AND DIFFERENCES OF SKIN POTENTIAL LEVEL AMPLITUDES UNDER AFFECTIVE STIMULATION
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Descriptors: skin potential level, alexithymia, empathy

Alexithymia (ALT) is characterized by a reduced ability to recognize and describe one’s own emotions. Patients with ALT often have impaired empathy (EPT) ability. ALT is associated with somatization. Tonic electric activity which is called skin potential level (SPL) reflects the gradual changes in arousal mediated by sympathetic regulation of skin sweat glands. We compared relationships of individual scores of ALT and EPT with SPL during a continuous 9-minute computer game or negative valence video in 21 volunteers. SPL was measured as the electric DC potential negativity in the surface of palmar skin. SPL increased for 5–7 mV after the onset of stimulations in accordance with the increases in subjective arousal. During the negative emotional video, SPL increased more in volunteers with higher levels of ALT or EPT (Spearman rank order correlation, r = .51 and r = .52 respectively). In the computer game test, such a correlation was found only for EPT level (r = .52). ALT was also related to sustained high SPL negativity (slow habituation) during computer game (r = .49). Conversely, EPT was associated with fast habituation of SPL. These results suggest the existence of some common mechanisms that underlie individual differences of empathy and alexithymia. Deficient emotional habituation can explain amplification of somatic sensations in alexithymia that may lead to somatization disorders.

Poster 81
IMPAIRED CORTICO-STRIAL CONNECTION FOR LOSS IN THE REWARD CIRCUITRY OF OBSESSIVE-COMPULSIVE DISORDER (OCD)
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Descriptors: psychophysiological interaction, obsessive-compulsive disorder, reward circuitry

A brain circuit model of OCD emphasizes an imbalance of the direct and indirect path within the cortico-basal ganglia-thalamo-cortical paths resulting in dysfunctional, most likely hyperactive, brain structures of the basal ganglia and cortical areas. The disease is associated with overactive performance monitoring presumably related to hyperactivity of the anterior cingulate cortex (ACC), brain gray and white matter abnormalities in the dorsal ACC (dACC), and also to higher sensitivity to avoid punishment or to loss. We challenged the brain’s reward circuitry, including the ACC, with a monetary incentive delay task and measured haemodynamic signals in 19 OCD patients and 19 well-matched healthy controls with event related fMRI. We were interested in the functional connectivity of the dACC with other brain regions during anticipation of potential (monetary) gain or loss and carried out a psychophysiological interaction (PPI) analysis. PPI is a method for finding out whether the correlation of activity between two distant brain areas differs in different psychological contexts. Patients and controls showed comparable BOLD responses in the dACC but PPI analysis revealed that OCD patients had significantly less connectivity between the dACC and the ventral striatum during anticipation of loss. The extent of reduced connectivity between dACC and ventral striatum correlated positively with symptom severity (as indicated by Y-BOCS scores). These results are direct evidence of a dysfunctional cortico-stratial network which is associated to the sensitivity loss in OCD.
**Poster 84**

**TASK PREPARATION AND MENTAL DEMAND DURING A VISUALLY CUED ATTENTION TASK IN YOUNG AND OLDER PARTICIPANTS AS REFLECTED IN THE CONTINGENT NEGATIVE VARIATION**

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Descriptors: aging, task preparation, CNV

An age-related decline for task preparation has been found in several studies. Other results suggest increased task preparation by older subjects possibly reflecting compensatory effort under high task demands. The present study aimed to explore age-related differences in task preparation in a highly demanding task. Younger (N = 25, M = 25 years) and older subjects (N = 24, M = 65 years) performed a dual task including continuous tracking and a visually cued attention task. In the cued attention task, the stimuli, following 2500 ms after the cues, called either for a response or not. Alongside the EEG was recorded. The P300, reflecting controlled processing of the cue, and the Contingent Negative Variation (CNV), reflecting task preparation, were assessed in the cue-stimulus interval. Older participants responded more slowly and committed more target errors, missings and false alarms. The P300 to cues was higher and the CNV started earlier and was increased for the older compared to the young subjects. Exploratory correlations showed a relation between an increased CNV and a lower rate of missed responses in the older but not in young group. For both groups there was a relation between an increased CNV and higher subjective mental demand at the end of the task as measured with the NASA-TLX questionnaire. The results suggest a compensatory increase in task preparation in this highly demanding task for the older subjects, which was reflected in increased P300 and CNV amplitudes. In addition, the CNV proved to be useful as a correlate of mental task preparation under high task demands.

**Poster 85**

**AGE-RELATED DIFFERENCES IN STIMULUS PROCESSING IN A DUAL TASK AS REFLECTED IN THE P300**

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Descriptors: ERP, aging, dual task

Several studies showed increased difficulties of older people in dual task situations that require simultaneous motor and cognitive performance. Furthermore older people showed lower P300-amplitudes and longer latencies in complex tasks where divided attention is needed. The aim of the present study was to investigate the information processing of relevant and irrelevant stimuli in a dual task situation in two age groups (20–33 and 57–70 years old). EEG was recorded while the 49 participants were performing a dual task consisting of a compensatory tracking task and a visual attention task with different types of stimuli (relevant targets, irrelevant targets, relevant non-targets, irrelevant non-targets). Participants were asked to perform both tasks as correctly and as quickly as possible. Older participants generally responded more slowly and committed more errors in the visual attention task. Contrary to expectations, they did not show lower P3-amplitudes overall, but there was a significant interaction between age and the stimulus type presented: Whereas young participants showed the expected increased P3-amplitude after relevant targets compared to other types of stimuli, there was no difference of P3-amplitude between different types of targets/non-targets in older participants. The results suggest that older people’s difficulties in dual tasks may be related to a reduced ability to differentiate between relevant and irrelevant stimuli in situations that require divided attention.

**Poster 86**

**EYE-BLINK STARTLE RESPONSE IS POTENTIATED BY COLD PRESSOR PAIN BUT INHIBITED BY CO2-INDUCED BREATHLESSNESS**

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Descriptors: emg eye-blink startle, pain, interoceptive

Eye-blink EMG startle modulation is observed in negative situations and negative emotional states, as well as in defensive responding to threat. The existing evidence supporting EMG startle potentiation as a defensive response is mainly based on exteroceptive stimuli – e.g., pictures or electrical stimuli. Evidence concerning EMG startle modulation in response to physical threat is however scarce, although EMG startle potentiation has been observed in response to heat pain. We investigated EMG startle modulation in response to cold pressor pain (n = 16; 1 minute 2°C immersion of non-dominant hand) and CO2-induced breathlessness (n = 13; 1 minute 10% CO2-enriched air inhalation). Six auditory startle probes were presented: two probes during the minute preceding the challenge (baseline), two probes during the challenge and two further probes during the minute following the challenge (recovery). The first probe of each phase was presented in the first 30 seconds, the second probe in the last 30 seconds. No differences in EMG startle responding were observed during baseline or recovery. The challenge resulted in EMG startle potentiation in reaction to cold pressor pain and EMG startle inhibition in response to CO2-induced breathlessness. The latter may be due to breathlessness – in contrast to pictures, electrical stimulation or pain – being an interoceptive stimulus, directing attention inwards and reducing attention to external threats. In contrast, CO2-induced breathlessness may be experienced as a circu-strike situation in which EMG startle modulation is generally reduced.

**Poster 87**

**NEUROIMAGING OF DECEPTION IN A FREE-CHOICE GUilty KNOWLEDGE TEST (GKT) AFTER A MOCK CRIME SCENARIO**

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Descriptors: lie detection, moral cognition, fmri

A major limitation of studies in the field of psychophysiological detection of deception is the lack of ecological validity of lab studies. Recent neuroimaging studies (e.g. Spence et al., 2008) that took into account, for example, by using a free answer format and revealed a bilateral higher activation of the ventrolateral prefrontal gyrus during lies. Constitutive to that approach the aim of this study was to further increase ecological validity by performing a mock crime scenario in which the participants had to steal money from a wallet, and subsequently by using videos of an interrogator known to the subjects in a GKT. Sixteen healthy subjects participated in the experiment. In addition to acquiring functional magnetic resonance imaging (fMRI) signals, sympathetic skin conductance response (SCR) was measured. Data driven independent component analysis (ICA) revealed a prefrontal component (medial and lateral prefrontal cortex and anterior cingulate cortex) and a parietal/insular component, both related to the deception task. Moreover, lies also led to higher SCRs than truthful answers, which indicated the effectiveness of the experimental procedure. These results support findings of a recent neurostimulation study (Karim et al., 2009) that showed that inhibition of the prefrontal cortex modulates deceptive behavior and sympathetic arousal.

**Poster 88**

**MAGNETOENCEPHALOGRAPHIC EVIDENCE FOR RAPID AND HIGHLY RESOLVING AFFECTIVE EVALUATION OF SHORT ENVIRONMENTAL TONES IN THE ABSENCE OF CONTINGENCY AWARENESS**

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Descriptors: MEG, auditory conditioning, motivated attention

Accumulating evidence suggests a modulation of neural activity in the presence of emotionally significant stimuli by motivated attention already on early processing stages. Previous studies proposed that rapid affective evaluation is strongly mediated by the amygdala via bottom-up pathways into sensory cortex. Using magnetoencephalography, we investigated the spatial extent, time-course, and resolution of the neural network underlying rapid selective affective attention in a highly demanding classical conditioning procedure. Environmental tones of only 20 ms duration (conditioned stimuli; CS) were paired with high-arousing pleasant, high-arousing unpleasant or neutral realistic auditory scenes (unconditioned stimuli; UCS). Associations among 14 unique CS–UCS pairings for each valence category were conditioned within only three learning instances, rendering each of 24 subjects unaware of the contingent relationship between CS and UCS. We found evidence for rapid affective differentiation already at 20 ms after CS onset and modulation within the time range of the auditory N100m. Source estimation for the underlying neural activity revealed amplified affective CS processing after learning within frontal and parietal cortex regions. Our findings argue for a highly efficient distributed neural network with impressive learning capacity, capable of almost instantaneous differentiation of motivationally significant from negligible stimuli, even in complete absence of contingency awareness.

**Poster 89**

**ELECTROPHYSIOLOGICAL INSIGHTS INTO THE DETECTION OF PERSONALLY SIGNIFICANT SOUNDS**

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Descriptors: electrophysiology, auditory processing, long-term memory

Personally and emotionally significant sounds play an outstanding role in our acoustic environment. We notice our mobile phone ringtone apparently independent of its current relevance or of our ongoing activity. The present study used electrophysiological methods to investigate whether the human brain differentiates sounds by their personal significance even if the auditory input is not relevant for the current ongoing activity and even though no physical auditory change detection mechanism could have triggered deeper semantic processing. For that purpose, we analyzed the evoked gamma band activity (GBA) as well as event-related potentials (ERP) to a personally significant sound (own ringtone) compared to a non-significant sound (ringtone of another participant). Both sounds occurred rarely in an auditory sequence of 12 different randomly played ringtones. The data revealed differences due to the experimental variation in the
evoked GBA starting after 40 ms. Those were followed by differences in ERPs after the 1st light flash also showed detectable VERs on the 2nd flash. In four of them, a response decrement in amplitude was detected. The prenatal response rate of the cortical responses on the 1st light was 45.5%, whereas it was only 25.6% on the 4th light. The statistical analysis showed significant differences between the amplitudes of the responses to the different flashes. A response decrement was observed in 85% of the cases. This effect manifested in faster reaction times in telling lies, but not in telling the truth. The observed decrease in sympathetic SCR and feelings of guilt while deceiving the interrogator were related to a significant improvement in lie detection performance. Our findings support the notion that a dysfunction of the frontopolar cortex (FPC) may underlie certain psychopathological disorders (i.e., psychopathy) that are characterized by the absence of sympathetic arousal while performing an antisocial act. The observed decrease in sympathetic SCR and feelings of guilt while deceiving the interrogator are related to a significant improvement in lie detection performance.

Poster 90

TOWARDS A TRUE HABITUATION PARADIGM: A NEONATAL/FETAL MEG STUDY

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Descriptors: fetal, habituation, MEG

Habituation is defined as a response decrement that occurs as a result of repeated stimulation. To distinguish habituation from sensory fatigue, a different stimulus (dishabituation), meant to account for response recovery, needs to be inserted between trains of repeated stimuli. In this study we aimed to (i) develop a habituation paradigm that allows the investigation of both response decrement and response recovery, and (ii) examine its applicability for measuring the habituation of the visually evoked responses (VERs) in neonatal and fetal magnetoencephalographic (MEG) recordings. Our paradigm consisted of a train of four light flashes with an interstimulus interval of 2 s followed by a 500 Hz burst tone 5 s after onset of the 4th light flash. This sequence was repeated 90 times. Healthy pregnant women (N = 22), with fetuses ranging in GA from 30 to 38 weeks, participated in the study. Sixteen mothers returned with their babies for a neonatal investigation. In 11 of 13 neonates we found a response decrement in amplitude from the 1st to the 4th light flash. The statistical analysis showed significant differences between the amplitudes of the five stimuli and the pairwise comparison of tone to 4th flash confirmed the response recovery. The prenatal response rate of the cortical responses on the 1st light was 45.5%, much lower than in the neonates (84.6%). Five out of the 15 fetuses who responded to the 1st light also showed detectable VERs on the 2nd flash. In four of them, a response decrement has occurred, while in the fifth, the response amplitude was the same.

Poster 91

MODULATION OF DECEPTION WITH PREFRONTAL TRANSCRANIAL DIRECT CURRENT STIMULATION (tDCS)

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Descriptors: lie detection, moral cognition, neuroethics

Recent fMRI studies have indicated a predominant role of the frontopolar cortex (FPC; BA 9/10) in deception and moral cognition, yet the functional contribution of the FPC remains elusive. Here we demonstrate the effect of prefrontal tDCS on deception. Three experiments were conducted to test the specificity of the transcranial stimulation effect. In the first experiment subjects participated in a mock crime and a subsequent interrogation with the Guilty Knowledge Test. Remarkably, inhibition of the FPC did not lead to an impairment of deceptive behavior but rather to a significant improvement. This effect manifested in faster reaction times in telling lies, but not in telling the truth, a decrease in sympathetic SCR and feelings of guilt while deceiving the interrogator and a significantly higher lying quotient reflecting skilful lying. In the second experiment reversing the stimulation polarity had no effect on deceptive behavior, confirming the specificity of the applied polarity. In the third experiment the Stroop-test was used as a control task. Our results demonstrate that although the incongruent condition is cognitively more demanding than the congruent one, tDCS of the FPC had no effect on performance, suggesting a specific effect on deceptive behavior and not on cognitively demanding tasks in general. Our findings support the notion that a dysfunction of the FPC may underlie certain psychopathological disorders (i.e., psychopathy) that are characterized by the absence of sympathetic arousal while performing an antisocial act such as deceiving in a criminal interrogation.

Poster 92

P300 BCI PERFORMANCE PREDICTION USING AN AUDITORY STANDARD ODDBALL

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Descriptors: BCI, EEG, P300

Brain-Computer Interfaces (BCIs) enable paralyzed people to communicate with their environment. Differences in performance between users and sessions remain largely unexplained, as does the question as to why communication in the complete locked-in state (CLIS) has not been possible. A reliable performance indicator would allow an analysis of subject-to-subject and session-to-session performance differences and serve as an indicator of the capacity to use a BCI during the progression of a disease. A study with 40 healthy participants was conducted to determine the viability of performance indicators. All participants performed a single 20 symbol visual (VP300) and auditory P300 (AP300) BCI session. Additionally, an auditory oddball was recorded from each subject. Using the amplitudes of two samples at 395 ms on Cz and CP1 correlations (Pearson) with performance of r = .57 were found. This result shows the viability of the auditory standard oddball to predict individual BCI performance and suggests that the long-term tracking of the P300 elicited by the auditory oddball will lead to a better understanding of BCI performance degradation in the CLIS.

Poster 93

DOES GRANGER CAUSALITY ANALYSIS OF THE INTERACTIVITY OF INDEPENDENT COMPONENTS TELL US SOMETHING PLAUSIBLE ABOUT TIME-LAGGED CO-REGULATION PATTERNS?

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Descriptors: connectivity, methodology, DTI

Information about the time-lagged interactions of functional networks increases our understanding of large-scale connectivity in the brain. To further investigate the feasibility of various methods for this purpose, sixteen subjects participated in a Tower of London task during a time-resolved fMRI measurement (TR = 1.4 s). High-resolution DTI data were additionally acquired. The data were analyzed with Group-ICA and results indicate involvement of the expected networks - best discrimination of task-complexity (one to five move problems were used) was reached by time-course analysis of IC 1 (precuneus, ACC and bilateral BA 45 — stronger activity left) and various visual ICs - which bespeaks task-complexity dependent activation of these functional networks. Statistical interactions of all identified ICs were analyzed using multivariate Granger Causality Modelling (mGCM). The resulting session-specific interactivity profile assesses the interactions of various noise types and the hemodynamic reflections of neural activity. When analyzing this network (nodes: ICs, edges: significant mGCM connections) the ICs with the highest cluster coefficients correspond to the ICs with highest task-complexity based activation-sensitivity (e.g. precuneus to frontal action monitoring areas, DLPFC to medial prefrontal areas). Results from the correspondence of graph edges with anatomical connectivity - based on DTI-based probabilistic fibre tractography - are presented. This data-driven method allows for the assessment of the role of certain ICs in specific time-lagged co-regulation networks.

Poster 94

GASTRIC DISTENSIONS ENHANCE AROUSAL RATINGS OF VISUAL FOOD CUES

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Descriptors: gastric distensions, food cues, arousal

Gastric sensations play an important role in the control of food intake, as well as during the experience of hunger and satiety. They are believed to influence the appraisal of food, but it is unclear how gastric sensations affect arousal ratings of food cues, which are known to increase during hunger and food restriction. Therefore, 8 healthy males who were restricted from food intake for 12 hours preceding the experiment, rated arousal of 18 food pictures presented during supra-, sub-liminal, and zero-control barostat balloon distension of the gastric antrum. Responses were averaged per subject and distension level. Arousal ratings of food pictures were higher during supra-liminal gastric distension as compared to zero-control (p = .059) and sub-liminal (p = .024) distension, but did not differ between sub-liminal and zero-control conditions. Electrodermal responses remained unaffected. In conclusion, gastric balloon distension is a valid method to manipulate gastric sensations, but distension intensities below the conscious perception thresholds do not have an affect. Our data corroborate previous research demonstrating that visceral sensations contribute to the appraisal of affectively relevant cues.

Poster 95

PREPULSE INHIBITION OF CARDIOVASCULAR STARTLE REACTION

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Descriptors: PPI, skin perfusion, heart rate

Startle elicits an increase in skin conductance as well as changes in heart rate, blood pressure and skin perfusion. It has clearly been demonstrated that startle-induced blinking and electrodermal responses can be inhibited when weak stimuli precede the startle stimulus (prepulse inhibition, PPI). The aim of the current study was to investigate PPI-effects on the startle responses of the cardiovascular system and skin-per-
fused. Therefore, we measured beat-to-beat changes in heart rate by ECG, blood pressure by non-invasive Finapres and skin perfusion of the fingertip by laser doppler flowmetry in 16 young healthy female subjects. Startle stimuli were (103 dB, white noise, 50 ms, instantaneous rise time, binaural) presented 32 times (mean inter stimulus interval: 14 s). Half of the startle stimuli were preceded by a prepulse (75 dB, 1200 Hz Sinus, 50 ms, SOA = 120 ms, binaural). The startle responses of heart rate, blood pressure and skin perfusion were significantly affected by prepulses. Our results indicate the existence of a prepulse inhibition effect on the cardiovascular startle response, but may contradict Lacey’s environmental intake-rejection hypothesis.

Poster 96
DO HUMANS PREFER SIMILAR OR DISSIMILAR MATES? FACIAL SELF-RESEMBLANCE INFLUENCES PHYSIOLOGICAL REACTIONS BUT NOT SUBJECTIVE RATINGS TO EROTIC STIMULI
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1University of Trier, 2Wake Forest University

Descriptors: affective startle modulation, erotic stimuli, kin recognition
Cues of kinship are predicted to increase prosocial behavior due to the benefits of inclusive fitness, but to decrease sexual attraction due to the potential costs of inbreeding. Previous studies have shown that facial resemblance, a putative cue of kinship, increases prosocial behavior. However, the effects of facial resemblance on mating preferences are equivocal, with some studies finding that facial resemblance decreases attractiveness in a sexual context, while other studies show that individuals choose mates partly on the basis of similarity. To investigate this question we conducted an experiment in which 30 male volunteers viewed pictures of erotic female nudes while startle eye blink responses to binaural bursts of white noise were recorded. The female nude pictures were digitally altered so that the face either resembled the male participant or another participant, or were not altered, and non-nude neutral pictures were also included. The digital alteration was undetected by the participants. We also assessed pleasure and arousal ratings of all pictures. Erotic pictures reduced startle eyeblink magnitudes as compared to neutral pictures. Furthermore, participants showed a greater startle eyeblink inhibition to self-resembling female nudes than to other-resembling female nudes or non-manipulated female nudes. However, subjective pleasure and arousal ratings did not differ between the three erotic picture categories. Our data suggest that facial resemblance with the participant increases the attractiveness of erotic female nudes instead of decreasing it.

Poster 97
ORAL CORTISOL IMPROVES IMPLICIT SEQUENCE LEARNING WHEREAS ORAL METRYAPONE SHOWS NO EFFECT
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Descriptors: implicit sequence learning, glucocorticoids, hippocampus
Medial temporal lobe structures are suggested to be essential for explicit memory. Recent studies show that the medial temporal lobe (including the hippocampus) is also active in implicit sequence learning. Since glucocorticoids affect memory function via receptors in the hippocampus, we investigated implicit sequence learning after glucocorticoid manipulation. In Experiment 1, oral cortisol (30 mg) was given to 29 healthy subjects, whereas 31 control subjects received placebo. In Experiment 2, oral metyrapone (1500 mg; blocker of cortisol production) was given to 27 healthy subjects, whereas 29 control subjects received placebo. In both experiments, participants performed 6 blocks of 10 trials, and conditioned eye blink response (CR) probability was assessed by EMG in the 550 to 950 ms interval after CS onset. CR was presented randomly and equally as often as the CS+. Learning was indicated by a significant increment of CR probability after CS+. During the extinction phase, intense (105 dB) and brief (50 ms) startle eliciting versions of CS+ and CS were presented in randomized order, counter-balanced across subjects, and peak EMG eye blink responses were measured immediately (20 to 150 ms) after CS onset. Startle eye blink responses were stronger when induced by the intense versions of CS+ than CS− (p = .016). However, this difference did not correlate with learning during the acquisition phase. Thus, previous pairing with blink inducing air puffs enhances the ability of a tone to induce startle. This effect is not redundant with learning during acquisition, and may help to differentiate aversive and non-aversive associative learning in eye blink conditioning studies.

Poster 98
STARTLING FACTS ABOUT EYE BLINK CONDITIONING
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Descriptors: startle, corneal air puff, trace conditioning
Recently, it was shown that intense versions of tones that had been paired at lower intensities as prepulses with aversive acoustic white noise stimuli induced significantly larger startle eye blinks than did unpaired tones. In this study we asked whether similar effects occur after pairing with corneal air puffs. Fifty-one healthy subjects participated in a differential trace eye blink conditioning study (US: air puffs, 10 psi, 50 ms; CS+/CS−: binaural tones, 400 ms, 70 dB, pitch of 1200 or 1600 Hz). The empty interval was 550 ms. Pairing of CS+ was done in 6 blocks of 10 trials, and conditioned eye blink response (CR) probability was assessed by EMG in the 550 to 950 ms interval after CS onset. CR was presented randomly and equally as often as the CS+. Learning was indicated by a significant increment of CR probability after CS+. During the extinction phase, intense (105 dB) and brief (50 ms) startle eliciting versions of CS+ and CS− were presented in randomized order, counter-balanced across subjects, and peak EMG eye blink responses were measured immediately (20 to 150 ms) after CS onset. Startle eye blink responses were stronger when induced by the intense versions of CS+ than CS− (p = .016). However, this difference did not correlate with learning during the acquisition phase. Thus, previous pairing with blink inducing air puffs enhances the ability of a tone to induce startle. This effect is not redundant with learning during acquisition, and may help to differentiate aversive and non-aversive associative learning in eye blink conditioning studies.

Poster 99
MODULATION OF THE STARTLE REFLEX BY ARTERIAL AND CARDIOPULMONARY BARORECEPTORS
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Descriptors: baroreflex, lower body negative pressure, cardiac cycle
Arterial baroreceptor afferent feedback originating from the high pressure vascular system inhibits the startle eye blink response. However, it is not known, whether cardiopulmonary baroreceptor signaling originating from the low pressure vascular system exerts a similar effect. We used Lower Body Negative Pressure (LBNP) with gradients of 0, −10, −20, and −30 mmHg to gradually unload cardiopulmonary baroreceptors. For the modulation of high pressure afferent feedback, we took advantage of spontaneous loading and unloading of the arterial baroreceptor over the cardiac cycle. White noise bursts were delivered 230 and 530 ms after spontaneous R-waves. We measured eye blink responses by EMG, and psychomotor reaction time by button pushes to startle stimuli. Startle eye blink responses were enhanced during unloading of either cardiopulmonary (p = .01) or arterial (p = .05) baroreceptors. An interaction effect on psychomotor reaction times (p = .05) indicated facilitation with combined unloading of both baroreceptor types. These results demonstrate that the loading status of cardiopulmonary baroreceptors has an impact on brainstem and cortical CNS processes.

Poster 100
STRESS INDUCES A TIMESHIFT OF THE BARO-AFFERENT-MEDIATED REDUCTION IN STARTLE
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Descriptors: baroreflex, startle eye blink, cold pressor stress
Eye blink responses to acoustic startle stimuli are smaller when startle stimuli are presented during the cardiac cycle (R-waves = 230 ms) than during the diastole (R = 530 ms). This effect relies on intact baro-afferent neural traffic, which is enhanced during the early cardiac cycle phase (systole). Stress is known to reduce the pre-ejection period (PEP), thereby shifting the beginning of the systolic phase to earlier time points in the cardiac cycle. However, there is no data on whether the expected shift of baro-afferent feedback would impact the pattern of startle modulation within the cardiac cycle. 38 healthy volunteers (24, mean age: 23.3 ±) received acoustic startle stimuli (105 dB) at 6 different latencies relative to the R-wave (R + 0, 100, 200, 300, 400, 500 ms), each before and immediately after either a cold pressor (n = 19) or a control intervention (n = 19). Autonomic parameters were increased in the cold pressor group right after the intervention (BP: +15±10 mmHg). Pre-intervention startle responses were lowest for latencies of R − 200 and + 300 ms. Immediately after the cold pressor test, startle responses were lowest for latencies of R + 0 and + 200 ms; significant 3-way interaction: p < .05. We conclude that the cardiac modulation of startle is sensitive to altered temporal baro-afferent feedback characteristics induced by stress and autonomic activation.

Poster 101
STRESS INDUCED REDUCTION IN HIGH FREQUENCY HEART RATE VARIABILITY CANNOT BE EXPLAINED BY RESPIRATORY FREQUENCY CHANGES
Linn K. Kuehl, Steffen Richter, André Schulz, Hartmut Schachinger
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Descriptors: stress, heart rate variability, respiration
Stress is well known to affect the function of the sympathetic and parasympathetic nervous systems. It has been suggested that stress induces vagal withdrawal of cardiac
control, thereby reducing parasympathetically-mediated high frequency heart rate variability (hf-HRV). However, reduced hf-HRV under mental stress may also be explained by stress-related increases of respiratory frequency, since respiratory frequency is a strong determinant of hf-HRV with higher respiratory frequency being associated with reduced hf-HRV. The current study asked whether the stress induced decrease in hf-HRV may be explained by respiratory frequency changes. Nine healthy subjects aged between 21 and 27 years underwent repetitive assessment of cardiovascular beat-to-beat data while their breathing was paced according to auditory tape instructions at defined frequencies between 1.5 and 45 Hz. Afterwards, a resting period with free breathing and a 5 min period of a stressful adaptive choice-reaction-time task were assessed. HRV was calculated by WinPAC software in the frequency range of 1.5 to 45 Hz. HF-HRV significantly decreased during stress (81.5 ms²/Hz) as compared to rest (676.5 ms²/Hz), while respiratory frequency increased from 2.7 (SD = 0.4) to 4.3 (SD = 0.6) Hz. Individual adjustment according to the subject’s respiratory frequency - hf-HRV relationship showed that this stress-induced reduction in heart rate variability cannot be explained by respiratory frequency changes, and are thus likely attributable to true stress-induced vagal withdrawal of cardiac control.

**Poster 102**

AUDITORY NOVELTY PROCESSING IN OBSESSIVE-COMPULSIVE DISORDER

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Descriptors: novelty-p3, obsessive-compulsive disorder, dopamine

Heightened arousal and hypervigilance have often been observed clinically in patients with obsessive-compulsive disorder (OCD). Thus, we hypothesized that OCD patients, relative to mentally healthy control participants, will exhibit an enhanced involuntary shift of attention toward novel stimuli. To test the hypothesis of an enhanced orienting response in OCD patients, we measured the auditory event-related novelty-P3 during performance of a three-stimulus novelty oddball task in 20 OCD patients and 20 control participants. We did not find the expected increase of the novelty-P3 in the total group of OCD patients. However, patients with early age at illness-onset showed enhanced amplitudes of the novelty-P3 compared to patients with a late illness-onset and control participants. This result might reflect a more severe biological vulnerability of patients with early illness-onset. As dopamine plays a central role in the generation of the novelty-P3, this vulnerability might be specifically related to alterations in the dopaminergic system.

**Poster 103**

ACTION MONITORING DYSFUNCTIONS AS AN ENDOGENOTYPE IN OBSESSIVE-COMPULSIVE DISORDER

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Descriptors: obsessive-compulsive disorder, error related negativity, endophenotype

Action monitoring dysfunctions in patients with obsessive-compulsive disorder (OCD) have been repeatedly reported. Event-related brain potentials (ERP) and functional magnetic resonance imaging (fMRI) studies consistently showed increased error-related brain activity in OCD patients. The enhancement of the error-related negativity (ERN) seems to be independent from state-related changes in OCD symptoms. Thus, the ERN is considered as a potential endophenotype marker of OCD and therefore might also be observed in unaffected first-degree relatives. Endophenotype models help to improve aetiological understanding of complex disorders such as OCD. The aim of the present study was to examine whether unaffected first-degree relatives of OCD patients show larger ERP amplitudes and/or larger amplitudes of the correct-related negativity (CRN). ERPs were recorded from unaffected first-degree relatives of OCD patients, OCD patients and healthy controls during performance of a modified flanker task. Preliminary results indicate enhanced ERP amplitudes in first-degree relatives and OCD patients compared to healthy controls. These data support the existence of action monitoring dysfunctions not only in OCD patients but also in their unaffected first-degree relatives. Thus, overt action monitoring could represent a potential neurocognitive endophenotype in OCD mediating the familial or genetic vulnerability for OCD.

**Poster 104**

CONFlict DETECTION AND DEFenSIVE MOTivaTION: The N2 AND ERN PREDICT STARTLE EYE-BLINK REFLEX

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Descriptors: N2, error related potential, startle eye-blink reflex

Both the N2 and error-related negativity (ERN) are negative deflections in the event-related potential that are generated in the anterior cingulate cortex (ACC), a brain region involved in a form of attention that serves to regulate both cognitive and emotional processing. Although the ACC has clear cognitive and affective components, early theories used to explain what the N2 and ERN represent have relied on computational models that have not taken affect and motivation into account. Recently, however, studies have linked the ERN with motivation and individual differences in anxiety, although empirical support for a link between the N2 and motivation has been absent. To fill this void, the current research explored the relationship between the N2 and defensive motivation, as measured by the startle eye-blink response. Twenty-five participants completed the Go/No-Go reaction time task, while we assessed both the N2 and ERN. The defensive startle reflex was elicited by a 50 ms white noise burst on a number of Go and No-Go trials. As predicted, results indicated that overall startle magnitude (on both Go and No-Go trials) was significantly correlated with N2 and ERN amplitudes. The larger these waves (more negative), the larger the defensive startle reflex; thus, individual differences in conflict monitoring predict defensive responding. Unexpectedly, startle magnitude was larger for Go than No-Go trials. This finding may be due to a motor priming effect on Go trials that potentiates motor reflexes, an effect that may overshadow startle differences related to conflict.

**Poster 105**

ANTISOCIAL PERSONality TRAITS AND FEEDBACK PROCESSING - AN ERP STUDY

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Descriptors: feedback related negativity, antisocial personality traits, EEG

People with an antisocial personality disorder are described to have different error processing mechanisms than healthy controls, as measured with electroencephalography (EEG). In our present study we investigated whether or not antisocial personality traits influence the so called 'Feedback Related Negativity' (FRN), a negative deflection over frontocentral electrode sites after the presentation of unfavourable feedback. Twenty subjects (ten women, ten men) encountered unfavorable feedback in a probabilistic gambling task while 64-channel-EEG was recorded. Prior to this, participants were administered a personality questionnaire (PSPI), including the subscale self-determined personality and antisocial personality disorder. The FRN amplitude was compared for 'antisocial' and 'non-antisocial' subjects with a peak-to-peak analysis at midline electrode sites. A significant between-subject effect of the PSPI ‘antisocial’ sub-scale was found. After receiving negative feedback the FRN amplitude was most prominent in ‘antisocial’ subjects. These results indicate that subjects with more ‘antisocial’ personality traits place higher emphasis on feedback outcomes that indicate a monetary loss than ‘non-antisocial’ ones do. These findings will be discussed referring to a comparable experiment with emotional faces serving as feedback stimuli (20 subjects, all women). Further results will be presented. The relation between personality traits and processing of decision outcomes are discussed to highlight psychopathological effects on feedback processing.

**Poster 106**

VISUAL ATTENTION AND NEUROTOXICANT STATUS IN 3-MONTH-OLD INFANTS

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Descriptors: attention, nutrition, infant

Developmental attention research is important given the construct’s association with sensory and perceptual development and later skill/ability attainment. In particular, infants’ visual attention has been linked with cognitive development and used to inform assessment of cognitive interventions. A well-known paradigm used to assess this is the heart rate-defined phases of attention, in which infant gaze behavior and changes in heart rate are assessed simultaneously. A recent addition to the developmental attention literature is the investigation of relations between these variables and early nutritional status. However, studies within the extant literature tend to focus on single indicators of nutritional status and maintain iron deficiency. Therefore, the following study investigated the relations between neurotoxicants (lead and cadmium) and 3-month old infant’s orientation to facial stimuli, sustained attention, and attention termination. Results demonstrated that there was a statistically significant relation between maternal blood cadmium concentration and the infants’ attention termination ($r = .47, p = .003$). However, maternal blood lead concentration was not significantly related to the attention phases. Although not statistically significant, relations between anthropometric indicators of nutrition and attention phase variables were in the expected directions. This study provides evidence of the relation between early infant attention and maternal neurotoxicant status. The significance, implications, and limitations of the study are discussed in greater detail.
SEQUENTIAL VERSUS SIMULTANEOUS STIMULUS ACKNOWLEDGMENT AND COUNTERMEASURE RESPONSES IN P300-BASED DETECTION OF DECEPTION
Alexander W. Sokolovsky, Jessica Rothenberg, John Meixner, & J. Peter Rosenfeld Northwestern University

Descriptors: deception, P300, CTP

A P300-based experiment is described which is a modification of the Complex Task Protocol (CTP) paradigm (Rosenfeld et al., 2008). A participant first sees either a rare probe or a frequent irrelevant and must respond with the same button to each stimulus. The participant is told that the stimulus will be a P300 identifier stimulus or recognition of the cue. The subject must then (after 1 – 2 seconds) identify a target or a non-target stimulus with one of two button presses. Three groups of participants were tested, a simple guilty (SG) group and two countermeasure (CM) groups. Our manipulation consisted of explicitly telling one of the two CM groups to respond with the button press and the CM 'suggestion' (lumpers) while the other CM group did the CMs separated from the button press (splitters) as in '08. The probe irrelevant differences were significant in all three groups with detection rates of 11/12 (SG), 10/12 (CM-split), and 11/13 (CM-lump). Attempted CM use, diagnosed with reaction time (RT), detected CM use in the splitters but not the lumpers. In fact, when we compared the reaction times of probes and countered irrelevant in the splitting group versus the lumping group, not only were reaction times to countered irrelevant stimuli in the lumping group significantly smaller than in the splitting group, r(23) = 5.51, p < .05.

SUBLIMINAL PROCESSING OF FACIAL EXPRESSION AND THE EFFECT OF FACE ROTATION
Eligiusz Wronka, & Wioleta Walentowska Jagiellonian University

Descriptors: attention, emotional expression, ERP

There is growing evidence that facial emotional expressions can be detected and may trigger selective brain responses even when subjects are not consciously aware that such a stimulus was presented. To investigate how the brain processes emotional expression in the absence of conscious perception, we recorded ERPs in response to subliminally (16 ms) presented faces and non-face objects in a task in which participants had to identify whether the abstract masking stimulus was symmetrical or asymmetrical. We found that the amplitude of the N70 was bigger when recorded in trials when faces were presented with compared to responses elicited by a non-face object. Moreover, significant amplitude differences in the component were observed as a consequence of face rotation whereas no such differentiation was obtained for non-face objects. These findings clearly show that faces are processed differently than other objects even in the absence of conscious awareness. Additionally, we compared brain responses to fearful and neutral faces. The negative shift specific for the fearful faces was recorded over occipital and occipito-temporal locations starting 240 ms after stimulus onset (Early Posterior Negativity EPN). Moreover, this effect was comparable in both tasks. However, again this effect seems to be determined by attentional resources available to process facial expressions.

ATTENTIONAL MODULATION OF FACIAL EMOTION PROCESSING
Eligiusz Wronka, & Wioleta Walentowska Jagiellonian University

Descriptors: attention, emotional expression, N170

Recent studies demonstrated that processing of facial emotional expression can be effectively modulated by attention. Our previous findings suggest that emotional expression effects could be observed at short latencies (N170) when the task demanded attentional shift triggered by facial emotion could be additionally modulated by functional asymmetry of the brain. This finding is consistent with models suggesting right hemisphere dominance for processing of faces and facial expressions.

QUESTIONING THE VALIDITY OF FRAC TAL MEASURES OF SHORT-TERM HEART RATE VARIABILITY: EVIDENCE FROM AUTONOMIC BLOCKADE AND PACHED BREATHING EXPERIMENTS
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1University of Granada, 2University of Boston, 3University of Jaén

Descriptors: fractal analysis, heart rate variability

Fractal scaling patterns in fluctuating signals are common in biology and are frequently associated with self-organized complex systems. We present results from two experiments on human subjects showing that fractal measures of heart rate variability (HRV) are sensitive to trend-like oscillations originating from specific control mechanisms such as respiratory sinus arrhythmia and baroreflex. In the first experiment, paced breathing at different frequencies (0.1, 0.2 Hz) was shown to significantly alter (t = 11.59, p < 0.001) the alpha 1 scaling exponent of short-term HRV obtained by Detrended Fluctuation Analysis (DFA). In the second experiment atropeine administration significantly increased the alpha 1 exponent (F = 19.55, p < 0.05). We compare these results with those obtained by simulated signals. Our interpretation raises serious methodological and conceptual concerns regarding the application of fractal measures to short-term HRV.

ATTENTIONAL BIAS TOWARD EMOTIONAL FACES AND THE EFFECT OF HEMISPHERIC ASYMMETRY
Eligiusz Wronka, Dariusz Asanowicz, & Wioleta Walentowska Jagiellonian University

Descriptors: attention, emotional expression, n2pc

Previous studies show that emotional expressions can rapidly capture attention. Our study investigated the temporal course of attentional biases for negative and positive facial expressions. ERPs were recorded while participants were exposed to pairs of faces in a dot-probe task. We found that attention orienting to angry faces emerged very early (170 – 320 ms poststimulus, N2pc). This effect was not obtained for happy faces. However, when we separately analyzed brain responses measured for the left and right-sided exposition of emotional faces, we found that later phase of the N2pc (220 – 320 ms) depended on the location of emotional expression. Comparable interaction effects were noticed for both positive and negative expressions. Similar effects of the visual field were also observed for the Sustained Posterior Contralateral Negativity (SPCN, 320 – 500 ms). These findings are consistent with results from recent studies that show a similar temporal onset of attentional shift toward threat-related faces and slower emergence of attentional allocation toward positive expression. However, the results we obtained suggest that attentional shift triggered by facial emotion could be additionally modulated by functional asymmetry of the brain. This finding is consistent with models suggesting right hemisphere dominance for processing of faces and facial expressions.

MEDIAL PFC THETA POWER SCALES WITH DEGREE OF NEGATIVE FEEDBACK PREDICTION ERROR
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Descriptors: FRN, prediction error, action monitoring

Investigations into action monitoring have consistently detailed a fronto-central voltage deflection in the ERP following the presentation of negative feedback, sometimes termed the Feedback Related Negativity (FRN). This ERP component is thought to reflect the evaluative processes of an action monitoring system following error feedback. Varying accounts postulate that: 1) the FRN should scale with the degree of negative prediction error, 2) the FRN reflects a binary distinction between good/bad outcomes, and 3) amplitude modulation in the FRN is predictive of post-error behavioral adaptation. To test these different and sometimes conflicting accounts, we investigated EEG activity during a probabilistic reinforcement learning task. Performance data from this task were fit to abstract computational models (Q-learning) which estimate action values and prediction errors, providing a quantification of the degree to which events are worse than expected. Single trial mid-frontal theta power following error feedback (arguably classification of facial expression but not when the task was to recognize gender of the face). The current study we record ERPs in response to pictures of faces presented in two different tasks. In a first task participants were instructed to compare expression of the two successively presented faces, while in a second task they had to evaluate if two pictures showed the same person or not. The amplitude of the face specific N170 was bigger when measured in response to emotional faces in comparison to neutral faces. In contrast to our previous study we observed this effect irrespective of the task. However, strength of this effect was related to amount of attentional resources available to process expression of the faces. We found also that emotional expression influences brain activity as early as 240 ms after stimulus onset (Early Posterior Negativity EPN). Moreover, this effect was comparable in both tasks. However, again this effect seems to be determined by attentional resources available to process facial expressions.
INTER-REGIONAL NEURONAL OSCILLATORY SYNCHRONY UNDERLIES COGNITIVE CONTROL

Michael X. Cohen
University of Amsterdam

Descriptors: cognitive control, oscillation, functional connectivity

In our day-to-day life, we must constantly monitor our actions, and flexibly adapt our behavior according to rules that we are told or learn through feedback. These abilities are supported by the “cognitive control network,” a circuit of anatomically and functionally linked brain regions. Typically in cognitive neuroscience, researchers attempt to identify specific brain regions that are responsible for specific functions; here, we explore the hypothesis that spatially disparate regions form the functionally unified cognitive control network via synchronous oscillatory activity. EEG is particularly useful for investigating this hypothesis because it measures synchronous and rhythmical phase changes in excitability of neural networks (oscillations). I will provide an overview of convergent findings from several different experiments, comprising healthy individuals as well as various patient groups, that support this hypothesis. I will also outline open questions and future directions. Briefly, changes in inter-regional oscillatory synchrony wax and wane with corresponding fluctuations in cognitive control activation. Further, the strength of synchrony predicts subsequent performance adjustments. Together, these findings have implications for our understanding of the functional architecture and dynamics of cognitive control. Because fluctuations in synchrony may occur in absence of changes in overall activity, these findings also demonstrate that the “functional localization” approach to cognitive neuroscience provides a limited view of brain functional dynamics.

USING N400 TO ASSESS STEREOTYPES INCONGRUITIES WITH THE USE OF EXEMPLARS

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Descriptors: N400, stereotypes, exemplars

A recent study revealed the potential use of the N400 component as an effective and versatile tool to study stereotypes. The present study extends on this research by using exemplars, examples of individual men and women, as primes. Participants were primed with either a male or female exemplar followed gender stereotypical word (target) that was either congruent with gender stereotypes (e.g., Women: Nurturing) or incongruent (e.g., Women: Aggressive) with the preceding picture; their task was to indicate whether the stimuli matched or did not match. Both response times and ERPs were recorded during performance of the task. It was hypothesized that stereotype incongruent picture/word pairs were associated with more negative N400 amplitudes and slower response times, relative to congruent word pairs. The results supported both hypotheses, indicating that they might be reflecting the processes that occur in daily life interaction with individual men and women. The implications of this study are discussed.

THE EFFECT OF TEMPORAL PRECISION AND PROBABILITY ON THE RESPONSE TO THREAT OF SHOCK: A FEAR-POTENTIATED STARTLE STUDY

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Descriptors: fear, anxiety, startle

Research using FPS to examine the emotional response to threat suggests that shock predictability can be adjusted to distinguish between fear and anxiety. This study was designed to examine the effect of temporal precision and probability on shock predictability to determine whether manipulation of these stimulus characteristics will produce potentiation in the acoustic startle response. Participants completed two fear conditioning tasks that each included predictable and unpredictable pairings of visual cue presentations with electric shock. In Task 1, temporal precision of predictability of shock was manipulated by varying the duration of the visual cues preceding shock, such that predictable shock conditions included a single due duration (4.5 s) and unpredictable shock conditions included multiple cue durations (4.5 s, 19.5 s, 49.5 s and 79.5 s). Task 2 involved the manipulation of predictability in three conditions of shock probability that represented predictable (100%), unpredictable (20%) and no shock recovery (0%) blocks. A significant increase in startle potentia
tion was elicited during both tasks in the predictable and unpredictable shock conditions suggesting that both temporal precision and probability are stimulus characteristics that can be used to parse affective changes associated with psychosis. Results from samples of marijuana withdrawn and alcohol intoxicated individuals will be discussed.

RESONATING CARDIAC VAGAL CONTROL AND QUALITY OF PARTNER RELATIONSHIP IN WOMEN NEWLY DIAGNOSED WITH BREAST CANCER

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Descriptors: cardiac vagal control, RSA, partner relationships

Cardiac vagal control as measured by respiratory sinus arrhythmia (RSA) is associated with a variety of indices of health and mental health. Whereas lower resting RSA characterizes a variety of chronic illnesses, higher resting RSA is associated with better affective regulation, social engagement, and coping with life stressors. To date, little is known about the association between RSA and partner relationship quality. The present study examined whether resting RSA was related to self-reported partner relationship quality in a sample of 39 women in committed partner relationships who were diagnosed with stage 0, I, II, or III breast cancer within the prior seven weeks. All of whom were free of medications that would affect cardiac function. At the oncology clinic visit, 10 minutes of resting electrocardiographic (ECG) data were recorded: the first 5 minutes from each subject alone, and the second 5 minutes holding the companion’s hand, if the companion was present, otherwise both segments were recorded from the subject alone. Subjects completed questionnaires on the quality of their committed partner relationships. Although there was no significant effect of the hand-holding manipulation, higher RSA during both recording periods predicted greater relationship satisfaction as measured by the Dyadic Adjustment Scale (DAS) and more positive partner interactions on the Social Relationships Inventory (SRI). These data suggest that higher resting RSA is indeed associated with higher partner relationship quality in couples who are coping with a significant stressor.

INTERACTION BETWEEN 5HT1A RECEPTOR ALLELES, PSWQ & FRONTAL EEG ASYMMETRY

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Descriptors: serotonin, eeg asymmetry, worry

Anxiety and depression are commonly comorbid psychopathologies and are often treated using similar methods. Given serotonin’s dominant role in pharmacological treatment of psychopathology, it is thought to be an important neuro-modulator of mood and arousal. It has also been hypothesized that serotonergic risk alleles in the 5HT1a receptor gene may be associated with risk for psychopathology when faced with life stressors. The current study examined the relationship between serotonin 5HT1a alleles, depressive history, worry (as measured by PSWQ) and their interactive effects on resting frontal electrical brain asymmetry. The sample consisted of 226 (31% male) Caucasian individuals with (n = 110) and without (n = 116) a history of depression. EEG was assessed from 64 scalp sites on four days (two 8-min periods each day). Although, the main effect of genotype on asymmetry across frontal regions indicated that the risk genotype was associated with greater relative right frontal activity, a significant interaction between PSWQ and 5HT1a genotype emerged. Pairwise comparisons indicated the 5HT1a risk genotype was associated with greater relative right frontal activity more strongly among those with low worry
compared to high worry (significant at channel pairs F7/8, F3/4 and F1/2 with a trend at F5/6). These results indicate the importance of evaluating genetic contributions to psychophysiological risk metrics, but also that this relationship is moderated by the complexity of comorbid phenotypic worry.

**Poster 120**

**PATTERNS OF STATE AND TRAIT REGIONAL BRAIN ACTIVITY IN DEPRESSION SUPPORT THE CAPABILITY MODEL OF EEG ASYMMETRY**

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Descriptors: EEG, depression, emotion

Resting frontal electroencephalographic (EEG) asymmetry is a promising marker of risk for major depressive disorder (MDD) and propensity to engage in less approach- than withdrawal-motivated behaviors across situations. The capability model of individual differences in EEG asymmetry (Coan, Allen, & McKnight, 2006) suggests, however, that brain activity during emotional challenge will provide a stronger index of the capacity for depressed individuals to engage in approach and withdrawal responses when emotion regulation may be needed. Frontal EEG asymmetry during rest and emotional challenge of approach (anger, happiness) and withdrawal (fear, sadness) was assessed on 4 occasions in 210 individuals age 18–33 (34% male) with (n = 93) and without (n = 117) a diagnosis of lifetime MDD (MDD+ and MDD−). Although results for men were not entirely consistent, findings for women were very clear: MDD+ women exhibited greater relative right frontal activity (lower right frontal alpha power) than MDD− women across conditions. Importantly, EEG asymmetry during the emotional challenge task was a more powerful indicator of lifetime MDD status than resting asymmetry in women, evidence in support of the capability model. Additionally, MDD+ women displayed lower bilateral alpha power during the emotional challenge conditions and higher bilateral alpha power during the rest condition than MDD− women, indicating that different mechanisms may underlie patterns of state and trait asymmetry as a function of lifetime MDD status in women.

**Poster 121**

**SHOULD IT MATTER WHEN WE RECORD? TIME OF YEAR AND TIME OF DAY AS FACTORS INFLUENCING FRONTAL EEG ASYMMETRY**

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Descriptors: EEG, seasonality

Resting frontal encephalographic asymmetry is a relatively stable individual difference that identifies trait aspects of risk for psychopathology such as major depression. Superimposed on stable trait variance are occasion-specific fluctuations that, to date, have been relatively poorly characterized. A recent study (Peterson & Harmon-Jones, 2008) found that time of year and time of day interacted to predict differences in resting frontal asymmetry, with participants assessed on fall mornings having more relative right frontal activity versus those assessed on spring mornings. In a sample of 111 non-depressed individuals, a time-of-year by time-of-day interaction emerged, although the direction differs from that of Peterson & Harmon-Jones, with participants assessed on fall mornings having more relative left frontal activity than those assessed on spring mornings. To determine if the effects were due to seasonal variations such as photoperiod or possibly driven by seasonal psychosocial stressors inherent in a student sample, season was replaced by a dimensional scale of length of the photoperiod; results were largely consistent with those based on fall/spring coding. Morning sessions run in periods of less light show more relative left frontal activity than other session times. Time awake appears to be an important moderating variable for the interaction of photoperiod and session time. Results of this study highlight the need to monitor or control seemingly extraneous factors that influence metrics assumed to be trait indices of motivational/affective propensities.

**Poster 122**

**CORTICAL SOURCES OF INFANT VISUAL PREFERENCES**

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1University of Tennessee, 2Memorial University, 3University of South Carolina

Descriptors: attention, ERP, infants

Measures of preferential-looking have been at the forefront of behavioral research on infant cognitive development, while event-related potential (ERP) studies have been commonly used by researchers interested in electrophysiological correlates of infant cognition. The goal of this study was to identify the cortical sources of infant visual preferences. The cortical sources of the ERP components associated with stimulus-type effects and visual preference behavior were localized with equivalent current dipole (ECD) analysis. Forty-seven infants were tested at 4.5, 6, or 7.5 months of age. Paired-comparison trials were embedded within the modified-oddball ERP procedure. The location of cortical sources was estimated with ECD analysis (see Reynolds & Richards, 2005). The cortical source models for the ECD analysis used “finite-element model” (FEM) mapping of the electrical conductivity of the head to calculate the forward model. The cortical sources for the 4.5-month-olds were scattered across the medial-lateral aspects of the basal prefrontal cortex well into the lateral aspects (Brodmann area 34). There was an increasing trend with increased age for infants to show a larger proportion of active cortical areas along the midline. The best fitting areas in common between the brief stimulus and paired-comparison procedures were in the inferior prefrontal regions (e.g., BA 11, 25, 34). This common activation combined with visual preference effects found across behavioral and ERP tasks indicates that these areas of the brain are involved in infant visual preferences.

**Poster 123**

**DIFFERENT AGES, DIFFERENT STAGES: A NEURODEVELOPMENTAL AGE-BASED DATABASE OF NORMAL BRAIN DEVELOPMENT FOR MRI**

Carmen Sanchez, Alexandra Basilakos, & John E. Richards

University of South Carolina

Descriptors: neurodevelopmental, MRI, database

Healthy children and adolescents demonstrate remarkable variability in regional brain measures with MRI (Durston et al., 2001). Using MRIs obtained from the Brain Development Cooperative Group’s MRI database, this investigation explored the utility of developing brain templates based on age increments of 6 months. The main goal of the work was to create a database of age-normed MRI volumes and stereotaxic atlases for use with MRI. IMRI, EEG and ERP psychophysiological source analysis, and age-based MRI use. Participants included 860 children and adolescents ranging from 4.5 years to 19.0 years and were divided into age groups by 6 month increments. Anatomical MRIs were done that produced T1-weighted, T2-weighted volumes, and brain and material-segmented (gray matter, white matter, CSF) files for each participant. Each MRI volume was standardized to the appropriate age norm, and the individual MRIs were registered (“warped”) to the age norm average, and then a final average was made. This average was used to develop average T1-Weighted, T2-Weighted, normed MRI volumes in six-month increments from 4.5 to 19. Yrs. This database can be used with MRI programs (FSL; SPM; VBM; ANTS) for doing age-based normed MRI and fMRI study. Several characteristics of MRI “pipeline” automatic analysis were examined with the database.

**Poster 124**

**SHIFTS IN HEMISPHERIC CONTRIBUTIONS TO LANGUAGE COMPREHENSION WITH AGE**

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Descriptors: aging, hemispheric asymmetry, sentential context

Although verbal knowledge remains relatively stable across the lifespan, there are age-related changes in online language comprehension, particularly message-level processing. In several studies, we have used event-related brain potentials (ERPs) to examine the nature of age-related change in these processes by varying the fit of sentence-final words with their sentence frames. Consistent with prior work, older adults elicited patterns similar to those for right-hemisphere-based processing (based on visual field studies) in younger adults. These patterns are marked by reduced sensitivity to the fit between a word and its context when sentential constraint is weak. Thus, only with a strong base of contextual support do older adults, like the right hemisphere of younger adults, seem to benefit from sentential context. Overall, our results implicate a changing balance of hemispheric contributions to comprehension over the lifespan, with the left hemisphere bias toward efficient and predictive use of context information declining with advancing age.

**Poster 125**

**HEMISPHERIC DIFFERENCES IN WORD CLASS EXPECTANCY—AN EVENT RELATED POTENTIAL STUDY**

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University of Illinois, Urbana-Champaign

Descriptors: hemispheric differences, syntactic processing, nouns and verbs

The current study used the split-visual field design to investigate each cerebral hemisphere’s sensitivity for syntactic information and word class distinction. Function words (to the) were used to create word class (verb/noun) expectancy of the upcoming word. After the centrally presented syntactic cue, nouns and verbs with no or little word class ambiguity (e.g., ‘the sofa’/’to observe’) were randomly presented to either visual field (VF), matching or mismatching the word class expectancy. Participants were asked to make a grammaticality judgment on the phrases. ERP responses to correctly judged
content words were compared across matching and mismatching conditions. The results showed that, compared with matched words, mismatched words elicited larger negativities (500 – 800 ms) and enhanced P600 (900 – 1100 ms) after both VF presentations. However, the P600 mismatch effect after the LVF presentation is less robust and appears to be mainly elicited by mismatched verbs (e.g. 'the carve'). Taken together, the findings suggest that both hemispheres are sensitive to word class and can make use of syntactic information from function words. However, the left hemisphere seems more likely to engage in control processes associated with syntactic revision, while the right hemisphere may rely more on lexical information.

**Poster 126**

CONSCIOUS ERROR DETECTION: DIFFERENTIAL AUTONOMIC RESPONSES AND EVENT-RELATED BRAIN POTENTIALS

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**Descriptors:** error awareness, performance monitoring, ANS

The differences between erroneous actions that are consciously perceived as errors and those that go unnoticed have recently become a prevalent issue in the field of performance monitoring. In electroencephalography studies, "error awareness" has been suggested to influence the error positivity (Pe) of the response-locked event-related brain potential (ERP), a positive voltage deflection prominent approximately 300 ms after error commission. In the autonomic nervous system, erroneous actions in general have been related to subsequent heart-rate deceleration. In this study, ECG (heart rate) and pupillometry were recorded during two versions of an antisaccade task to measure autonomic arousal separately for perceived and unperceived errors. Additionally, the error-related negativity (ERN) and the Pe were investigated in relation to conscious error detection. Our results indicate that only aware errors do in fact provoke a heart-rate deceleration. The pupillometry results parallel the findings of heart-rate deceleration after an error, yielding a more prominent pupil-dilation after an erroneous saccade. This effect, however, is not modulated by error awareness, showing that in this physiological domain unaware errors do evoke autonomic arousal. In addition, we connect these indices of autonomic arousal to the differential effects of conscious error perception on the scalp ERPs by means of single-trial EEG.

**Poster 127**

ELECTROPHYSIOLOGICAL CORRELATES OF SPATIAL PROCESSING

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**Descriptors:** spatial processing, N170, parahippocampus

In a previous study, we identified an ERP component sensitive to the spatial location of reward-related stimuli in a virtual maze. The latency of this component, which we termed the "Topographical" N170 (NT170), occurred about 5 – 10 ms earlier for rewards following right turns versus left turns in the maze. We suggested that the NT170 was elicited when presentation of the reward-related stimuli in the maze alleles resets the phase of an ongoing theta rhythm generated in the parahippocampal cortex (PPC), and that the timing of the resetting occurred slightly earlier for objects encountered on the subject’s right side compared with the left side. In the present study we ran a series of three experiments to investigate this hypothesis further. All three experiments replicated the basic latency effect. In addition, in Experiment 1, the effect was not reproduced when subjects engaged in a guessing task that was formally equivalent to the T-maze task but that did not involve its spatial aspect. In Experiment 2, we observed the strongest latency effect in participants who used a "place strategy" to navigate a complex virtual maze and who were later able to reproduce the maze from memory. In Experiment 3, dipole source localization analysis indicated that the NT170 was best described by mirror dipoles located in the region of PPC, and further, that this activity was characterized by power in the theta frequency range. Taken together, these data indicate that the NT170 is elicited by a spatially-dependent process mediated by the PPC that induces phase resetting of theta activity.

**Poster 128**

DECOMPOSITION ANALYSIS OF THE ELECTRODERMAL ACTIVITY (EDA) WITH SHORT INTERSTIMULUS INTERVALS, USING THE EXAMPLE OF CLASSICAL AVersive CONDITIONING OF TACTILE STIMULI

Anne-Kathrin Bräucher1, Dieter Kleinnohl1, Jörg Trojan1, Susanne Becker1, Francisco Muñoz2, José Manuel Reales2, Soledad Ballestros2, Rupert Hölzl2
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Two surface patterns of different roughness served as CS+ (rough) and CS− (smooth) in a differential classical conditioning paradigm. These patterns were moved across the tip of the right digit by a custom-made, computer-controlled device. Healthy participants (N = 19) received sequences of such stimuli (duration 550 ms; typical ISI 2650 ms). The rough CS+ was coupled with an aversive heat stimulus presented to the left thenar, serving as an UCS; the smooth CS− was presented uncoupled. In the course of the experiment, subjective ratings of perceived roughness and pleasantness were recorded. The CS+ was rated more negative after conditioning than before. To check the success of the conditioning procedure, electrophilic activity was measured and analyzed in relation to the stimulus onset by a decomposition method. Responses on the different stimulus categories were compared before conditioning, after conditioning and after an extinction phase. Because of the short interstimulus intervals in the experiment, a classical EDA analysis would have been hard to realize, whereas the decomposition analysis is a well suited possibility for short stimulations with overlaid EDA responses.

**Poster 129**

SENSORY AFFECTIVE GATING - A NEW DESIGN, AN OLD PHENOMENON, EXAMINED BY WAY OF MAGNETOEENCEPHALOGRAPHY

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**Descriptors:** affective gating, MEG, M50

The present study explored sensory gating for affective stimuli in the visual modality. The original double-click paradigm was changed into a double-affective-flash paradigm. Seventeen subjects (7 male) attended to 300 pairs of identical pictures (high arousing pleasant, high arousing unpleasant and low arousing neutral), presented for 100 ms with 500 ms SOA, while the magnetoeencephalogram was recorded. gating, defined as ratio of the event related field responses at 50 – 70 ms latency (ERR to the second divided by ERR to the first stimulus), was analyzed for each picture category. Ratios were significantly smaller for pleasant and unpleasant relative to neutral pictures, but did not differ between pleasant and unpleasant stimuli. Source analysis indicated affective sensory gating origin in the limbic system. Results indicate sensory gating for visual affective stimuli, suggesting an affective sensory filter system in the brain, which guides and determines human behavior.

**Poster 130**

A SMALL GAP AND ITS LARGE CONSEQUENCES IN AUTOMATIC OBJECT REPRESENTATION IN AUDITION

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**Descriptors:** automatic, sound, representation

Previous research showed that the automatic representation only exists for short tones. Concerning long lasting tones information occurring beyond ~ 300 ms is not (or just to a minor degree) automatically represented. However, a recent finding revealed that a brief gap segmenting long tones re-gained the automatic sound representation. By utilizing the mismatch negativity (MMN), a brain wave elicited by auditory deviance, the present study determined whether this gap results in one meta-object consisting of two related sound parts or in two independent objects. As the MMN to the second of two successive deviances in a sound is known to be reduced, a deviance before and after the gap should result in an MMN decrease when the sound is organized as meta-object. Our finding of two full-amplitude MMNs (before and after the gap) suggests that the gap segmented the acoustic input in two (with respect to the MMN-system) independent objects.

**Poster 131**

THETA OSCILLATIONS AS A MARKER OF COGNITIVE CONFLICT

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**Descriptors:** conflict, adaptation, oscillations

Cognitive conflict resolution processes in the brain and behavioral adjustments following them have drawn much attention to the question whether the brain treats conflicts within a unitary conflict monitoring system or whether different mechanisms contribute to conflict adaptation processes. The present study aimed at investigating whether an increase in theta power (4 – 7 Hz) is observed during different types of conflict (as reported during error commission or in the Stroop task). In a within-subject design with 24 participants we used four different typical conflict paradigms (Eriksen flanker task, Simon task, Go-NoGo-task and mixed Simon-Go-NoGo design). Theta power was increased significantly in incompatible compared to compatible Go trials whereas NoGo theta power depended on whether typical two-choice interference tasks were used or a mixed trials, hence Simon Go-NoGo paradigm was applied. Response conflict was measured in terms of wrong-hand activation in the lateralized readiness potential, which was reduced following incompatible Go trials in the two-choice Simon task and as well in the mixed paradigm. In contrast, neither response conflict in the flanker task nor NoGo conflicts in the mixed task led to reduced wrong-hand activation in the upcoming
trial. We conclude that enhanced theta power indicates increased cognitive demand across different conflict paradigms. Recruiting such cognitive resources, however, does not reduce upcoming response conflict in every case.

**Poster 132**

IS THE PROCESSING OF AFFECTIVE PROSODY INFLUENCED BY SPATIAL ATTENTION? AN ERP STUDY  
Julia Gädeke, & Brigitte Röder  
University of Hamburg

Descriptors: emotion, attention, ERP  
It is still a controversy whether the processing of emotional stimuli depends on attention. Most research in this area has been conducted with visual stimuli. Thus, the goal of the present study was to test whether the processing of spatial affective prosody is modulated by the locus of spatial attention. Two-syllable pseudo-words spoken by two female voices in different emotional prosodies (neutral, happy, threatening, fearful) were presented at two spatial positions (left or right). Participants attended to one position and one voice only in order to detect infrequent deviant stimuli of the attended channels (named targets, p = .05). Emotional prosody was task-irrelevant. The EEG was recorded throughout the experiment in order to assess processing differences for task-irrelevant stimuli as a function of spatial attention and emotional valence of the stimuli. First, the well known enhanced negative ERPs to spatially-attended compared to spatially-unattended stimuli were replicated. ERPs to vocal stimuli differed as a function of emotional prosody both when spatially attended to and when spatially unattended to, although the effect of emotional prosody was not identical under both spatial attention conditions. Processing of emotional prosody, therefore, seems to take place outside the focus of spatial attention.

**Poster 133**

THE INFLUENCE OF PRIOR BELIEFS ON THE VISUAL BRAIN: EVIDENCE FROM EVENT-RELATED BRAIN POTENTIALS  
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1University of Technology Braunschweig, 2Braunschweig Hospital

Descriptors: shape-from-shading, visual search, light-from-above prior  
The nature of visual perception is still a matter of debate. Two contrasting theoretical approaches to visual perception are predominant: one consists of variants on the Helm-holtzian constructivist-inferential approach (e.g., Gregory 1993; Rock 1983; 1997); the other, of the ecological-direct approach (Gibson 1979). In direct theory, perception does not involve computations of any sort, whereas inferential theories of perception assume that prior beliefs influence visual perception. One of the best-known examples of a prior is the assumption that light is coming from above (Kersten et al., 2004). This assumption is particularly useful to disambiguate convex from concave shapes from shading information (Ramachandran, 1988; 2000). Spatial orientation of the shading gradient (vertical, horizontal), direction of the assumed light source (from above, from below / from left, from right) and set size (1, 2, 4 items) were manipulated in our multiple-target visual search study (Thornton & Gilden, 2007). As revealed by RTs, visual search was more efficient when stimuli were vertically shaded than when they were horizontally shaded. P3b amplitudes revealed that visual search of vertically shaded stimuli was less attention demanding than horizontal shading, particularly when the source of the assumed light was above of and left from the stimuli (Sun & Perona, 1998). These ERP results are the first EEG-based data to provide empirical evidence in favor of inferential theories of perception. Future studies will examine the replicability and the generality of our conclusion.

**Poster 134**

THE BRAINS OF PROBLEMATIC ONLINE GAME USERS SEEK STRONGER SENSATION: AN EVENT RELATED POTENTIAL STUDY ON PROBLEMATIC ONLINE GAME USERS  
Wooyol Shin, Junghyun Hahn, Joohan Kim, & Hae-Jeong Park  
Yonsei University

Descriptors: N2, problematic online game use, go/no-go  
As online games have grown in popularity, many studies have focused on the essential features of these online games. The state of knowledge regarding online game use generally consists of case studies or phenomenological descriptions of excessive game playing, whereas neural investigations of the underlying mechanism of the users are missing. The authors assessed the event-related potentials of online game users during a Go/No-Go task. We attempted to investigate the N2 component of online game users who were assessed by the Problematic Online Game Use scale. Sensation seeking is considered to be a biological trait of excessive online game users associated with a need for novel experience. We considered that the No-go trials might function as novel experience during the task. The N2 component, which is generated by the no-go stimuli might be a marker of a specific neural trait of problematic online game users. As a result, the levels of problematic online game use reflected individual differences in the functioning of a neural mechanism related to activation against novel stimuli. The problematic online game user group and the control group differed in their neural control, not their behavioral performance. The N2 amplitudes in the anterior cingulate cortex region produced by the problematic online game use group were significantly greater than those produced by the control group. Higher Problematic Online Game Use scores, thus, reflected stronger neural sensitivity to rare stimuli. We contend that greater N2 amplitudes might reveal the specific trait, sensation seeking, of problematic online game users.

**Poster 135**

EFFECTS OF ATTENTION ON BINOCULAR RIVALRY  
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Descriptors: binocular rivalry, attention  
Binocular rivalry causes perceptual awareness to fluctuate between two dissimilar monocular images. We investigated what happens when attention is completely withdrawn from binocular rivalry. We presented one grating to one eye and another to the other eye. The gratings could either be the same orientation, fusion conditions, or different orientations, rivalry conditions. Our events were transitions from fusion to rivalry, rivalry to rivalry, fusion to rivalry and rivalry to fusion. We had two tasks. In one, observers had to report changes in perceived orientation, focusing their attention on the gratings. In the other, observers had to report changes in a fixation cross, taking attention away from the gratings. In both tasks we measured event-related potentials to the onset of either fusion or rivalry. We found evidence that rivalry does not only take place when rivalry stimulation was task-relevant but also when it was ignored supporting the notion that rivalry processing does not depend on attention. However, a larger N1-component for all transitions when attention is taken away from the gratings as compared to the same transitions when attention is on the grating indicates that the gratings were processed differently in the two tasks. This difference was especially large with rivalry to rivalry and rivalry to fusion transitions. We presume that the processing of the transition is more adapted when attention is on the gratings than when attention is withdrawn from the gratings. This is possibly due to an increase of perceptual alternations with attention.

**Poster 136**

EEG CORRELATES OF MEMORY MATCHING IN THE VISUAL WORKING MEMORY  
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Descriptors: working memory  
During recognition processes of visual working memory it can be necessary to match incoming sensory information with retained memory contents. This study aimed to investigate the underlying electrophysiological correlates of memory matching process based on EEG oscillatory phase synchronisation analysis. Twenty-three healthy subjects completed a delayed match to sample task in which items stored in visual-spatial short-term memory had to be compared with match or non-match probe items. The results show that this matching process of top-down memory representation and bottom-up visual information is reflected by transient phase-synchronization over parieto-occipital regions between theta (4 – 8 Hz) and high gamma (50 – 70 Hz) oscillations 150 – 200 ms after probe presentation. Furthermore, non-matching of information demands higher cognitive resources for the comparison and manipulating memory representations with new object information as reflected in large-scale theta and gamma phase synchronisation.

**Poster 137**

ORIGINAL MEANING OF FACIAL EXPRESSION MODULATES EVALUATION OF OUTCOME  
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The University of Tokyo

Descriptors: facial expression, feedback-related negativity (FRN), evaluation of outcome  
When we see someone else’s face, we naturally understand their emotional states, as we understand that negative events are related to angry faces, and positive events are related to smiling faces. This ability is developed by the typical experiences after our births. In this study, we focused on the evaluation of outcome in terms of the congruency between facial stimuli contained the meaning related to actual outcomes and not related to actual outcomes. Two experiments were conducted to investigate this issue based on the feedback-related negativity (FRN). The FRN is an ERP component which reflects whether the outcome is good or bad. ERPs were recorded during the alternative gambling task, and we associated face stimuli with Gain/Loss outcome. In experiment 1, we associated face stimuli with Gain/Loss (congruent) and Loss/Gain (incongruent). The result showed that the FRN was elicited by the Loss feedback in both conditions. In addition, we associated face stimuli with Gain/Loss and we associated face stimuli with Gain/Loss outcome. In experiment 2, we associated female/male face with Gain/Loss and we associated face stimuli with Gain/Loss (congruent) and Loss/Gain (incongruent). The result suggested that the association between expression and actual result affects the evaluation with a temporary dimension. In experiment 2, we associated female/male face with Gain/Loss and we associated face stimuli with Gain/Loss as a control. The result showed that the FRN was elicited by “Loss” but also that there was no difference of the FRN between two
conditions in terms of latency. These results suggest that the congruency between the original meaning of a facial expression and actual outcome modulates the evaluation process. We conclude that socially acquired meaning of facial expressions have effects on evaluation.

Poster 138

EXPERIMENTAL ERP EFFECTS DO NOT CONFORM WITH THE LARGEST AMPUTATIONS OF COMPONENTS IN A VISUAL SEARCH TASK

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Descriptors: data exploration, effect size, components

There are many established analysis approaches that use average amplitudes to statistically secure experimental effects in research involving event-related potentials (ERPs). The spatiotemporal attributes of these average amplitudes are, however, to a large degree dependent on criteria that are set by individual researchers. Using an innovative effect-size based exploration technique, we explored ERP data of a visual search paradigm and obtained an objective criteria that more precisely defines interesting spatial and temporal areas for the average amplitudes. In addition, our results suggest that the largest experimental effects must not coincide with the relative largest amplitudes of a given ERP component. For example, a P2 component had its largest amplitude at parietal recording sites, while the P2 effect was largest at frontal recording sites. These kinds of findings suggest that effect-size based data exploration can hold additional information when making decisions about the spatiotemporal properties of average amplitudes.

Poster 139

THE NEURAL RESPONSES TO FEEDBACK INFORMATION PRODUCED BY SELF-GENERATED OR OTHER-GENERATED DECISION MAKING: AN ERP STUDY

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Descriptors: schizophrenia, feedback related negativity, sense of agency

INTRODUCTION: Schizophrenia can involve a delusion of control that is an abnormal sensation of being controlled. In this delusion, one experiences one’s feelings, impulses, thoughts, or actions as not one’s own, but as being imposed upon him or her by some external force. The purpose of this study was to investigate the neural response to feedback information produced by self-generated or other-generated decision making.

METHODS: Eleven schizophrenia patients and 11 normal subjects participated in present study. They performed gambling task. In the self-decision condition, participant himself had to choose to press a button for one of two options. In the other-decision condition, other person sitting next to the participant chose one of two options and later the participant was instructed to press the button according to decision made by other person. We measured event-related brain potentials to feedback stimulus and examined differences of neural responses in the self-decision condition and the other-decision condition. RESULTS: In normal subjects, the neural response to feedback stimulus was obviously different for the normal subjects across the self-decision and other-decision condition. On the other hand, amplitude of positive slow wave in self-decision condition in schizophrenia patients was reduced significantly compared to normal subjects. DISCUSSION: The results demonstrated that schizophrenic patients show reduced neural response to feedback information produced by self-generated action.

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THE RELATIONSHIP BETWEEN LOW-FREQUENCY BRAIN OSCILLATIONS AND RESPONSE VARIABILITY IN ADHD: A TWIN STUDY

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Descriptors: default-mode network, twin study

Response variability is a clear characteristic of ADHD, and several studies suggest it best discriminates ADHD cases from healthy controls in comparison to other performance measures. Increased variability in ADHD may arise from the inability to appropriately modulate very low-frequency oscillations that are observed when the brain is at rest or in ‘default-mode’. Previous research suggests the role of ‘default-mode’ interference in attentional lapses, which may lead to increased response variability, through the intrusion of low-frequency oscillations during cognitive activity. Using a high-density electrode cap, goal-directed activity was recorded using EEG during the completion of an Eriksen arrow flanker task. Fast-Fourier Transform (FFT) analysis extracted a specific EEG frequency band, ‘slow-3’ (0.6–2 Hz), identified in previous studies to be stable and consistent with fMRI findings in terms of electrode location. Data was collected on 11 subjects as part of a larger sample of 66 twin pairs with high and low scores of ADHD. Phenotypic analysis suggests that there is a possible relationship between absolute power of low-frequency oscillations and both reaction-time variability (RTV; r = .50) and errors (r = .61), and that greater associations are observed on incongruent trials (r = .61; Error r = .74). These preliminary findings suggest the involvement of the default-mode in performance on cognitive tasks and response conflict processing. Ongoing investigation aims to examine the familial relationships between electrophysiological correlates and ADHD in a larger twin sample.

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THE NEURAL MECHANISM OF LONG-TERM PERCEPTUAL LEARNING ON THE TEXTURE DISCRIMINATION TASK: AN ERP STUDY

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Descriptors: neural mechanism, visual perceptual learning, ERP

It is well known that training on a task improves the performance possibly as consequence of neural changes that evolve over a period of several hours or several days. The position- and orientation-specific learning effect in the texture discrimination task (TDT) indicated that such learning occurred at early stages of visual processing, such as primary visual cortex (V1), which has been demonstrated by previous fMRI and ERP studies. But recent studies suggested that the higher-level brain areas might be involved in the TDT learning. In the present study, we recorded the high resolution electroencephalography from the whole-scalp sensor array to investigate the neural mechanism of the long-term perceptual learning on the TDT. Fifteen subjects were trained on the TDT in the upper visual field for six days and 128-channel EEG was recorded before each training session. Behavioral performance was improved and then saturated across the training sessions and maintained at a constant level fourteen days after training. The event-related potential results showed that the amplitude of C1, known to reflect V1 activity, was not significantly different across the training sessions. However, the amplitude of the frontal P2 component, from about 160 ms to 350 ms post-stimulus, decreased steadily and considerably with the training. Interestingly, this positive wave became negative fourteen days later. These findings indicated that the higher-level brain areas might be involved in perceptual learning and made even greater contribution to the learning.

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THE REGULATION OF EMOTIONS IN ALEXITHYMA: AN ERP ANALYSIS

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Descriptors: emotion, alexithymia, event-related potentials

The reduced ability to regulate, identify and communicate feelings or emotions is primarily seen as the deficit named as alexithymia. Many studies have examined this individual difference trait, to try and understand this impairment in more detail, with the majority of researchers concluding that although participants with alexithymia are able to perceive emotional information, they are unable to process such information effectively. To specifically analyse the effects of such deficits on electro-cortical responses, 30 individuals who scored low, and 21 individuals who scored high on the Toronto Alexithymia Scale, were asked to interpret emotional images using a series of regulation tasks (suppress, reappraise and attend), whilst their brain potentials were simultaneously recorded. Overall, negative images were found to elicit larger later positive potentials (LPPs) as compared to neutral images in left parietal regions starting from 300 ms post-stimulus onset, and becoming more prominent after 500 ms. Although there was no main effect of regulation task, or a regulation task by image type interaction, there was a moderation effect dependent on alexithymia. That is, reappraisal was found to exert higher LPPs when viewing negative as compared to neutral images in high alexithymia only. This may indicate that reappraisal can cause an increase in cognitive effort when trying to evaluate emotional stimuli in those who find it difficult to process their emotions.
memory were compared using data from behavioral and EEG methods. Fifty participants (25 monolingual, 25 bilingual) were tested and bilingual language proficiency was assessed using a battery of tests. Behavioral responses and EEG was recorded from a 128 electrode EEG net continuously sampled at AD rate 1000 Hz/channel. Inter-electrode impedance using a battery of tests. Behavioral responses and EEG was recorded from a 128 electrode memory were compared using data from behavioral and EEG methods. Fifty participants for serial order is an important predictor of language processing.

Operant conditioning of alpha patterns in human EEG using affective reinforcing stimulation

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Descriptors: operant conditioning, eeg alpha patterns, neurofeedback

It is known that a person can voluntarily manage their own EEG rhythms using contour neurofeedback. However, this management can not form a basis for operative interaction with an environment; interaction with an external world should be automated to reduce conscious cognitive load. Earlier, we showed that it was possible to exert unconscious control of computer monitor color by means of mutual reinforcement of EEG rhythms and RGB values (Kaplan, 2005). This means that EEG can be used as a tool for the selection of an emotionally positive external environment. In the present study, we examined whether the brain can manage events having negative emotionality by means of EEG. Each EEG alpha wave or groups of waves switched on intermittent light stimulation if they exceeded a certain threshold level. This light stimulation switched on a warning sound stimulus when the subject had avoided a negative reinforcement (a very unpleasant sound or skin electric stimulation). The subjects did not know that they could cancel negative stimulation by means of EEG. It was shown that after only four 8-min sessions in one day, more than 60% of examinees learned to change EEG in response to the warning stimulus to escape negative stimulation. Results suggest that there is an opportunity for operative manipulation of external objects by means of EEG.

Application of the P300 in the evaluation of the cognitivies functions of patient with endogenous monopolar depression

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Descriptors: P300, endogenous monopolar depression

Objective: To use the P300-event related potential (ERP) to evaluate cognitive functions involved in Endogenous Depression. Methods: Eighteen patients diagnosed with Endogenous Depression (age range 30 to 66 years) were studied, and results were compared with matched healthy controls. Results: P300 obtains significant continuation of the latencies of all the components of this Potential, with decrease of the values means of interpeak interval width for the N200-P300 complex and P300-N3 complex did not differ between patients and controls. Conclusion: These results suggest that during the DEM a retard exists in the speed of the cognitive processing of the information and a decrease in the intensity of the attentives processes, being conserved the sinencia among the different generators of this potential. Significance: The registration of the P300 is useful to evaluate the cognitive functions in in those with DEM and it contributes elements of interest in the physiopathological interpretation of these dysfunctions.

Does the lateralized readiness potential reflect impaired response selection in schizophrenia?

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Descriptors: lateralized readiness potential, n2pc, schizophrenia

Slowed reaction time has been consistently documented in research on schizophrenia. Here we follow the hypothesis that the slowing reflects a generalized deficit in response selection, including the activation of simple manual responses. Recent findings of increased onset latencies of the lateralized readiness potential (LRP) in schizophrenia patients might indicate a slowing of response selection processes but could also be due to delayed allocation of attention to imperative stimuli. In the present study with 20 schizophrenia patients and 20 matched healthy control subjects, we use a Simon-type spatial compatibility task to simultaneously measure onset latencies of the LRP and the N2pc of the event-related potential waveform — an electrophysiological correlate of the focusing of attention. Preliminary data suggest that this methodology is suitable to dissociate impaired response selection from normal attention allocation processes in schizophrenia.

Incentives influence error detection but not post-error remedial action following sleep deprivation

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Descriptors: error-related negativity (ern), sleep deprivation, post-error remedial actions

The present study examined whether one night of total sleep deprivation would deteriorate error monitoring, including error detection and post-error remedial actions, and further examined whether the deterioration in sleep deprivation conditions, if found, would be counteracted by proving monetary reward. All participants performed a letter version of the flanker task on two mornings, one following a normal sleep night, and one following a sleep deprivation night, with a 1-week interval between and with a counterbalanced sequence of the two sleep conditions. Participants were divided into two groups, with one group (12 participants) receiving monetary reward depending on response correctness, and one group (12 participants) receiving no reward for their performance. The results showed that sleep deprivation was associated with deficits not only in error detection processing, as reflected on reduced error-related negativity, but also in post-error remedial actions. The effect of reward was shown to be able to counteract deficit in error detection processing, such that the amplitude of ERN could be maintained at the same level following sleep deprivation as that following normal sleep, however the effect of reward was unable to alleviate deficit in post-error remedial actions following sleep deprivation. The amplitude of Pe was demonstrated to be correlated to the efficacy of post-error remedial actions, such that the Pe amplitude was found to be reduced following sleep deprivation and could not be modulated by the presence of reward as shown in post-error remedial actions.

Single trial EEG amplitude predicts subsequent changes in heart rate within individuals – the cardioelectroencephalographic covariance trace

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Descriptors: P300, heart period, anxiety

The presentation of feedback stimuli evokes ERP components such as the feedback related negativity (FRN) or the P300 and also induces changes in heart period (HP). Because HP modulations, FRN and P300 have all been linked to frontocentral brain structures, they may be generated in overlapping regions or may even be functionally coupled. To investigate the relationship between EEG and HP, single trial EEG magnitude in varying time windows was correlated with HP changes across trials within individuals. The results can be visualized as cardio-electroencephalographic covariance traces (CECTs), which plot the height of intradividual EEG-HP correlations as
a function of time window lag for both EEG and HP. In the present study participants (N = 31) performed a gambling task while EEG and ECG were recorded. CECTs revealed that frontocentral EEG magnitude in the P300 window (200–400 ms post feedback) predicted feedback-related HP changes 2–5 s later. This effect was robust across individuals (p < .00001) and remained stable when controlling for potential influences of habituation and respiration. In addition CECT amplitudes in the time window showing maximal HP correlations were associated with self-reported trait anxiety for negative, but not for positive, feedback. Results are discussed with regard to (a) an evaluation of the CECT methodology, (b) temporal dimensioning of centrally triggered modulations of autonomous activity, and (c) recent models relating anxiety to neurovisceral connectivity.

female voice adaptors causes a subsequent test voice to be perceived as more male (and vice versa), even minutes after adaptation (Schweinberger et al., 2008). In addition, we recorded event-related potentials (ERPs) to test voices morphed along a gender continuum. A systematic attenuation in fronto-central N1-P2 amplitudes was seen whenever a test voice was preceded by gender-congruent voice adaptors. Additionally, similar amplitude attenuations were seen in a late parietal positive component (P3, 300–700 ms). These findings suggest that contrastive coding of voice gender takes place within the first few hundred milliseconds from voice onset, and is implemented by neurons in auditory association areas that are specialized for detecting male and female voice quality.

EFFECTS OF SURPRISE AND ENTROPY ON BEHAVIOR AND EVENT-RELATED EEG IN THE ERIKSEN FLANKER TASK

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Descriptors: cognitive control, surprise, entropy

Recently fMRI and EEG signals that precede performance errors have been described. In order to further characterize this activity we investigate conditions where performance is parametrically modulated in order to test if and how error-preceding activity relates to external manipulations. Here, we report on results from an Eriksen flanker task where ratio of compatible to incompatible trials was modulated in five levels (9/1, 7/3, 5/5, 3/7, 1/9). EEG data were collected from 22 participants (13f, age 21±5 yrs) from 64 channels. The data were filtered, segmented, trials with paroxysmal artefacts were rejected, and independent component analysis (ICA) was used to remove stereotyped artefacts. EEG epochs were then wavelet denoised. The data from each channel and time point were predicted with a multiple linear regression model as a function of compatibility, estimates of the information theoretical measures surprise and entropy, as well as predictors coding for error trials, and response side. Behaviorally, error rate and reaction time to incompatible trials increased as these became more surprising/less frequent, and error-preceding trials showed decreased entropy and reaction times. In the stimulus-locked EEG data, compatibility, surprise, and entropy predicted central negativities in the N2-range with separable peaks from 280–350 ms post-stimulus. The results highlight the sensitivity of performance and event-related EEG to modulations of stimulus probability and information, which represent one source of error-preceding (mal – ) adaptation of behavior and brain activity.

THE IMPACT OF WORKING MEMORY LOAD ON EEG MEASURES OF MENTAL EFFORT AND MOTIVATION DISPOSITION

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Descriptors: EEG, mental effort

Mental effort may be conceived in terms of computation (energy mobilization for cognitive tasks) or motivation disposition (decision to invest or withdraw task effort). The aim of this study was to disentangle the effects of both valence and arousal. The results showed omnibus effects for load on anterior and event-related EEG to modulations of stimulus probability and information, which represent one source of error-preceding (mal – ) adaptation of behavior and brain activity.

THE EFFECT OF MOTIVATION IN BCI PERFORMANCE

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Descriptors: BCI, motivation, ALS

People with amyotrophic lateral sclerosis (ALS) lose their motor activity and so their ability to talk in the course of their disease. Brain-Computer Interfaces (BCIs) provide an alternative communication channel because they rely on brain signals and are muscle independent. However, individuals differ in their ability to use a BCI. To investigate the relevance of psychological influencing variables such as motivation in patients with ALS this study examined the relation between motivation and the ability to learn using a BCI and the P300 amplitude measured within a BCI controlled by event-related potentials (ERP). Motivation was manipulated with a 20 Euro gift certificate for an internet store. In the first run twelve ALS patients spent a 14 character sentence without receiving a reward. In the second run they were promised a gift certificate for trying particularly hard to spell the sentence correctly. Motivation was assessed with a BCI-adapted questionnaire and a visual analogue scale. BCI performance was defined as the overall percentage of correctly selected characters (correct response rate = CRR). Three patients were not able to finish the session and were excluded from analysis. Average CRR across all runs and patients was 93%; four patients had a CRR of 100%. The gift certificate did not affect motivation but BCI performance. We found a trend for CRR being higher after motivation (96%) than before motivation (89%, Z = –1.84, p = .07). The results indicate that motivation may explain some of the variance in BCI performance and should be monitored in BCI settings.

SEX DIFFERENCES IN MENTAL ROTATION: HEMISPHERIC LATERALIZATION EFFECTS

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Descriptors: EEG/ERP

Mental rotation can be investigated in paradigms, in which a parity judgment decision is required after mentally rotating an object. A larger angular disparity between a rotated and an upright version of a stimulus goes along with longer RTs and more negative ERPs. This is called the mental rotation effect (MRE). RT data usually reveal that men outperform women. This effect might be traced back to the hemispheric lateralization account, i.e. women prefer an analytic way of mentally rotating – involving more likely the left hemisphere –, while men use a rather holistic strategy – involving more likely the right hemisphere.
the right hemisphere. The recent study investigated the effects of sex on the MRE. In a two-alternative forced choice task two-dimensional polygons were used as stimuli. Two polygons were presented side by side on the screen with an angular disparity of 30, 90 or 150 degrees in a clockwise or counterclockwise direction. Participants (N = 51) had to perform a parity judgment decision after they had mentally rotated the stimuli. RT data and ERPs from 32 electrode locations were recorded. RTs were significantly faster for males than for females. ERP analyses revealed a parietal distribution of the MRE as a function of angular disparity. Women showed the MRE as a function of angular disparity in the P300 time frame at left-parietal electrode position P7, while men showed the same effect at the right parieto-temporal electrode position TP10. These lateralization effects are in line with the hemispheric lateralization accounting for sex differences during mental rotation.

**Poster 156**

MOVEMENT-RELATED CORTICAL POTENTIALS AND PERCEPTION OF EFFORT DURING EXERCISE

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Descriptors: effort, movement-related cortical potentials, exercise

It has been speculated that increases in movement-related cortical potentials (MRCPs) with increasing workload and muscle weakness are related to effort. However, MRCPs have never been measured together with ratings of perceived effort and most studies have tested finger or hand movements. This study tested the feasibility of investigating the neurophysiology of perceived effort by recording MRCPs during exercise with larger muscle mass. Perceived effort was manipulated by varying the load (6, 2, and 4 kg) around the ankle during blocks of 50 dynamic leg extensions. Extension and flexion phases were indicated by 2 beeps (1 s apart); lifts were separated by 4 s rest. In task 2, perception of effort was increased over time by repeating the 2 kg lift 150 times. EEG was recorded from 64 channels with a DC amplifier (BrainProducts, UK) at 2500 Hz with a DC-1000 Hz band-pass filter. The electromyogram (EMG) was recorded from the thigh (vastus lateralis). Participants rated their perceived effort (RPE) on a CR-10 scale (Borg, 1998) after every 10 trials. After an independent component analysis (ICA) to reduce eye movement, eye blink and skin potential artifacts, EEG was time locked to the EMG onset and average amplitudes of early Bereitschaftspotential (early BP; −1500−−−−650 ms), late BP (−650−0 ms) and motor potential (0−1000 ms) were calculated. Preliminary data suggest that it is feasible to measure MRCPs during exercise with a large muscle mass and that changes in MRCPs are associated with changes in perception of effort induced by increasing load and time on task.

**Poster 157**

NEUROPHYSIOLOGICAL SUBSTRATES OF BEHAVIORAL FLEXIBILITY: AN ERP STUDY

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Descriptors: emotion regulation, EEG/ERP

Normal development relies on the ability to effectively regulate emotions, and children lacking these skills often develop serious behavioral and interpersonal problems. Emotion regulation skills are acquired within the context of parent-child interactions, where emotional flexibility (i.e., the capacity to move across emotional states according to the contextual demands of the interaction), may reflect emerging emotion regulation capacities. Using a sample of children clinically referred for aggressive behavior problems, we examined the association between flexibility in parent-child interactions during a problem-solving discussion, and amplitude of the N2—an ERP component linked with self-regulation. Dyadic interactions were measured using state space grid analysis, a graphical tool based on dynamic systems principles that quantifies behavioral interactions based on movement across a field of behavioral states. Dense-array EEG data were collected during an emotional Go-Nogo task, and N2 amplitudes were measured 200–400 ms post-stimulus. Results showed that children with lower flexibility scores showed significantly smaller N2 amplitudes and significantly higher scores on clinical measures of emotional problems, such as depression. These results may reflect decreased recruitment of frontal control systems necessary to regulate negative emotions. Furthermore, these findings suggest that children with the most serious behavior problems may have the poorest emotion regulation capacities.

**Poster 158**

UNDETECTED ERROR COMMISSION AFTER TASK-SWITCHING

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Descriptors: task switching, ERN

Causes of behavioral error can be classified into three types; internal noise, external interference (e.g. Stroop task), and goal setting. The last type of error may slip through the supervisory top-down control, because it is generated from the “top” end of the system. Behavioral studies have suggested that the error rate increase after task-switching might be generated in this way (Altman & Gray, 2009; Ikeda & Hasegawa, 2009). This study provides neural evidence for this hypothesis, utilizing the response-locked ERN, an ERP component of error generation. In the randomized-runs task-switching procedure paradigm, the ERN amplitude was significantly attenuated after task-switching compared with task-repetition, suggesting that error was not efficiently detected by the error (or conflict) monitoring system in the brain. Implications for the cognitive models of task-switching and cognitive control will be discussed.

**Poster 159**

EXAMINING THE NEURAL SUBSTRATES OF THE AFFECTIVE PRIMING EFFECT

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Descriptors: affective priming, erps, LPP

Studies focusing on semantic/associative priming find that when primes are presented that are congruent with the target (e.g., GRAPE: JELLY), reaction times are quicker compared to when primes are incongruent (e.g., SHOE: JELLY) with the target. Also, the N400 peak amplitude of the ERP is more negative when pairs are incongruent than congruent (Kutas & Federmeier, 2000). Collectively, these findings suggest spreading activation as a mechanism involved. The affective (or evaluative) priming literature has established similar behavioral findings, yet the electrocorticical signals involved with these effects remain unclear. Twenty-six participants were exposed to affectively congruent (unpleasant-unpleasant, pleasant-pleasant) and affectively incongruent (unpleasant-pleasant, pleasant-unpleasant) picture pairs via the International Affective Picture System (IAPS) in an affective sequential priming paradigm. Participants assessed the target valence and indicated whether it was pleasant or unpleasant while electroencephalographic data were recorded. The mean peak amplitudes of the N400 for congruent (−2.61 μV) and incongruent (−2.57 μV) conditions were not significantly different. These data, however, revealed a significant effect of congruence (p = .001) for a late positive potential (LPP), such that affectively incongruent pictures pairs elicited a larger (more positive) LPP peak amplitude (M = 6.04 μV) than congruent picture pairs (M = 5.25 μV). The current study may add insight into the process models for the affective priming effect.

**Poster 160**

DETECTION AND COMPENSATION OF RESPONSE SELECTION DIFFICULTIES: SIMON VERSUS FLANKER CONGRUENCY EFFECTS

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Descriptors: N2, simon, flanker

Behavioral stimulus-response congruency effects are similar for irrelevant stimulus locations (Simon effect), and noise stimuli (Flanker effect). In Event Related Potentials (ERPs), Simon effects at N2 are often response-locked, but visual asymmetry evokes large deflections in stimulus-locked Lateralized ERPs (L-ERPs). Flanker effects are as early as stimulus-locked N2, despite little asymmetry in L-ERPs. This dissociation suggests that Flanker effects are incurred during stimulus processing, but Simon effects during response selection. We employed behavioral and ERP measures to make a direct comparison between Simon and Flanker effects, using arrow stimuli in neutral, congruent, and incongruent conditions. Performance results revealed the expected similarity in congruency patterns for Simon and Flanker effects, with slightly larger effects for incongruent noise than for incongruent locations. Both incongruent noise and locations delayed P3, but it was incongruent locations and not noise that enhanced the stimulus-locked N2. This appeared to reflect incorrect-side activation found in stimulus-locked L-ERPs for incongruent locations, but not for incongruent noise. The combined results for incongruent Simon stimuli, with larger asymmetries in L-ERPs, an enhanced stimulus-locked N2, but smaller asymmetries in L-ERPs, only reflected detection of incongruent stimulus locations, but also serves a function in reducing response selection difficulties. N2 appears less involved in compensating for incongruent Flanker stimuli.

**Poster 161**

DOES MMN AMPLITUDE VARY WITH DEVIANT PROBABILITY? NEGATIVE FINDINGS USING PATTERNED AUDITORY STIMULI

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Descriptors: mismatch negativity, auditory, sensory memory

The mismatch negativity (MMN) is an ERP that signals the detection of change in the auditory modality. It is classically obtained in the oddball paradigm, in which
a train of identical standard stimuli is interrupted at rare and unpredictable times by a deviant stimulus with some changed feature, often tonal frequency. The MMN is thought to reflect the outcome of a comparison between an incoming deviant stimulus and the memory representation of the standard, and its amplitude is thought to vary directly with the strength of the memory trace. This relationship was established in part by studies showing a negative correlation between MMN amplitude and deviant stimulus probability. An alternative interpretation for this probability effect, however, is that it results from a different refractoriness in the different neuronal populations responding to the standard and deviant frequencies of the frequency oddball paradigm. The current study examined the effect of probability on the MMN using a standard-deviant paradigm in which two pure tones were used. Deviants were physically identical to the standards, but violated the rule of alternation (A-B-A-B-B-B-). In different conditions, this repetition deviant was presented directly with the strength of the memory for the standard. This relationship was thought to reflect the outcome of a comparison between an incoming deviant stimulus and the memory representation of the standard stimuli, which was considered to indicate processes related to visual task performance. By EEG and ET synchronization we marked out the short EEG epochs concurrent with the moment of finding the RS and analyzed ERD dynamics. We studied the alpha band ERD induced by finding a nonverbal relevant stimulus (RS) among about fifty nonverbal irrelevant ones in a visual search task paradigm. Subjects were instructed to find the RS and fixate gaze on it for a couple of seconds. After each test trial the subjects were asked to fixate on the four RS that were exposed and angular points of rectangle (control session). The gaze fixation on RS was verified by ET. The finding of RS in test trials induced the ERD 2–2.5 times greater and longer than in control trials for all leads. ERD was better exposed in frontal leads in test trials, and in occipital leads in control trials. We suppose that mostly bottom-up attentional processes were involved in control task, as occipital ERD was expressed better. The visual search task performance additionally involves the top-down attentional process that is proved by better expressed ERD in all leads, especially in frontal leads. We suppose that ERD features and spatial distribution to indicate the different attentional processes' contributions to different task performances.

INTERACTIONS BETWEEN LANGUAGE AND ATTENTION SYSTEMS: EARLY AUTOMATIC LEXICAL ACCESS?

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Descriptors: early language time course, attention, memory circuits, EEG, ERP, MMN, N400

An ongoing debate is whether, and to what extent, access to cortical representations is automatic or dependent on attentional processes. To address this, we modulated the level of attention on auditory input, and recorded ERPs elicited by syllables completing acoustically matched words and pseudowords. Under non-attend conditions, the word-elicted response (peaking at ~120 ms) was larger than that to pseudowords, confirming early activation of lexical memory traces. However, when attention was directed towards the auditory input, the word-pseudoword difference disappeared. Whereas responses to words seemed unchanged by attentional variation, early pseudoword response was significantly modulated by attention. Later on, attention modulated a positive deflection at ~230 ms and a second negativity at ~370 ms for all stimuli. The data indicate that the earliest stages of word processing are not affected by attention, confirming early automatic word processing. The difference was modulated by attention as the top-down attentional process that is proved by better expressed ERD in all leads, especially in frontal leads. We suppose that ERD features and spatial distribution to indicate the different attentional processes' contributions to different task performances.

FULLY SIMULTANEOUS ACQUISITION OF SLOW CORTICAL POTENTIAL CHANGES AND FUNCTIONAL MRI AT 3 TESLA

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Descriptors: concurrent eeg/fmri, slow cortical potentials

Simultaneous acquisition of EEG and fMRI data causes severe artifacts in EEG recordings. In the case of SCPs, representing changes in the frequency range below 5 Hz, existing artifact reduction methods fail since they modify the DC level. Here we show an approach that allows adequate artifact compensation for SCP experiments based on advanced EEG methodology enabling for simultaneous SCP and fMRI data acquisition. A slowly rotating propeller was presented 40 times for 8 s with a 7 s black screen ISI. In order to verify the EEG setup and methodology, this paradigm was performed three times, outside and inside of the scanner, with and without simultaneous fMRI acquisition. EEG was recorded using an MR compatible EEG amplifier (NeuroConn, Germany). Imaging and pulse artifacts were corrected online using an adaptive template matching algorithm. Single channel signals were low-pass filtered and averaged using a 500 ms baseline. Images were acquired on a 3 Tesla Trio system (Siemens, Germany). Activity in occipital areas was perfectly visible in all SCP recording runs. Clear negative SCPs were easily depicted with slightly smaller amplitudes within the scanner and the BOLD signal. Clear negative SCPs were easily depicted with slightly smaller amplitudes within the scanner. Conclusions: The smaller EPP amplitudes in children with ADHD indicates diminished error awareness. In addition, errors were overshadowed in children with ADHD on the trial directly preceding an error, with larger EPPs, where smaller Pe amplitudes. Children with ADHD also differed in brain activity in the trial directly preceding an error, mirroring in a larger EPP. Conclusions: The smaller Pe in children with ADHD indicates diminished error awareness. In addition, errors were overshadowed in children with ADHD on the trial directly preceding an error, supportive of increased transient deficits in functioning of the monitor system prior to actual execution of an error.
PERCEPTUAL CUES MODULATE RESPONSE CUE EFFECTS ON FRONTAL N200 AMPLITUDE AND RESPONSE ACTIVATION
Thorstén Albrecht, & Uwe Mattler
University of Göttingen

Descriptors: combined expectancies, perceptual conflict, response activation

When participants use cues to prepare for a likely stimulus or a likely response, reaction times are facilitated by valid cues but prolonged by invalid cues. When two cues independently give information regarding two dimensions of the forthcoming task, cueing effects regarding one dimension can be reduced when the cue regarding the other dimension is invalid. According to the Adjusted Expectancy Model, cues affect different processing levels and a mechanism is presumed which is sensitive to the validity of cues. When two cues independently give information regarding two dimensions of the forthcoming task, cueing effects regarding one dimension can be reduced when the cue regarding the other dimension is invalid. According to the Adjusted Expectancy Model, cues affect different processing levels and a mechanism is presumed which is sensitive to the validity of cues. However, given the known relationships between self-efficacy (SE) and multiple personality traits, it is unclear whether these associations with action monitoring are unique or part of a larger common construct. To assess this issue, we examined the relationships between SE, a five-factor personality model, and behavioral and neural indices of action monitoring for 59 young adults during the completion of a flanker task. Results indicated higher levels of SE and Intellect/Openness were independently associated with larger ERN amplitude. Further, larger ERN amplitude was associated with higher post-error accuracy, even after controlling for overall response accuracy as well as the relationships post-error accuracy had with IQ and Emotional Stability. These findings suggest that SE and personality provide unique and discriminating insights into the factors underlying the function of the ERN and action monitoring system, and are not simple examples of redundancy evidenced from a common core factor. Further, although individual difference variables may be able to account for some variation in post-error behavior, the cognitive processes relating the ERN and corrective behavioral adjustments are distinct from these characteristics and traits.

PERCEPTUAL CUES MODULATE RESPONSE CUE EFFECTS ON FRONTAL N200 AMPLITUDE AND RESPONSE ACTIVATION
Thorstén Albrecht, & Uwe Mattler
University of Göttingen

Descriptors: combined expectancies, perceptual conflict, response activation

When participants use cues to prepare for a likely stimulus or a likely response, reaction times are facilitated by valid cues but prolonged by invalid cues. When two cues independently give information regarding two dimensions of the forthcoming task, cueing effects regarding one dimension can be reduced when the cue regarding the other dimension is invalid. According to the Adjusted Expectancy Model, cues affect different processing levels and a mechanism is presumed which is sensitive to the validity of cues. However, given the known relationships between self-efficacy (SE) and multiple personality traits, it is unclear whether these associations with action monitoring are unique or part of a larger common construct. To assess this issue, we examined the relationships between SE, a five-factor personality model, and behavioral and neural indices of action monitoring for 59 young adults during the completion of a flanker task. Results indicated higher levels of SE and Intellect/Openness were independently associated with larger ERN amplitude. Further, larger ERN amplitude was associated with higher post-error accuracy, even after controlling for overall response accuracy as well as the relationships post-error accuracy had with IQ and Emotional Stability. These findings suggest that SE and personality provide unique and discriminating insights into the factors underlying the function of the ERN and action monitoring system, and are not simple examples of redundancy evidenced from a common core factor. Further, although individual difference variables may be able to account for some variation in post-error behavior, the cognitive processes relating the ERN and corrective behavioral adjustments are distinct from these characteristics and traits.
on the lateralized readiness potentials (LRP) was modulated by the validity of stimulus-level cues. The N200 amplitude was used to measure conflict. N200 amplitudes were similarly increased in trials with any one invalid cue compared to trials with two valid cues. Findings suggest measures of N200 amplitudes reflect stimulus and response related conflict.

**Posters**

**Poster 173**

STRUCTURING THE INTER-INDIVIDUAL VARIATION IN WAKING EEG FOR DISCRIMINATION BETWEEN THE OBJECTIVE MARKERS OF SLEEP DEBT AND SLEEP PRESSURE

Arcady A. Putilov, Olga G. Donskaya, Evgeniy G. Verevkin, & Mark B. Shtark
Research Institute for Molecular Biology and Biophysics

Descriptors: sleep deprivation, sleepiness, waking EEG

Modern society is characterized by the steadily increasing demand for wakefulness at all hours of the day. The psychophysiological research can offer the instruments enabling the quantitative differentiation of people with such advantageous traits as little need for sleep, decreased sleepiness associated with sleep loss, and rapid adaptation to the alternations of the work-rest schedule. Our aim was to assess, inter-individually, the association of the waking EEG structure with the response of sleep-wake regulation to sleep loss. Resting EEG was recorded 9 times at 3-hour intervals with eyes closed and eyes open in the course of sustained wakefulness of 130 healthy subjects. The ipsilateral power densities were calculated from the log-transformed absolute powers averaged across 10 frequency ranges (from slow delta to slow gamma). These spectra were further reduced by performing the principal component analysis that yielded the subjects’ scores on the largest principal components (PCs). It was found that any EEG spectrum can be represented by only three scores on the PCs with eigenvalues greater than 1. The PCs remained virtually invariant in terms of the order of their extraction and loading patterns which signify EEG amplifying (1st), EEG slowing (2nd), and EEG smoothing (3rd). In the course of wakefulness, the 1st PC showed a link with sleep deprivation (i.e., the self-reported sleep restriction in the morning preceding the experiment), while the 2nd PC was associated with sleep pressure (i.e., the perception of increased sleepiness caused by sleep deprivation).

**Poster 174**

EARLY CORTICAL RESPONSES CORRELATE WITH SUBSEQUENT VISUAL EXPLORATION

Hiroshi Nittono, & Junko Ishiguro
Hiroshima University

Descriptors: anterior n2, novelty, viewing duration

Exploring novel objects is a common tendency of human beings and animals. In a free viewing task in which participants were asked to view novel drawings as long as they wished, a larger anterior negativity (N2) of the event-related potential (ERP) peaking around 250 ms was elicited by the longer-viewed drawings than by the shorter-viewed drawings (Nittono, et al., 2007). This finding suggests that the anterior N2 is sensitive to stimulus unfamiliarity or difficulty in encoding and that its elicitation triggers further recognition processes. However, because the drawings used in the previous study varied greatly in brightness and complexity, such physical differences may explain the observed ERP differences. In the present study, a modified replication experiment was conducted by using black-and-white polygons with 24 sides. The polygons were identical in size and were similar to those used in past visual exploration experiments. Sixteen university students viewed 80 novel polygons for as long as they wished. ERPs were recorded from 38 scalp electrodes and averaged separately for polygons that were viewed for longer or shorter than the median viewing time of each participant. As predicted, longer-viewed polygons (mean 3.4 s) elicited a larger anterior N2 than shorter-viewed polygons (mean 2.0 s). This result suggests that the anterior N2 elicited by visual objects is an endogenous ERP component that reflects psychological processes.

**Poster 175**

NEUROPLASTICITY-BASED TRAINING MAY NORMALISE AUDITORY GATING IN SCHIZOPHRENIA AND IMPROVE VERBAL PROCESSING

Tveten Popov 1, Todor Jordanov 1, Gregory A. Miller 1, Thomas Elbert 2, Michael M. Merzenich 3, & Brigitte Rockstroh 4
1University of Konstanz, 2University of Illinois, Urbana-Champaign, 3University of California, San Francisco

Descriptors: auditory gating, MEG, schizophrenia

An unusually large response ratio in the auditory paired-click task is a common finding for schizophrenia patients. In the present magnetoencephalographic (MEG) paired-click design, sensory gating ratio (SGR) served to study effects of computer-based cognitive exercises (CE, Posit Science, SF), which emphasizes auditory discrimination and verbal memory, with the aim of improving signal-to-noise ratio of auditory/verbal processing in schizophrenia. Across 100 paired-click trials, M50 was scored as peak amplitude of the magnetic field 40 – 80 ms post S-onset; SGR were determined in source space (activity of two best-fitting equivalent current dipoles, one in each hemisphere). In an ongoing study, 21 patients (F20.0 ICD-10) exhibited higher SGR than 17 sex and age-matched healthy subjects (F23, 39) = 6.68, p < .01. SGR tended to decrease during the course of CE (20 sessions within 4 weeks) in 12 patients, F(2, 10) = 7.43, p < .01; right hemisphere SGR declined from .57 to .39, p < .01; left hemisphere .58 to .44, p = .09. No such decrease was observed in a 9 patients accomplishing standard cognitive training F(2, 7) = .36, p = .71 (Cogmap, Markersoftware). Performance in verbal memory improved only after CE (p < .01), though largely unrelated to SGR changes. Results indicate that MEG-based SGR assessment can track the course of successful auditory training and provide preliminary evidence that the auditory training tasks employed here provide a specific impact on sensory gating.

**Poster 176**

CHILDHOOD STRESS AND PSYCHIATRIC DISORDER MODIFY REWARD PROCESSING

Astrid Steffen, Daniel Muller, Christian Wienbruch, & Brigitte Rockstroh
University of Konstanz

Descriptors: reward prediction, MEG, stress

Altered functioning of the reward system is assumed for individuals with mental disorders relative to normals, but also as a consequence of stressful experiences. Using a gambling design to produce reward processing, the present magnetoencephalographic (MEG) study examined brain activity during value appraisal and reward expectation in 22 patients with psychiatric diagnoses (MDD, schizophrenia, BPD, addiction) and 12 healthy subjects. The life-stress interview determined high childhood stress in 11 and low stress in 11 patients and the healthy subjects. During MEG-recording, subjects decided, whether or not to gamble for 10 or 50 c, which they could win with 10%, 50% or 90% chance, with value and chance being represented by visual cues. All subjects showed a more posterior temporal activity to cues for higher value.

**Poster 177**

THE SPATIO-TEMPORAL PATTERN OF REWARD PROCESSING: MAGNETOENCEPHALOGRAPHIC RESPONSES TO VALUE APPRAISAL AND REWARD PREDICTION IN A GAMBLING TASK

Astrid Steffen, Daniel Muller, Christian Wienbruch, & Brigitte Rockstroh
University of Konstanz

Descriptors: reward prediction, MEG, decision making

Reward processing is frequently examined in decision-making designs, as they involve essential components like evaluation of value and reward prediction. The present study examined magnetoencephalographic (MEG) correlates of such components in 20 volunteers: subjects had to decide, whether or not to gamble for 10 or 50 c (Eurocent), which they could win with 10%, 50% or 90% chance. MEG responses to the visually presented value (10 or 50 c) and chance (10, 50 or 90%) stimuli, analyzed using Minimum Norm Estimates (MNE), distinguished value evaluation and reward prediction in time windows between 150 and 350 ms after stimulus onset in different brain areas: right-hemispheric temporo-parietal dipole activity 150 – 230 ms distinguished value evaluation (p < .01), whereas the chance prediction varied with right-hemispheric temporo-parietal dipole activity at 215 – 255 ms (p < .05), bilateral fronto-temporal dipole activity at 235 – 275 ms (p < .01) and frontal dipole activity at 250 – 350 ms (p < .05). Frontal activity was larger and decision time was longer on risky trials (decision to gamble at 50% chance). Activation of the same region by both cues (value and chance) suggests that reward processing comprises the interaction of preferred value and expectancy of outcome, while the course of activity suggests a consecutively activated neuronal network of reward processing, including posterior temporal to prefrontal regions.

**Poster 178**

FREQUENCY SPECIFIC EEG COHERENCE CHANGES RELATED TO DIFFERENT COMPONENTS OF WORKING MEMORY

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Institute of Developmental Physiology of the Russian Academy of Sciences

Descriptors: working memory, eeg coherence

Analysis of EEG coherence in theta, alpha and beta frequency bands was performed to investigate brain functional organization of verbal and visuo-spatial working memory (WM). WM task consisted of a warning signal (exclamation sign), a set of referent stimuli (RS) and a test stimulus (TS) with a random 4 – 4.5 s interval between RS and TS. Subjects pressed ‘yes’ or ‘no’ response key to indicate the presence/absence of the test stimulus in the referent set. Verbal (semantically unrelated words) and visuo-spatial (nonverbalized shapes) matching and nonmatching pairs of stimuli were shown in random order with equal probability. The EEG was recorded in 18 healthy 18 – 25-year-old adults at rest with eyes closed (background), during 2 s preceding the referent stimuli (nonspecific mobilization) and during 2 s preceding the test stimulus (information re-
tention in WM). Results showed different functional organization of regulatory and information-related components of WM. Nonspecific mobilization increased cross-hemispheric theta rhythm synchronization between the frontal and temporal zones, and local beta-specific links within those zones. Information retention strengthened modality independent alpha rhythm distant synchronization with foci in the right frontal, parietal and temporo-parietal zones accompanied by modal-specific local synchronization of beta oscillations: in speech zones of the left hemisphere synchronization was higher in the verbal task than in the visuo-spatial task, whereas in posterior zones of the right hemisphere the pattern was reversed.

**Poster 179**

**ASSESSING LATENT FEATURES OF BRAIN DEVELOPMENT BY EEG PHOTIC DRIVING REACTIVITY**

Vladimir V. Lazarev, Maria Alice Genofre, Adalton Pontes, & Leonardo C. deAzevedo

Oswaldo Cruz Foundation

Descriptors: EEG photic driving, brain development, neurologic disorders

The capacity of the EEG driving reactivity (DR) to the intermittent photic stimulation (IPS) to enhance the manifestation of latent EEG oscillators can provide an additional tool for assessment of normal brain development and its pathological alterations. In the present work, the DR to 11 fixed IPS frequencies (3 – 24 Hz) was studied in 70 normal subjects and 99 neurologic patients, aged 5 – 18 years. In the occipital visual areas where the DR was most pronounced, both children and adolescents showed strong responses to the theta IPS frequencies while spontaneous EEG spectra had increased theta values only in children. In this way, the DR revealed one additional stage of “latent theta oscillators” in the brain development not apparent in the resting state. In general, the driving amplitude in the delta and theta bands negatively correlated with the age. The occurrence of the driving peaks in the spectra of the 12 non-visual areas and EEG coherence among these leads at the IPS frequencies positively correlated with the age indicating a gradual generalization of the DR with the brain maturation. In 85 patients with partial epilepsy, the number of driving peaks in the spectra of non-visual areas and coherence at the IPS frequencies were reduced showing a likely delay in brain maturation as well as the effect of the antiepileptic drugs. Fourteen “high functioning” autistic boys showed reduced spectral characteristics of DR in the right hemisphere and higher coherence in the left hemisphere, particularly at the alpha and beta IPS frequencies, not apparent in the resting state.

**Poster 180**

**THE ILLUSION OF MISALIGNMENT IN THE POGGENDORFF FIGURE IS MODELED BY AN EARLY VISUAL PROCESSING AND COGNITIVE MECHANISMS**

Irina Shoshina1, Leonid Medvedev2, Ella Olada3, & Ekaterina Fedorova2

1Siberian Federal University, 2Krasnoyarsk State Pedagogical University, 3Free University of Berlin

Descriptors: illusion, erps

Features of the geometrical figures causing the Poggendorff illusion in the Jastrow modification were investigated. We recorded event-related potentials of 13 right-handed females in a visual classification task. We used a set of different stimuli, all of them were composed of five identical elements. Figures differed from each other only by angle of inclination of lateral segments. The control figure had an inclination angle of lateral segments .164 radians and did not cause the Poggendorff illusion. These stimuli allow us to differentiate the processing of collinear elements (stimulus features) and illusory figures (perceptual properties). There was registered a visual component in response to visual stimulus, whereas in response to the presentation of another collinear stimulus that does not cause distortion - N100. The occurrence of this component in parietal, temporal and occipital areas of the cortex is probably evidence that the illusion of displacement of the collinear pieces relative to each other arises during the information processing in the ventral pathways. The visual N170, registered in response to visual stimuli, was significantly smaller than the same in response to non-collinear stimuli in the symmetric and right temporal areas. This indicates that perceptual processing beyond the analysis of the stimulus' physical properties can be shown by the N170 amplitude. Besides, during the illusory perception, the visual P300 had smaller amplitude, than during the presentation of a stimulus perceived without distortion.

**Poster 181**

**EXPLORING THE ELECTROPHYSIOLOGICAL CORRELATES OF EMOTION-ENHANCED RECOGNITION**

Alexandre Schaefer, Claire L. Pottage, & Karrie Alexander

University of Leeds

Descriptors: EEG/ERP, emotion, memory

Why are memories for events such as the 9/11 terrorist attacks or private emotional memories so vividly remembered? These are instances of the phenomenon of enhanced recollection (EER), i.e. the fact that emotional memories are more vivid and detailed than neutral memories. We report a study that used event-related potentials (ERP) to investigate the formation of memory traces leading to the EER phenomenon at both encoding and retrieval stages. Participants had to watch emotional and neutral pictures in an incidental encoding task. One week later, they performed a recognition test followed by a “Remember-Know” task (Gardner and Java, 1993). For encoding-related activity, ERPs recorded during the encoding task were sorted according to subsequent memory performance in the recognition test performed one week later. Results revealed an early frontal (100 – 400 ms) and a late posterior (post-800) positivity specific to emotional items that were richly recollected (“Remember” items) one week later. For retrieval-related activity, “Old-New” effects were measured contrasting ERPs to items judged as “Remember” and ERPs to items judged as “know” with ERPs to correctly rejected items during the recognition test. Old-New effects (between 300 and 800 ms) were enhanced for emotional items that were richly recollected mainly in fronto-central sites. In addition, an early (P200) Old-new effect was observed specifically for emotional “Remember” items. Results will be discussed in relation with current developments in the field of human memory.

**Poster 182**

**EVOKED AND INDUCED EVENT-RELATED EEG OSCILLATIONS IN HIGH-FORMING YOUNG AND ELDERLY INDIVIDUALS DURING A COGNITIVE FLEXIBILITY TASK**

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1Braunschweig Hospital, 2University of Technology Braunschweig

Descriptors: eeg oscillations, brain aging, cognitive flexibility

We conducted a study of normal brain aging that was based upon the quantitative analysis of event-related EEG biosignals. Forty participants (24 young, mean age 22 years; 16 elderly, mean age 70 years) took part in a task that was designed to challenge cognitive flexibility. Elderly participants had slower RTs than young participants, whereas error rates did not differ between the two age groups. The analysis of evoked and induced event-related EEG oscillations rested on Morlet wavelet transformations in the theta-, alpha- and beta-frequency bands. The analysis of the evoked event-related EEG oscillations revealed more pronounced fronto-parietal theta activity during response selection to the elderly compared to the young participants. We also observed a crossover interaction with regard to the induced EEG oscillations. Specifically, young participants showed more pronounced event-related alpha-desynchronization at occipito-parietal electrodes during stimulus recognition, whereas elderly participants showed evidence of more pronounced event-related beta-desynchronization at central electrodes during response preparation. These data are discussed against the background of thalamo-cortical mechanisms of the genesis of EEG rhythms. Specifically, process-induced facilitation of posterior thalamo-cortical processing (stimulus recognition) and of anterior basal ganglia-thalamo-cortical processing (response preparation) seem to be age-dependent. Future studies will examine the role of dopamine in these EEG phenomena that are related to the aging of the brain.

**Poster 183**

**AUTOMATIC PROCESSING OF FEATURE- VS. OBJECT-RELATED DEVIANCES IN THE VISUAL MODALITY**

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Descriptors: visual change detection, vmmn, visual objects

Task-irrelevant visual stimuli deviating from some feature-based regularity established by the preceding stimulus sequence elicit the visual mismatch negativity (VMMN). In this study we compared the processing of a simple feature-related and a more complex object-related visual deviance to test the power of the automatic visual change detection mechanism. Each test-display contained 8 colored discs evenly distributed around the fixation point. In the color-deviance condition, usually all discs were equally colored (p = .9, standard) but occasionally 2 neighboring discs were deviant colored (p = .1, deviance). In the object-deviance conditions, the 8 discs formed 4 objects by use of the gestalt principle of common region. Each object-display contained 6 blue-colored and 2 neighboring red-colored discs which either belonged to the same or to different objects. Standards and deviances were exclusively defined on the basis of color-object-assignments. Participants were instructed to detect slight changes of the continuously presented fixation cross and to ignore the serial presentation of test-displays. In the color-deviance condition, the comparison of ERPs elicited by deviances and physically identical standards yielded a VMMN peaking in the 200 – 260 ms latency range. However, in the object-deviance conditions, we observed (if at all) considerably reduced VMMN amplitudes. Our results suggest that the automatic visual change detection system has difficulties to deal with complex object-related deviances and thus, seems to be more limited than its auditory counterpart.
to age-matched and young controls age-based P300 amplitude reduction previously observed in cirrhotic patients compared unknown single-trial P300 response. Repeated-measures ANOVA replicated the aver-
and latency, together with their standard deviation, were derived using a non-parametric age and educational level, and in 9 young normal subjects. Single-trial P300 amplitude alteration), 10 cirrhotic patients without MHE, 10 healthy control subjects matched for patients with minimal hepatic encephalopathy (MHE was recorded during the execution of a visual choice reaction time task in 13 cirrhotic hand extension and right-hand flexion), the present results indicate that participants do 
Continuous recording and mean fLRP amplitude during a 200-ms interval immediately 
full (right hand) information about the forthcoming response. After a foreperiod of 
provided either no, partial (side, effector), ambiguous (e.g., left hand and right foot), or 
responses and left versus right foot responses after the imperative signal. The precue (S1) 
displays different effectors are simultaneously prepared in advance although they are unknown 
not simultaneously prepare different effectors at an effector-specific level of motor 
spatiotemporally distinct memory-based processes of visual change detection: early posterior positivity, followed by change-related negativity — CERN (120 – 160 ms), and two late frontal negativities (310 – 350 and 360 – 400 ms). Crucially, a significant correlation revealed that higher CERN amplitudes indexed larger color deviance effects in RTs, in accordance with the perspective that this distraction effect is connected to early sensory-memory processes that are indexed by CERN to color deviance.

**Poster 184**

**INVESTIGATING ALTERATIONS IN THE ERROR-RELATED NEGATIVITY AND POST-ERROR BEHAVIORAL IMPROVEMENTS ACROSS TIME**
Jason R. Themanson, Peter J. Rosen, Aaron B. Ball, Michael J. Cunningham, Brandon M. Clark, Matthew B. Pontifex, Charles H. Hillman, & Edward McAuley

**Abstract:**
Both the error-related negativity (ERN) and the increased implementation of cognitive control following error commission (e.g., post-error response accuracy) have been shown to be sensitive to self-efficacy (SE; one’s beliefs in their ability to successfully perform a task). However, no investigations have manipulated SE to determine if altering participants’ task-related beliefs influences action monitoring processes. To examine this topic, 56 healthy young adults completed two sessions of a flanker task, both under accuracy instructions, and were exposed to either false positive, false negative, or no performance feedback after the first session to alter their task SE. Results indicated a significant effect of the feedback manipulation on SE, but no significant influences on the ERN, post-error accuracy, or changes in either measure. However, a relationship was evident between changes in ERN amplitude and post-error accuracy across task sessions, with more negative ERN amplitude changes associated with greater improvements in post-error accuracy. No other variables, including age, sex, IQ, five-factor personality, or SE were significantly associated with changes in post-error accuracy across sessions. These results indicate that the relationship between ERN amplitude and post-error accuracy remains intact despite manipulations intended to alter both action monitoring metrics through SE, and the relationship is not directly dependent upon any individual difference variables previously associated with action monitoring in normal or non-symptomatic patients.

**Poster 185**

**SINGLE-TRIAL ANALYSIS EXPLAINS REDUCTION OF P300 AMPLITUDE IN CIRRHOTIC PATIENTS**
Sami Schiiff, Costanza D’Avanzo, Giorgia Cona, Giovanni Sparacino, Patrizia Bisiauci, & Piero Amadio

**Abstract:**
Average-based P300 amplitude reduction is a common feature in dementia and in others psychiatric illness. P300 amplitude reduction was previously assessed also in cirrhotic patients. The phenomenon may depend, in cirrhotic patients, by an amplitude reduction of each single-trial P300 response, or by an increased variability. An increased variability was previously detected in cirrhotic patients in reaction time distribution. EEG was recorded during the execution of a visual choice reaction time task in 13 cirrhotic patients with minimal hepatic encephalopathy (MHE = spectral EEG and/or TMT alteration), 10 cirrhotic patients without MHE, 10 healthy control subjects matched for age and educational level, and in 9 young normal subjects. Single-trial P300 amplitude and latency, together with their standard deviation, were derived using a non-parametric Bayesian estimation method which employs mild assumptions on the smoothness of the unknown single-trial P300 response. Repeated-measures ANOVA replicated the average age-based P300 amplitude reduction previously observed in cirrhotic patients compared to age-matched and young controls $F(3, 48) = 4.9, p < .05$.

**Poster 186**

**PARALLEL PREPARATION OF HAND AND FOOT: INFERENCES FROM THE LATERIALIZED READINESS POTENTIAL**
Hartmut Leuthold, & Ines Jentzsch

**Abstract:**
We recently proposed we the foreperiod lateralized readiness potential (fLRP) to sensitively reflect advance specification of movement parameters at an effector-specific level of the brain. Here we exploit this characteristic to test in a response precuing paradigm whether different effectors are simultaneously prepared in advance although they are unknown before the imperative signal. Participants were asked to perform left versus right hand responses and left versus right foot responses after the imperative signal. The precue (S1) provided either no, partial, (side, effector), ambiguous (e.g., left hand and right foot), or full (right hand) information about the forthcoming response. After a foreperiod of 1,400 ms, the imperative signal (S2) indicated the required response. EEG was continuously recorded and mean fLRP amplitude during a 200-ms interval immediately preceding S2 was analysed. Critically, the parallel preparation view predicts a strong fLRP with ambiguous side-effector information. In contrast to this prediction, we observed a reliable fLRP only with full precue information but not with ambiguous precue information. In contrast to our previous reports of parallel hand preparation with partial direction precues (e.g., extension movement) and ambiguous precues (e.g., left-hand extension and right-hand flexion), the present results indicate that participants do not simultaneously prepare different effectors at an effector-specific level of motor preparation. We speculate that limitations in higher-level motor memory are responsible for these effects.

**Poster 187**

**CHANGE EVENT RELATED NEGATIVITY FOR DEVIANTS IN VISUAL SEARCH**
Elke B. Lange, Olga V. Sysoeva, Alexander B. Sorokin, & Tom A. Campbell

**Abstract:**
Consistently, visual search for a unique shape is slowed by a singleton distractor object that differs in color from all other objects in the search array. This reaction time (RT) effect is classically interpreted as the automatic recruitment of attention by the distractor. Here we show a different form of distraction that is mediated by changing one feature of the distractor: A deviant-colored singleton slowed RTs more than a standard-colored distractor singleton. This color deviance effect indicates that the standard color was: i) extracted, and ii) stored in memory. The present study sustains to enhance subsequent selectivity so as to prioritize the processing of information. This slowing of search by color deviance was accomplished by four spatiotemporally distinct memory-based processes of visual change detection: early posterior positivity, followed by change-related negativity — CERN (120 – 160 ms), and two late frontal negativities (310 – 350 and 360 – 400 ms). Crucially, a significant correlation revealed that higher CERN amplitudes indexed larger color deviance effects in RTs, in accordance with the perspective that this distraction effect is connected to early sensory-memory processes that are indexed by CERN to color deviance.

**Poster 188**

**MATERIAL-SPECIFIC ELECTROPHYSIOLOGICAL CORRELATES OF RECOLLECTION**
Giulia Galli, & Leun J. Otten

**Abstract:**
Event-related potential (ERP) studies have shown specific electrophysiological signatures of recollection using verbal material. In contrast, studies with objects and faces have yielded dissimilar results. This suggests that the ERP correlates of recognition memory are material-specific. To verify this hypothesis, ERP responses to objects, words and faces were directly compared using a source memory task. At study, visual stimuli were paired with auditorily-presented names of locations. At test, only visual stimuli were presented, and for old items subjects were asked to retrieve the location. Stimuli belonging to different materials were presented in separate study-test lists (“blocked design”, Experiment 1) or intermixed across trials (“intermixed design”, Experiment 2). Performance was better for objects compared to words, and for words compared to faces, and overall in the intermixed compared to the blocked experiment. Recollection effects had a more frontal scalp distribution for objects and faces compared to words. This effect was more evident in the blocked experiment. These findings show that ERP recollection effects for pictorial material differ from those typically found with words. Moreover, material specificity interacts with the kind of design. The different cognitive mechanisms involved in different designs do not only affect behavioral performance, but also the ERP correlates of recognition memory.

**Poster 189**

**PROCESSING OF FACIAL EMOTION IN PATIENTS WITH MAJOR DEPRESSION: ERP CORRELATES OF A NEGATIVE BIAS**
Andrea Figura, Katja Werheid, Norbert Kathmann, Philipp Klein, & Isabella Heuser

**Abstract:**
Rationale: Mood-congruent information processing in terms of a ‘negative bias’ is a well-established phenomenon in major depression. Yet, it is unclear whether the negative bias is characterized by hyperattentian toward negative information or hypooattention toward positive information. Method: Event-related brain potentials (ERPs) were recorded in patients with major depression (n = 19) and healthy controls (n = 20) while participants judged the emotional valence of faces with positive, negative, and neutral facial expressions. Group differences in emotional processing were examined by analyzing emotion-sensitive ERP components and valence judgments. Results: Analysis of behavioral data revealed negatively biased valence judgments in patients, which were significantly correlated to current mood and severity of depression. ERP analysis revealed the expected pattern of enhanced LPP amplitudes to positive and negative faces in the control group, but attenuated LPP amplitudes for positive faces in the depressed
group. Conclusion: Negatively biased emotion processing in depression was confirmed both by behavioral and electrophysiological results. Attenuated LPP amplitudes to positive faces are interpreted as hypooptention toward suppressed processing of positive social signals and confirm the view that the pathological mechanism in major depression is an altered processing of mood incongruous information.

**ROLE OF ATTENTION IN PROCESSING OF VISUAL STIMULI**

Chairs: Michal Kuniecki, & Piotr Jaskowski,
1Jagiellonian University, 2University of Finance and Management

Descriptors: attention, vision, emotion

This group of posters summarizes current work being conducted in leading Polish psychophysiological laboratories on broadly defined aspects of visual attention. The posters bring together interdisciplinary research paradigms having one common denominator, which is visual attention. Jaroslaw Michalowski presents research on mechanisms of visual attention in subjects with spider phobia. His results suggest that effects of increased attention to phobia related pictures in spider phobics seem to be related to emotional relevance of the stimulus cues, rather than reflecting a fear-specific response. Michał Kuniecki, using oculography, shows how colour of emotional stimuli influences their attention capturing features. Piotr Jaskowski explores interactions between the prime and the mask on motor responses. His findings suggest that in certain circumstances a mask, traditionally thought to be neutral, can also exhibit attention capturing features. Finally, Mateusz Gola investigates attentional deficits in spatial attention in elderly and young subjects showing that the number and power of beta bursts are correlated with subjective level of difficulty.

**TEMPORAL DYNAMICS OF THE BRAIN RESPONSE TO PHOBIA-RELEVANT AND STANDARD EMOTIONAL VISUAL STIMULI IN SPIDER-PHOBIC INDIVIDUALS**

Jaroslaw M. Michalowski, Christiane A. Melzig, Almut I. Weike, Jessica Stockburger, Gerald T. Schupp, & Alfonso O. Hamann
1University of Gdańsk, 2University of Greifswald, 3University of Konstanz

Dense sensor event-related brain potentials were measured in participants with spider phobia and non-fearful controls exposed to spider and standard emotional (pleasant, unpleasant, neutral) pictures. Spider phobia participants showed enlarged P1 amplitudes for all picture contents than controls, suggesting increased vigilance in this group. Furthermore, spider phobia participants responded with significantly larger early posterior negativity (EPN) and late positive potential (LPP) during the encoding of phobia-relevant pictures, relative to non-fearful participants. No group differences in the EPN and LPP were found for standard emotional materials indicating that these effects were specific to phobia-relevant material. However, within group comparisons of the spider phobia group revealed comparable EPN and LPP evoked by spider pictures and emotional (unpleasant and pleasant) picture contents. These results demonstrate a temporal shift in perceptual processing from unspecific vigilance (P1) to preferential responding (EPN and LPP) to phobia-relevant materials in the spider phobia group. However, at the level of early stimulus processing, these effects of increased attention seem to be related to emotional relevance of the stimulus cues rather than reflecting a fear-specific response.

**ELEMENTS OF FORMAL CHARACTERISTIC OF EMOTIONAL VISUAL STIMULI DETERMINING THEIR ATTENTIONAL ADVANTAGE**

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What makes a stimulus emotional? Is it color? According to some researchers, color has no role in determining emotional valence of a stimulus. However, others postulate that color is an important stimulus characteristic, determining its valence and arousal values. In order to shed light on this issue, we conducted two experiments using oculograph for eye-gaze tracing. Both experiments employed lateral presentation of stimuli, however the first one was conducted in free viewing while the second one in antisaccade paradigm. Part of the stimuli were transformed to eliminate physical differences (e.g. luminance) between them – pixels from an emotional picture were used in the neutral stimulus, and vice versa. Results clearly show that color is a significant factor in processing of emotional stimuli even at the very early stages of stimulus evaluation. In the first experiment we found that neutral stimuli with pixels from its emotional counterparts have higher probability of attracting attention than original neutral stimuli. Those results were generally confirmed in the second experiment, however they were affected by laterality.

**ATTENTION CAN BE CAPTURED BY NEUTRAL MASKS**

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In subliminal priming, a backward masked prime can affect motor responses to a main stimulus displayed after the mask. It is commonly accepted that the mask renders the prime invisible and does not affect the motor response to the target. However, there is a growing body of evidence suggesting that a mask containing elements shared with the target (i.e. the target-like mask) can modulate the motor response to the target. Accordingly, the target-like mask is expected to capture participants' attention. We examined this hypothesis by using lateralized parietal potential (NP2p). Pairs of primes, followed by pairs of masks and pairs of main stimuli were presented. The two elements of each pair of primes, masks, and main stimuli appeared on the left and on the right of fixation point. One element of the main stimulus pair was the target. The participants' task was to indicate the side where a specific target (an arrow or diamond both formed from oblique lines) was shown in the main pair. In some trials, only masks were displayed and participants were asked to withdraw their responses (no-go trials). We showed that a target-like mask (i.e. formed from randomly distributed oblique lines) evoked NP2 in no-go trials suggesting that the mask attracted attention (NP2p) to the place where it appeared. Additionally, such a mask was shown to evoke lateralized readiness potential suggesting that the mask can affect motor preparation. This finding strongly indicates that the mask cannot be treated as a neutral stimulus but is processed and can modulate prime-induced motor preparation.

**BETA-BAND EEG ACTIVITY AS A NEURONAL CORRELATE OF ATTENTION — CHANGES RELATED WITH AGING**

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Daily observation and plenty of psychological research on elderly people (>65 y.o.) have shown attentional deficits compared to young people (18 – 30 y.o.). In our recent research we compared the time course of beta band activity of young and elderly subjects who were involved in visual and auditory spatial differentiation experimental tasks. Experimental procedure was relevant to the one used previously in our animal research. The task was to observe whether the first target stimulus appears in the left or right channel. Modality of stimuli was signaled by the cue. Beta burst EEG activity was identified in all subjects. Data analysis showed that the number and power of bursts and frequencies correlates with subjective level of task difficulty. Decrease of the number and power of beta bursts in visual cortex significantly correlates with behavioral response errors. In the case of elderly people, two different beta activity patterns have been observed: Local increase of number and power of beta bursts in visual and frontal cortex (characteristic for high performance level subgroup) and general increase of number and power of beta activity in visual, sensorimotor, and frontal cortex (characteristic for low performance level subgroup). Decrease of the number and power of beta bursts in visual cortex significantly correlates with behavioral response errors. Correlation between these patterns and behavioral results suggests also a connection with speed-accuracy effort.

**RIGHT VENTROLATERAL PREFRONTAL CORTICAL ACTIVITY IS INCREASED DURING REWARD ANTICIPATION IN EUTHYMIC BIPOLAR ADULTS**

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Psychosocial and electrophysiological research indicate that bipolar individuals display a hyperresponsivity to reward relevant stimuli. Reward relevant life events have been demonstrated to trigger bipolar episodes, and bipolar individuals display excessive approach motivation in response to reward relevant events, as indexed by event-related potentials (ERP). The current study extends this research by examining reward-related brain function in euthymic bipolar adults and healthy controls. Participants were 15 euthymic bipolar adults and 15 individuals with no lifetime history of psychiatric disorder who underwent functional MRI scanning while engaged in a number-guessing task with monetary reward. Euthymic bipolar adults and controls were classified based on structured diagnostic interviews. Data were collected using a 3T Siemens Trio scanner. Analyses, conducted in SPM5, addressed group differences in BOLD response during reward anticipation. Preliminary findings indicated that during
reward anticipation, bipolar individuals displayed increased ventrolateral prefrontal cortical (VLPFC) activity relative to control individuals ($t = 3.86, p < .05$).

**Poster 2**

EXPENDING COGNITIVE EFFORT LEADS TO EMOTIONAL DYSREGULATION

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Descriptors: emotion, regulation, amygdala

Failure to appropriately regulate one's emotions is a hallmark of many clinical psychiatric disorders. Evidence from brain imaging research has focused on an amygdala–prefrontal circuit that appears to be critical for successful emotion regulation and is often impaired in mood disorders such as PTSD and depression. Findings from research on self-regulation have repeatedly demonstrated that engaging in effortful emotion regulation tasks impairs attempts at self-regulation in cognitive and social domains. In the present study, we tested whether engaging in effortful self-regulation in a demanding attention-control task would disrupt the prefrontal–amygdala circuit, leading to dysregulation of amygdala response to negatively valenced stimuli. Participants viewed two blocks of valenced images during functional magnetic resonance imaging (fMRI). Task blocks were separated by a depletion task which required participants to engage in effortful attention control. Prior to the depletion task activity in the amygdala when blocks were separated by a depletion task which required participants to engage in effortful self-regulation was increased ventrolateral prefrontal activity relative to control individuals ($t = 3.86, p < .05$).

**Poster 3**

MISMATCH NEGATIVITY TO CHANGE IN AZIMUTHAL POSITION OF LOW-FREQUENCY NOISE BURSTS IN FREE FIELD: SUGGESTION FOR AN OVER-REPRESENTATION OF LATERAL SOUND SOURCES COMPARED TO SOUND SOURCES IN FRONT

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Descriptors: mismatch negativity, sound localization

According to the 'duplex theory' sound localization in humans is based on the processing of interaural time differences (ITDs) at low frequencies. Frontal sound sources separated by only 1-2 degrees can be differentiated, while the minimal separation threshold increases for lateral sound sources. This is caused by the fact that already small azimuthal changes in front of the head cause noticeable changes in inter-ear differences, while in the periphery larger spatial separations are required to achieve comparable changes in inter-ear differences. Here, we investigated the cortical representation of azimuth by measuring the location mismatch negativity (MMN). The first experiment employed a passive oddball paradigm by presenting deviant standard (D/S) pairs with different azimuthal positions, but constant ITD separation. The second experiment used an active oddball paradigm in which the stimulus presentation was randomly varied, but all subjects had to detect the occasional deviant positions. In both experiments the frontal (S/D) positions elicited smaller MMNs than respective (D/S) positions located more laterally. In the second experiment the interhemispheric comparison of the MMNs revealed a prominent right-hemispheric activation, while the sound source discrimination performance was not affected by the azimuth of (S/D) positions. Thus, present MMNs suggest a cortical over-representation of lateral compared to frontal sound source positions. Further, pronounced right-hemispheric MMNs suggest an engagement of right cortical networks during active sound source discrimination.

**Poster 4**

AUDITORY ATTENTION: EFFECTS OF TEMPORAL AND SPATIAL EXPECTATION

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Descriptors: audition, attention, ERP

A naturalistic behavioral task was used to investigate mechanisms of spatial and temporal attention in audition. Attention was directed to a specific moment in time, respective to a specific location. Expectations were set up implicitly using the information inherent in the movement of a sound. There were four conditions of expectation: temporal plus spatial expectation; temporal expectation only; spatial expectation only; and no expectation. Event related brain potentials were recorded while participants performed a go/no-go task, set up by anticipation of the reappearance of a target tone through a white noise band. Results showed that 1) temporal and spatial expectations independently enhanced target detection at both early indexed by N1 and late (indexed by N2) processing stages; 2) later task-related processing (indexed by P3) was modulated only by both spatial and temporal expectations together; 3) temporal expectation alone speeded reaction time and increased response accuracy compared to the other conditions. Thus, the results indicate an important role for temporal attention in audition. There appear to be distinct mechanisms of spatial and temporal attention, which act independently on early processing stages. However, late synergistic effects demonstrate that these mechanisms are not completely independent, but interact according to task characteristics. Our results are consistent with the view from vision research that spatial and temporal attentional control is based on the activity of partly overlapping, and partly functionally specialized neural networks.

**Poster 5**

THE DIFFERENTIAL ROLE OF MODALITY-SPECIFIC WORKING MEMORY TRAINING IN LEARNING CHINESE AS A SECOND LANGUAGE

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Descriptors: fntt, working memory, training

Logographic Chinese differs from alphabetic German in aspects of phonology and orthography, which results in differences in brain networks involved in reading Chinese characters and alphabetic words. Whereas previous research has shown a systematic relationship between phonological working memory capacity and second language proficiency for alphabetic languages, for Chinese as a second language visuo-spatial working memory should be a better predictor of second language proficiency due to the greater visual complexity of Chinese characters. In our working memory training study we investigated the differential impact of visuo-spatial and auditory working memory training (n-back training paradigm) while Germans learned Chinese as a second language. Additionally, training induced modulations in language-related brain networks using functional magnetic resonance imaging (fMRI) were examined. Behavioral data show that especially the training of visuo-spatial working memory leads to larger transfer effects in orthographic proficiency as compared to auditory working memory training and no working memory training. Furthermore, brain imaging data showing training and transfer effects in language-related brain areas are reported. Our results suggest that, consistent with our predictions, the training of visuo-spatial working memory leads to higher proficiency when Germans learn logographic Chinese as a second language.

**Poster 6**

EFFECTS OF TEMPORALLY UNPREDICTABLE CONTEXTS ON AMBIGUOUS FACIAL EXPRESSIONS OF EMOTION

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Descriptors: facial expressions

While some facial expressions predict clearly positive or negative environmental events, others (e.g., surprise) can predict both positive and negative events. This ambiguity in the predictive value of surprised faces makes their interpretation susceptible to contextual manipulation. The human amygdala is particularly responsive to facial expressions with ambiguous predictive value. Specifically, while amygdala responses to clearly negative expressions habituate rapidly with repeated presentations, responses to ambiguous expressions are sustained over time. The amygdala is also sensitive to subtle contextual manipulations of ambiguous stimuli, such as temporal unpredictability, which can prime empathy-related behaviors. This suggests that unpredictable contexts might induce viewers to interpret surprised faces negatively. Here, we used facial EMG and fMRI to examine implicit valence interpretations of surprised faces presented in temporally predictable and unpredictable sequences. Predictable surprised faces elicited corrugator responses similar to clearly positive (happy) expressions. In contrast, unpredictable surprised faces elicited corrugator responses similar to clearly negative (angry) expressions. Amygdala response to predictable surprised faces was of moderate amplitude and sustained over time. However, response to unpredictable surprised faces was enhanced compared to predictable faces, but this response habituated over time. We conclude that the amygdala mediates biased valence interpretations of surprised faces based upon temporal predictability.

**Poster 7**

EXTINCTION OF CONDITIONED FEAR RESPONSES TO MASKED STIMULI

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Descriptors: pavlovian fear conditioning, awareness, fear potentiated startle

Research on human fear conditioning suggests that conditioned fear responses are independent of awareness of the conditioned stimulus (CS). In contrast, fear extinction, involving prefrontal mechanisms, may be more dependent on cognitive awareness. We examined conditioned fear to masked and unmasked extinction trials using the fear potentiated startle reflex and shock expectancy ratings as our primary measures. During acquisition, subjects watched four different pictures of fearful faces. Two faces (CS+) were paired with a mild electric shock (US) and two were never paired with a shock (CS−). In the subsequent extinction phase, awareness of one CS+ and one CS− was prevented by backward masking while the other CSs were presented unmasked. Following extinction, participants received three unmasked presentations of the US followed by a reinstatement test including only masked CSs. Acquisition resulted in a differentially potentiated startle response to the CS+ vs. CS−, paralleled by differential shock expectancy ratings. During extinction, a significant startle
CS+/CS− differentiation was seen to both the masked and the unmasked CSs with no difference between the masked and the unmasked CS+, even though expectancy ratings were higher for the unmasked CS+. This relationship between startle and expectancy differentiation was reversed during reinstatement with larger expectancy to the formerly masked vs. unmasked CS+. These results suggest that awareness was not necessary for extinction of conditioned fear responses, but that masking resulted in less expectancy extinction.

Poster 8

OSCILLATORY BRAIN ACTIVITY IN THE TIME-FREQUENCY DOMAIN ASSOCIATED TO CHANGE BLINDNESS AND CHANGE DETECTION AWARENESS

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Descriptors: change blindness, ERSP

In spite of the evolutionary importance of successful change detection, observers often fail to detect substantial changes to visual objects and scenes when these happen across saccades, blinks, flickers, blank screens, movie cuts and other interruptions. This phenomenon is known as change blindness. Using EEG data obtained in a one-shot change detection paradigm, we performed time−frequency analysis to reveal the changes in oscillatory neural activity in the theta and alpha bands of the spectrum. Participants saw two brief and successive visual displays, each with four sinusoidal gratings, and reported whether or not one of the gratings changed its orientation between the first and second displays. Analyses were performed on epochs including the pre-change and post-change stimuli as well as the blank interval between them. Spectral modulations were computed by the event-related spectral perturbation index. Relative to change blindness, change detection was associated with a distinct pattern of power changes at several processing stages, including some during the presentation of the first display, that is, before the occurrence of a change. Power modulations after the second display also showed differences associated to correct change detection in the analyzed bands. These results suggest that differences in the oscillatory activity related to change detection do not only depend on the processing of the change itself, but also on the activity while encoding the visual scene even before the change happens.

Poster 9

RELATING VISUAL WORKING MEMORY CAPACITY AND ATTENTIONAL CONTROL IN THE SCHIZOPHRENIA-SPECTRUM

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Descriptors: schizophrenia, working memory, attention

Numerous studies have found deficits in visual working memory (VWM) in schizophrenia patients (SZ) in comparison to healthy controls (HC). Gold et al (2003) found that SZ have reduced VWM capacity, particularly when presented with larger set size arrays. Moreover, in HC, memory capacity strongly predicts selective attention ability (Vogel et al, 2005). Here, behavioral and electroencephalographic data were recorded while 19 schizotypal (SPD) and 23 HC performed a battery of attention and VWM tasks. We examined whether the predictive relationship between VWM capacity and selective attention is preserved within SPD. Contralateral delay activity (CDA), a highly sensitive index of VWM capacity (Vogel et al, 2004), used to pinpoint each individual’s capacity limit. The CDA is a large negative-going component that occurs during the maintenance stage of a VWM task, and is primarily observed over temporoparietal electrode sites about 275 ms after stimulus onset. SPD exhibited lower memory capacity than HC, especially at super-capacity arrays. Despite differences in memory capacity, selective attention remained intact and the relationship between capacity and attention was preserved. Examining the association between cognitive domains allows for the investigation into mechanisms that underlie known cognitive deficits within schizophrenia. Since memory capacity has been shown to be predictive of later cognitive performance (e.g., Kane et al, 2004), understanding VWM deficits may help unveil the mechanisms related to discrepant cognitive achievement between HC and SPD populations.

Poster 10

THE CONTRIBUTION OF AFFECTIVE STYLE TO THE SUCCESSFUL DOWNREGULATION OF PAIN: A PSYCHOPHYSIOLOGICAL AND NEUROIMAGING INVESTIGATION

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Descriptors: affective style, EMG, pain regulation

Pain is a nonlinear phenomenon with a strong affective signature. Stable individual differences in emotion regulation are known as affective style, a framework hereby adopted to assess individual differences in pain regulation. We compared responses recorded from the same sample across two different paradigms spaced ~3 years apart. In study #1, participants underwent a voluntary emotion regulation task where they were instructed to either maintain [M] or suppress [S] their responses to negative pictures. Corrugator supercilii power (COR) provided a metric of regulatory success. Affecive style was hence indexed by the [M-S] difference in COR. In study #2, participants were trained to either [M] or [S] their responses to painful heat. BOLD (MRI) and pain unpleasantness ratings were acquired. Pain regulation success was calculated as the [M-S] difference in pain ratings. Neural correlates of successful pain regulation were computed by correlating across participants [M-S] pain ratings with [S-M] BOLD parameter estimates. The contribution of affective style to pain regulation was assessed by regressing [M-S] COR within brain areas associated with the successful regulation of pain. Pain unpleasantness was attenuated during [S], t(17) = 8.27, p < .01. As predicted, affective style was associated with successful regulation of pain, r = .64, p < .01. Maladaptive affective style and poor regulation were associated with increased engagement of sub-calclosal cortex during suppression, z = 2.9, p < .01, an area known to be implicated in chronic emotion dysregulation, such as in depression.

Poster 11

PROPRANOLOL BLOCKS THE NEURAL SIGNATURE OF UNPLEASANT MEMORIES: A SPATIOTEMPORAL EEG ANALYSIS

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Descriptors: EEG, ERP, emotional memory, propranolol

Evidence from both animal and human research suggests that the formation of emotional memories is triggered by the beta-adrenergic system. In the present EEG (256 channel) study we investigated whether pre-encoding administration of beta-adrenergic antagonist propranolol modulates electrocortical brain potentials (ERPs) to emotional pictures during memory retrieval. 46 male participants incidentally encoded IAPS pictures varying in emotional content after pre-encoding administration of either propranolol (80 mg) or placebo and recognition memory was tested one week later. During retrieval, a widespread old/new effect was obtained over mid-frontal (500 - 800 ms) and parieto-central sites (500 – 800 ms), indicating more positive ERP waveforms for correctly memorized old pictures relative to correctly categorized new pictures. The centro-parietal old/new effect was more pronounced for emotional pictures than neutral pictures, indexing the explicit recollection of the material. Systemic administration of propranolol selectively blocked this neural signature during the retrieval of unpleasant, but not pleasant pictures. Source analyses using sLORETA showed that activity in the parietal cortex during retrieval of unpleasant pictures was reduced in the betablocker group relative to placebo, but not for pleasant pictures. Taken together, these data suggest that the beta-adrenergic antagonist propranolol selectively reduces the neural signature of the memory trace for unpleasant events in the parietal cortex.

Poster 12

BOLD-RESPONSES TO REPEATED STIMULUS EXPOSURE IN ANIMAL PHOBIA

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Descriptors: animal phobia, fear response, habituation

Fear is an aversive emotional state elicited by threatening cues that activate the organism’s defense system. In people with specific phobias this defense system seems to be overactive, causing marked fear responses if confronted with the phobic stimulus which are recognized as both excessive and unreasonable. One central aim of exposure therapy in animal phobia is the habituation of phobic fear. However, the mechanisms of the fear reduction gained with exposure therapy, particularly the interaction of brain regions initiating the defensive mobilization (insula, amygdala) and those regions modulating this initiation (prefrontal cortex) remain unresolved. Therefore, the current study investigates BOLD-responses during repeated presentations of phobia-relevant and neutral stimuli in snake/spider phobic participants (n = 9) and non-phobic controls (n = 11). Preliminary data analyses indicate that phobic participants show an initial potentiation of insula BOLD-responses during viewing phobia-relevant compared to neutral stimuli, which is diminished with repeated picture presentation. Additionally, phobic participants show an increase of BOLD activity bilaterally in the middle frontal gyrus throughout repeated presentations of phobia-relevant pictures. These results indicate that the neural structures that regulate the fear response may need active inhibition exerted by prefrontal brain regions to gain substantial fear reduction.

Poster 13

WHY DO SOME PATIENTS ESCAPE WHILE OTHERS DON’T? AUTONOMIC AROUSAL BUT NOT SUBJECTIVE REPORTS PREDICTS ESCAPING BEHAVIOUR DURING A BEHAVIORAL AVOIDANCE TEST IN HIGH ANXIOUS PANIC PATIENTS WITH AGORAPHOBIA

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Descriptors: panic disorder and agoraphobia, behavioral avoidance test, autonomic arousal

In a multi-centre psychotherapy study 270 panic disorder patients with agoraphobia...
(PDA) were, after an anticipation period, instructed to remain in a small, dark and locked chamber for as long as possible (max 10 minutes). Anxious activation was indexed by 1) subjective reports of anxiety and panic symptoms, 2) skin conductance level, heart rate and startle response magnitudes, and 3) the duration of stay in the chamber. Overall, escape frequency from the chamber increased with greater reported anxiety. However, a high proportion of patients completed the full exposure period despite intense anxiety. These 48 high anxious non-escapers were compared to 64 escapers. While the groups did not differ in reported anxiety or number and intensity of reported panic symptoms, different response patterns in autonomic arousal were observed. Escapers showed a stronger heart rate acceleration at the beginning of the exposure as compared to the end of anticipation. Furthermore, the escapers showed a lack of habituation of heart rate and skin conductance level. Heart rate acceleration was negatively correlated with duration of exposure in the escaper group. Interestingly, no group differences were observed in sensitization and habituation of startle response magnitudes during exposure. Taken together, the data indicate that autonomic response patterns predict escaping behavior in high anxious PDA patients while subjective reports and startle response magnitudes did not. Theoretical implications are discussed.

THE HIDDEN COSTS OF ANXIETY ON COGNITIVE PERFORMANCE: IMPLICATIONS FOR ATTENTIONAL CONTROL THEORY

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Descriptive: anxiety, attention, ERP
Evidence shows that anxiety impairs cognitive performance via its adverse effects on attentional control (Derakshan & Eysenck, 2009). In the antisaccade task, the working memory functions most affected by anxiety are the inhibition and shifting functions (Derakshan et al., 2009; Ansari et al., 2008). According to Attentional Control Theory (Eysenck et al. 2007), high anxious individuals (HA) invest more resources to overcome the effects of anxiety; and so anxiety is thought to be associated with hidden costs. Using ERPs we tested this prediction in a modified version of the mixed antisaccade task that manipulated the time between offset of instructional cue and the peripheral target (0 or 400 ms CTI) to which the antisaccade was made. HA compared with low-anxious (LA) individuals made more errors and had longer antisaccade latencies at 0 CTI, but both groups showed comparable performance at 400 ms CTI. ERPs to cue indicated that while both groups showed the expected N1/N2 patterns, the LA showed greater activity in anterior, central frontal, and temporal sites. However, ERPs in the CTI period showed that the HA had greater positivity than the LA in the parietal, temporal, and occipital sites indicative of larger P3 activity. Our findings indicate that anxiety impairs the recruitment of frontal areas necessary for attentional control. As a result the HA exert greater compensatory effort to maintain comparable performance levels to the LA.

Posterior clusters accounting for the scalp variance of the ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounts for the greatest variance in the ERP difference envelope during the N170 latency (130 to 200 ms), the fourth cluster with an occipital projection accounted for the greatest variance in ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounted for the greatest variance in the ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounted for the greatest variance in the ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounted for the greatest variance in the ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounted for the greatest variance in the ERP difference envelope during the P1 and N170 time periods.

THE EFFECTS OF NATURALISTIC STRESS AND SEROTONIN TRANSPORTER (5-HTTLPR) GENOTYPE ON REWARD RESPONSIVENESS: IMPLICATIONS FOR DEPRESSION

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Descriptive: depression, stress, serotonin transporter
Individuals carrying the short (S) allele of the serotonin transporter gene (5-HTTLPR) are more prone to depression under stress, than long (L) allele homozygotes. Stress-induced hedonic deficits may be a mechanism underlying the association between stress and depression. However, no human study has investigated whether stress-induced anhedonia may be influenced by 5-HTTLPR genotype. We hypothesized that exposure to a naturalistic stressor (school examinations) would disrupt reward learning, a key component of hedonic capacity, and that this effect would be more pronounced in S allele carriers, than L/L homozygotes. To assess reward learning, we administered a probabilistic reward task to 90 high school students over 2 study sessions in the 6-month period preceding the school examinations. For each participant, the two sessions were subsequently designated as the Stress and Control conditions, based on a self-report measure of exam stress. Within each session, participants reporting high exam stress had impaired reward learning, relative to participants reporting low exam stress. Additionally, a Genotype x Stress interaction emerged, such that S allele carriers had reduced reward learning in the Stress relative to the Control condition, whereas the inverse pattern was observed in L/L homozygotes. Our results indicate that naturalistic stress produces hedonic deficits, the susceptibility to which is modulated by 5-HTTLPR genotype. These findings identify anhedonia as a promising mechanism linking 5-HTTLPR genotype and stress to depression.

IS THE BDNF MET-ALLELE A PROTECTIVE FACTOR FOR THE 5-HTTLPR S-ALLELE ASSOCIATED REDUCTION OF GREY MATTER VOLUME?

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Descriptive: structural me, voxel based morphometry, gene interaction
Both Brain Derived Neurotrophic Factor (BDNF) and the serotonin transporter polymorphism (5-HTTLPR) have been discussed in the regulation of memory and the etiology of depression and anxiety. Studies using the common BDNF Val66Met polymorphism indicate that Met carriers show poorer hippocampal-dependent memory, lower hippocampal and amygdala volume, whereas the Val allele could be the risk allele in depression. Carriers of the 5-HTTLPR S allele show increased anxiety, an elevated risk of depression, and also decreased gray matter volume of amygdala and hippocampus. However, a recent study showed that the BDNF Met allele, which is predicted to have reduced reactivity to serotonin signaling, protects against S allele-associated decrease of the amygdala volume. In our study, we assessed the interactions of BDNF Val66Met with 5-HTTLPR genotype and their influences on brain morphology of 45 young healthy subjects using Voxel Based Morphometry. We found a significant interaction of the two genotypes indicating that the BDNF Met allele only not protects against 5-HTTLPR S allele reduction of amygdala and hippocampal volume but leads to greater volume in S allele carriers.

EEG DYNAMICS UNDERLING THE P1 AND N170 FACE EFFECT

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Descriptive: N170, ICA, faces
The N170 ERP produces a reliably increased negative deflection to faces relative to other images at occipito-temporal locations centered around 170 ms poststimulus onset. The N170 is more generally associated with high-level, integrative visual processing. The earlier P1 ERP component measured as a positive peak around 100 ms post stimulus onset at occipital scalp sites is predominantly associated with low-level visual processing and has been less reliably documented as displaying a face-specific amplitude increase. In a dataset containing a robust P1 as well as an N170 increase at the scalp for faces compared to objects, an independent component clustering analysis revealed four component clusters accounting for the scalp variance of the ERP difference envelope during the P1 and N170 time periods. While three of the clusters having occipito-temporal scalp projections accounted for the greatest variance in the ERP difference envelope during the N170 latency (130 to 200 ms), the fourth cluster with an occipital projection accounted for the greatest variance in ERP difference envelope during the P1 latency (80 to 130 ms). While other methods have revealed independence of the P1 and N170, ICA applied to the train of single trials maintains the dynamics of the ongoing EEG processes underlying the averaged scalp ERPs. Single trial characteristics and individual differences related to the complex P1 and N170 face-effects are discussed.

SMOKING CUE REACTIVITY AS A LABORATORY MODEL OF SHORT-TERM TOBACCO ABSTINENCE

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Descriptive: tobacco, abstinence, emotion
Emotional responses to smoking-related cues are thought to contribute to relapse in quit-smoking programs, and it is important to develop new measures of responses to these stimuli. Nonsmokers (n = 23) and smokers (n = 42) participated in an affective picture viewing task, during which half the smokers were 24 h into a 48 h abstinence period and the remainder were nonabstinent. Eyeblink startle reflex, EEG, and peripheral measures were recorded while participants viewed a series of emotional pictures (15 each from 4 content categories: tobacco, pleasant, neutral, unpleasant) for 6 s each, ordered randomly with respect to content. Corrugator and Orbicularis EMG, P300 to the startle probe, and the late positive potential to picture onset at Pz all followed their familiar patterns of affective modulation across pleasant, neutral, and unpleasant pictures in both smokers and nonsmokers. Corrugator responses to tobacco pictures were smaller in nonabstinent smokers than in nonsmokers or abstinent smokers (p < .05). Startle probe P3 suppression to tobacco pictures was greater in smokers than in non-smokers (p < .01). The pattern of responses to tobacco pictures between the groups using the other physiological measures. These results suggest that certain responses (corrugator and startle probe P3) may be promising measures of tobacco cue-reactivity, with relevance to studies regarding the role of physiological mechanisms in the efficacy of smoking-cessation treatments.
Sadness and Reward Sensitivity: Trait and State Mood Variables Impact the Magnitude of the Feedback Negativity

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Descriptors: ERP, FN, depression

The feedback negativity (FN) is a negative deflection in the ERP that is larger following feedback that indicates outcomes are worse than expected. Building upon behavioral and biological evidence demonstrating that depression is associated with abnormal reward processing, a recent study found that the enhancement of the FN to non-rewards relative to rewards was inversely related to depressive symptoms. In two studies, we sought to further examine the relationship between the FN and constructs relevant to depression. In the first study, participants were randomly assigned to either a sad or neutral mood induction; following the induction, ERPs were recorded during a gambling task in which participants could win or lose money on each trial. The enhancement of the FN to non-rewards relative to rewards was reduced among individuals who reported a more unpleasant mood following the induction, even after taking into account current levels of depressive symptoms. In the second study, the FN was recorded from never-depressed individuals who either reported parental history of depression or not. Following a negative mood induction, the magnitude of the FN in response to monetary losses was significantly reduced in individuals at risk for depression. Taken together, the results of these two studies indicate that the propensity to experience sadness moderates electrophysiological measures of reward processing. The FN, therefore, may be useful in detecting both state and trait abnormalities in reward sensitivity relevant to the prediction of depressive symptoms.

Advance Movement Preparation in Hemiparetic Patients: Electrophysiological Indice

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University of Surrey

Descriptors: motor preparation, hemiparesis, CNV

Movement preparation in patients with left hand hemiparesis (n = 26) was investigated using a response priming paradigm, and in addition compared to age-matched controls (n = 26). In this experiment, trials with valid, neutral, and no response cues were presented 1300 ms before the imperative stimulus. Behavioral results showed validity effects for the control and the patient group’s affected and unaffected hand. In addition, patients responded slower with both the affected and the unaffected hand compared to the control group. Analysis of CNV amplitude within the patient group revealed validity effects over the contralateral left hemisphere for the unaffected hand. Interestingly, similar validity effects were found for both hemispheres for the affected hand. This additional usage of the ipsilateral hemisphere might reflect a greater effort required for movement preparation. A comparison between conditions of patient and control groups showed reduced CNV amplitude over the contralateral hemisphere for the unaffected hemisphere for validly prepared trials of the unaffected hand compared to the control group’s right hand. This might suggest a reduced usage of the lesioned ipsilateral cortex side possibly reflecting reduced innervation after the acute phase of the stroke. The competition for resources in the left hemisphere between the affected and unaffected hand and the reduced usage of the right ipsilateral hemisphere for the unaffected hand might explain why patients are generally slower than controls in the task.

An Electrophysiological Investigation of Glucose Administration Effects on Sensorimotor Processing in a Modified Eriksen Flanker Task

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Descriptors: glucose, LRP, flanker task

Behavioural studies suggest that elevated blood glucose concentrations accelerate response times in complex tasks (Owens and Benton, 2004, Neuropsychobiology). With the present study we aimed to explore the mechanisms subserving elevated blood glucose effects (7 mmol/litre versus fasting levels of 5 mmol/litre) by studying EEG-derived indices of sensorimotor processing. More specifically, the Erikson flanker task was used to examine glucose-dependent modulations of the P300, the stimulus lateralized readiness potentials (LRPs), and response-locked LRP, to see whether enhanced blood glucose levels affect stimulus evaluation, response planning, and response selection, respectively. 10 participants took part in a within-participant double-blind 2-session experiment where either glucose (25 g) or placebo drinks were administered. Initial data suggests slower reaction times, higher error rates and delayed stimulus-locked LRP onset in incongruent compared to congruent and neutral trials. With placebo administration, error rates were increased for the non-dominant hand but not the dominant hand; no effects were found for the EEG parameters. This suggests that hyperglycaemia does not affect senorimotor processing in the flanker task. However, the placebo-related increase in error rates together with the findings of (Donohoe and Benton, 2000) support the proposition that beneficial effects of increased blood glucose levels on cognition might only occur when cognitive demands are high.

The Influence of Color on the Perception of Briefly Presented Emotional Scenes

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Descriptors: emotion, categorization, perception

Event-related potential studies have consistently found that emotionally arousing (pleasant and unpleasant) pictures elicit a larger late positive potential (LPP) than neutral pictures. This effect has been obtained when participants view color pictures, and recent studies have demonstrated that these emotional cues affect the LPP even when scenes are flashed for an extremely brief duration (25 ms). However, less is known regarding the influence of color on the affective modulation of ERPs. Particularly, when pictures are briefly presented, color could help with scene segmentation, and/or color could act as a cue for scene meaning via its association with scene-relevant concepts (e.g., red for mutilated bodies). To clarify the influence of color on affective picture perception, we compared LPPs to color versus black-and-white pictures, which were presented for very brief (25 ms) versus long (6 sec) exposure durations. Electroencephalogram was recorded with a 256 dense sensor array. Results indicated that removing color information had no effect on the affective modulation of the LPP, regardless of exposure duration. Both color and black-and-white pictures showed an identical affective modulation of the LPP, suggesting that this effect reflects the categorization of significant events. Moreover, these data seem to indicate that the categorization of very briefly presented emotional scenes does not critically rely on color information.

Indexing Externalizing Psychopathology as a Multivariate Physiological Phenotype

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Descriptors: externalizing psychopathology, event-related potentials, impulsivity

Externalizing (EXT) is a broad dimension that appears to underlie risk for a number of disorders involving deficient impulse control, such as attention deficit/hyperactivity disorder, substance abuse and dependence, and antisocial personality disorder. Prior work has documented deficits in event-related brain potential (ERP) responses in individuals prone to EXT. Specifically, high externalizers show reduced amplitudes in the error-related negativity (Hall et al., 2007), target P300, and feedback P300 (Bernat, et al., 2009a, 2009b). The present study (N = 88) evaluated relations among these three brain response measures in order to examine their coherence as indicators of EXT. The three measures correlated with one another such that each loaded appreciably on a common factor when subjected to a factor analysis. A further factor analysis of the three ERP measures together with self-report EXT scores likewise yielded a single factor on which all four variables loaded strongly—despite the fact that one measure (EXT) was based on self-report. Furthermore, the creation of a physiologically-based composite variable using the three ERP measures yielded a variable that both predicted self-report indices of externalizing and accounted for externalizing-related variance in other common ERP indicators of externalizing. These findings indicate that the EXT construct can be indexed as a composite (multivariate) physiological variable (phenotype) and suggest that these ERP measures may share something that reflects a common neurobiological substrate of EXT.

Alcohol Placebo Selectively Increases the Feedback-Related Negativity in a Gambling Task

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Descriptors: alcohol, placebo, feedback-related negativity

Alcohol intoxication is known to affect event-related potential (ERP) responses such as the P300 (Marinkovic et al., 2001), an ERP response to stimuli, and the error-related negativity (ERN), an ERP response to behavioral errors that reflect online action monitoring (Ridderinkhof et al., 2002). The present study evaluated the effects of alcohol consumption on two feedback-related brain potentials in a gambling task: the feedback-related negativity (FRN), a measure thought to reflect a similar neural process as the ERN, and the feedback P300. Time-frequency analysis was used to isolate these overlapping components, yielding theta-FRN and delta-P300. Participants were assigned to one of three conditions: alcohol (mean BAC = .089%), placebo beverage, or no beverage. Similar to prior work on ERN and P300, both theta-FRN and delta-P300 were reduced in amplitude for the alcohol
relative to either control condition. However, interesting differences between the control conditions emerged. Specifically, the placebo group showed increased theta-FRN response to low feedback relative to the no beverage group. Thus, the placebo condition was associated with the opposite effect relative to alcohol intoxication—enhanced initial processing of the loss stimuli relative to the no beverage condition. In addition to demonstrating the effects of alcohol consumption on the FRN, these findings support the idea of an overcompensation induced by the placebo administration and demonstrate how these two experimental control conditions differentially impact feedback ERPs.

**Poster 25**

**FRONTO-STRIATAL-LIMBIC HYPERACTIVATION IN OBSESSIVE-COMPULSIVE DISORDER DURING INDIVIDUALLY TAILORED SYMPTOM PROVOCATION**

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Descriptors: anxiety, obsessive-compulsive disorder, fnirs

Anxiety disorders have been linked to a pathologically hyperactivated cortico-amygdalar circuitry. To date, inconsistent findings regarding the amygdala’s role in the pathophysiology of obsessive-compulsive disorder (OCD) have been provided, probably due to methodological variability across studies. Fourteen medication-free OCD patients and 14 healthy controls underwent a symptom provocation paradigm using individually tailored OCD-relevant, generally aversive and neutral stimuli presented for brief and long time periods during functional magnetic resonance imaging (fMRI). Relative to controls, patients showed increased activation in fronto-striatal brain areas that have consistently been linked to OCD when facing OCD-relevant contrasted with neutral stimuli. Brief stimulus exposure additionally revealed the recruitment of limbic and paralimbic areas, such as the amygdala, the anterior cingulate cortex (ACC) and the insula. Whereas amygdala engagement did also occur to equally arousing aversive control stimuli, hyperactivation of frontal brain regions was specific to OCD-relevant stimuli. Our results demonstrate a hyperactivity of the fronto-striatal circuit and connected limbic and paralimbic areas during individually tailored symptom provocation in a multisymptomatic sample of OCD patients. Amygdala hyperactivation in OCD patients reflected general emotional hyperarousal. The hyperactivation of frontal areas known to be engaged in emotion regulation points towards a sustained endeavor to suppress exaggerated emotional responses to symptom-related triggers.

**Poster 26**

**REDUCTION OF PATHOLOGICAL INHIBITION OF CORTICAL REACTIVITY TO AVERSIVE STIMULI IN VISUAL SENSORY AREAS IN PTSD THROUGH EXPOSURE THERAPY**

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Descriptors: change of neural networks, exposure therapy, PTSD

Posttraumatic Stress Disorder (PTSD) is associated with an altered processing of aversive or trauma-related stimuli. It remains unclear whether these functional abnormalities can be changed by psychotherapy. The present randomized controlled treatment trial examined whether exposure therapy causes alterations of affective picture processing in patients with severe and chronic PTSD. 32 (14 women; mean age: 33.3; SD = 9.9) survivors of organized violence diagnosed with PTSD were randomly assigned to either 10 sessions of exposure treatment (Narrative Exposure Therapy, NET) or a waiting-list condition. Prior to and after 4 month the therapy, patients underwent an extensive clinical interview as well as an MEG examination employing a visual steady-state design to measure cortical correlates of affective picture processing. Minimum norm source localization was carried out to estimate the distribution of sources of the evoked neuromagnetic activity in the brain. PTSD symptom severity score declined significantly in the NET group, whereas symptoms persisted in the waiting-list condition (Time x Treatment interaction F(1, 17) = 35.5, p < .05). Suggested effects of MPH on sensorimotor integration can be assessed by means of event-related neuroelectric oscillations (Yordanova et al, 2004). Fourteen healthy subjects (8 male, aged 20 – 40 years) performed a visual Go/NoGo task (S1-S2 paradigm). MPH (20 mg) or placebo were administered using a randomized, double-blind, cross-over design. Event-related electromyographic (EEG) activity after S2 was recorded. Time-frequency decomposition (wavelet analysis) was applied to evaluate power dynamics in delta, theta, slow and fast alpha, and beta frequency bands. At the performance level, faster reaction times and a trend towards less impulsivity errors under MPH vs. placebo were observed. MPH effects on EEG were specific for Go-trials at parietal locations.

MPH enhanced slow alpha total power (8.29 – 9.66 Hz), fast alpha total power (10.32 – 14.45 Hz) within the first 300 ms post-stimulus associated with motor production. It might be proposed that a single dose of 20 mg MPH modulates early visual information processing related with motor response generation in healthy adults.

**Poster 27**

**METHYLPHENIDATE MODULATES SENSORIMOTOR INTEGRATION AS REFLECTED BY NEUROELECTRIC OSCILLATIONS IN A GO/NOGO TASK**

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Descriptors: methylphenidate, sensory and motor systems, sensorimotor integration

Methylphenidate (MPH) is a psychostimulant drug acting mainly on the dopaminergic and noradrenergic systems. It is widely used in the treatment of attention-deficit/hyperactivity disorder (ADHD). Behavioral and psychophysiological studies have shown that MPH affects executive functions at the level of both sensory and motor systems. Thus suggested effects of MPH on sensorimotor integration can be assessed by means of event-related neuroelectric oscillations (Yordanova et al, 2004). Fourteen healthy subjects (8 male, aged 20 – 40 years) performed a visual Go/NoGo task (S1-S2 paradigm). MPH (20 mg) or placebo were administered using a randomized, double-blind, cross-over design. Event-related electromyographic (EEG) activity after S2 was recorded. Time-frequency decomposition (wavelet analysis) was applied to evaluate power dynamics in delta, theta, slow and fast alpha, and beta frequency bands. At the performance level, faster reaction times and a trend towards less impulsivity errors under MPH vs. placebo were observed. MPH effects on EEG were specific for Go-trials at parietal locations.

MPH enhanced slow alpha total power (8.29 – 9.66 Hz), fast alpha total power (10.32 – 14.45 Hz) within the first 300 ms post-stimulus associated with motor production. It might be proposed that a single dose of 20 mg MPH modulates early visual information processing related with motor response generation in healthy adults.

**Poster 28**

**GENDER-SPECIFIC DEVELOPMENT OF AUDITORY INFORMATION PROCESSING IN CHILDREN: TIME-FREQUENCY ANALYSIS**

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Descriptors: time-frequency erp components, gender, children

Developmental changes in auditory processing mechanisms depend on gender in children as reflected by earlier and larger N1, P2, N2, and P3 ERP components in 7 – 10 year old girls than boys. The aim of the present study was to provide evidence for the neurophysiologic sources of these gender differences. Three neurophysiologic sources that could account for the gender effects on auditory ERP components were explored: (a) background power, (b) stability of synchronization of oscillatory neuroelectric networks, and (c) shifts of task-specific slow waves. Thirty six healthy children were divided into two age groups (7 – 8 and 9 – 10 years-old), pairwise matched for age. Auditory ERPs were recorded in a passive listening condition, a simple reaction task and a serial learning reaction task. Single-sweep ERPs were analyzed in the delta (0.5 – 4 Hz), theta (4 – 7 Hz), slow (8 – 10 Hz), and fast (10 – 14 Hz) alpha frequency bands. It was found that delta and slow alpha phase-locking increased with development only in girls, whereas theta phase-locking was overall stronger in girls than boys. Parietal delta magnitude reflecting task-specific shifts in slow waves increased with development only in girls. The results demonstrate that gender differences in auditory ERPs basically originate from a stronger functional synchronization of oscillatory responses subserving stimulus processing. It is concluded that the functional maturation of oscillatory auditory networks, whose synchronization progressively increase with age, is more accelerated in girls than in boys.

**Poster 29**

**EVENT-RELATED POTENTIALS TO SCHEMATIC SPIDERS AND FLOWERS IN A CHANGE DETECTION TASK**

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Stockholm University

Descriptors: change detection, fear, ERP

Fearful stimuli have been found to draw attention in many experimental tasks. The present study used ERPs to investigate whether fearful stimuli are processed differently than non-feared stimuli in a change detection task. Spider fearful (n = 14) and non-fearful (n = 16) participants detected schematic spiders and flowers controlled for low-level features appearing in black and white backgrounds. Because a stimulus appearing in a background gives rise to a motion signal that makes it easy to detect, we removed the motion signal by introducing a blank interval before the change. Overall, participants detected 41.7% of the targets on a blank. As a manipulation check, 25% of the trials contained no blank and had a very high detection rate (98.2%). Detected changes were associated with a more positive peak (P3) at central sites at 450 to 510 ms (p < .001). The groups did not differ in detection performance (d’; p > .30). However, fearful participants tended to show a more positive P3 to detected spiders than flowers whereas non-fearful did not; groups did not differ for undetected pictures (picture type x fear group x response; p = .13). This suggests that schematic representations of fearful stimuli may be processed differently than non-fearful stimuli only if they are detected.

**Poster 30**

**DISSOCIATION OF PSYCHOLOGICAL AND CARDIOVASCULAR CAFFEINE EFFECTS IN HIGH AND LOW ANXIETY SENSITIVE CAFFEINE USERS**

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Descriptors: anxiety sensitivity, caffeine, heart rate

The theory of anxiety sensitivity proposes an increased sensitivity to somatic arousal sensations in high anxiety sensitive persons. To elucidate the relationship between phys-
THE INFLUENCE OF EMOTION ON RESPIRATORY-RELATED EVOKED POTENTIALS
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Descriptors: emotion, ERP, respiration

Psychological factors such as emotion can influence the perception of respiratory sensations, but the neural mechanisms underlying this modulation are unknown. We therefore examined the impact of viewing pleasant, neutral, and unpleasant affective picture series on the respiratory-related evoked potential (RREP) elicited by short inspiratory occlusions in healthy volunteers. We observed reduced P3 amplitudes of the RREP for inspiratory occlusions presented during viewing pleasant or unpleasant series, when compared to those presented during the neutral series. Earlier RREP components, such as Nf, P1, N1, and P2, showed no difference between emotional conditions. The present findings suggest that emotion impacts the perception of respiratory sensations by reducing the attentional resources available for processing affective respiratory sensory signals.

THE IMPACT OF EMOTION ON THE PERCEPTION OF DYSPNEA IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE
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Descriptors: emotion, perception, respiration

Dyspnea (breathlessness) is the impairing cardinal symptom of chronic obstructive pulmonary disease (COPD). Emotions can profoundly impact the perception of dyspnea, however, little is known about this relationship in patients with COPD. The present study examined the impact of viewing pleasant versus unpleasant affective pictures on the respiratory-related evoked potential (RREP) elicited by short exercise tests (CEET) in 30 patients with COPD. Whereas cardiopulmonary measures indicated comparable levels of exercise intensity during both CEETs, parallel viewing of unpleasant affective pictures resulted in increased dyspnea ratings compared to parallel viewing of pleasant affective pictures. Additional regression analyses demonstrated that increases in the affective unpleasantness of dyspnea, but not in the sensory intensity of dyspnea, during CEETs were predictive of greater dyspnea during activities of everyday life and reduced health-related quality of life. The present findings suggest that a negative emotional state is associated with increased levels of perceived dyspnea in patients with COPD, which underscores the importance of targeting the emotion-dyspnea-relationship in this patient group.

DOWN REGULATION OF INSULAR CORTEX ACTIVITY DURING DYSPNEA AND PAIN IN ASTHMA
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Descriptors: pain, perception, respiration

Dyspnea (breathlessness) is an impairing symptom of asthma, but the brain mechanisms underlying the perception of dyspnea in these patients are unknown. The present IMRI study examined whether patients with asthma show different brain responses during perceived dyspnea than healthy controls. These responses were compared with brain activations during perceived pain to examine possible neural generalization processes to another unpleasant bodily sensation. While positioned in a 3 Tesla scanner, 14 asthma patients and 14 healthy controls repeatedly received conditions of mild and severe resistive load induced dyspnea and mild and severe heat pain. The sensory intensity of dyspnea and pain was rated similar by patients and controls, whereas affective unpleasantness ratings for both sensations were reduced in patients. This was mirrored by reduced activity in the insular cortex, but increased activity in the periaqueductal grey (PAG) in asthma patients during perceived dyspnea and pain. Connectivity analyses demonstrated that the asthma-specific down regulation of the insular cortex during dyspnea and pain was moderated by increased PAG activation. The findings show a down regulation of insular cortex activity by the antinociceptive PAG in patients with asthma during perceived dyspnea, but also pain. This could represent an asthma-specific brain habituation mechanism to decrease the perceived affective unpleasantness of dyspnea, which generalizes to other unpleasant bodily sensations such as pain which are processed by common brain areas.

DECLINE OF THE VISUAL ERP DURING THINKING
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Descriptors: ERP, eye movement, thinking

When a person is given a question, e.g., mental calculation or imaging, she/he shifts gaze to another position with vacant eyes. While a person thinking about something, visual function would be declining. We can obtain a EFRP (Eye Fixation Related Potential) with averaging EEGs at terminations of saccadic eye movements. EFRP varies with visual perception and attention. In this experiment, we measured EFRP during thinking, while each participant faced stripe pattern. Ten participants faced to a stripe pattern varied with sinusoidal luminance level. They were assigned three tasks: 1) mental calculation task, 2) image task, and 3) eye movement task. For task one, each participant was given orally 30 questions of mental calculation and asked to solve the question. For task two, 10 image tasks (e.g., Give names of the world inheritance) were assigned. For task three, the participant was asked to move eyes on the stripe pattern. Eye movements and EEGs (Oz, Pz, Cz) were recorded on a hard disk. When a participant started to think about a question, an involuntary saccadic eye movement (saccade) occurred. EEGs associated with terminations of saccades were averaged to obtain EFRP. The early positive component with latency of about 80 ms of EFRP appeared from all participants in the eye movement task. The amplitudes of the component in two thinking tasks were significantly smaller than the amplitude in the eye movement task. Some subjects showed alpha waves after eyes shifted. Results showed that visual function declined while a person was thinking about something.

POTENTIATION OF THE ACOUSTIC STARTLE REFLEX DURING IMAGERY OF SELF-ESTEEM VIOLATING SCENES IN PATIENTS WITH BORDERLINE PERSONALITY DISORDER
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Descriptors: startle reflex, script-driven imagery, borderline personality disorder

According to Linehan’s biosocial theory, Borderline Personality Disorder (BPD) is primarily a disorder of the emotion regulation system. BPD patients show stronger reactions to emotional evocative cues, especially for affective stimuli like violation of self-esteem or abandonment. In the current study, psychophysiological responses in a script-driven imagery paradigm were assessed to test the reactivity of BPD patients to disorder-related cues compared to standard emotional stimuli. In 35 unmedicated patients with BPD and 35 healthy controls startle responses and autonomic measures were recorded while the subjects were first reading and then imagining personalized and standardized unpleasant, neutral and pleasant scripts. The standardized unpleasant category included disorder-specific scripts about self-esteem violation and abandonment as well as standard unpleasant scripts describing diverse threat scenarios. Compared to healthy controls, patients with BPD rated all scripts as more unpleasant and arousing. Furthermore, in comparison to neutral scripts, BPD patients displayed a pronounced startle response during imagining of self-esteem violation scenario but not during imagining of standard threat. This effect was not observed in the control group. These data confirm a specific emotional vulnerability of patients with BPD.

NATURAL IMAGE STATISTICS AND BRAIN POTENTIALS
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Descriptors: EEG/ERP, natural image statistics

Event-related potentials (ERPs) are reliably modulated by semantic and emotional properties of pictorial stimuli. On the other hand, function of the visual system is strongly connected to physical image properties (e.g. contrast, spatial frequency). Here, we studied the influence of statistical properties of natural images on event-related potentials. 20 participants passively viewed a large number (n = 1024) of photographs,
while the electroencephalogram was recorded from 256 sensors. Stimuli were divided into quartiles according to various statistical image parameters (e.g., brightness, contrast, spatial frequency) and for each quartile an ERP was created. Initial analysis of the data reveal that late components (> 300 ms) are not related to the examined physical parameters. However, during early time windows (< 300 ms) brain potentials were modulated by physical features. Enhanced negativity (starting around 150 ms after picture onset) over posterior sensors was found for images of lower complexity (estimated by JPEG compressibility) relative to images of higher complexity. Moreover, the P1 component was enhanced for images with higher brightness values compared to darker images. Results indicate that physical image features are reflected in early ERP components and therefore need to be controlled in ERP studies of emotion and cognition using natural images.

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ANTICIPATION OF INTEROCEPTIVE THREAT - AN FMRI STUDY
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Descriptors: anticipatory anxiety, interoceptive threat, anxiety sensitivity

Although the anticipation of interoceptive threat is of specific relevance for etiological models of panic, it has rarely been investigated applying imaging technology. Therefore, the current study was designed to evaluate a novel paradigm suitable for the fMRI environment using a symptom provocation procedure to establish an interoceptive threat. As a sample analogue to panic patients concerning their high fear of interoceptive arousal sensations, 15 subjects high and 14 subjects low in anxiety sensitivity were trained in an anticipation of and exposure to a repeated hyperventilation task outside the scanner. In a second session, the participants expecting repetitions of this procedure, were exposed to short periods (18 sec) of either anticipation of hyperventilation or normoventilation (each condition indicated by a different colored slide) while the negative emotional significance as indicated by amygdala activity.

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USING REAPPRAISAL OR RESPONSE MODULATION TO INCREASE AND DECREASE EMOTIONAL RESPONSES: AN FMRI STUDY
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University of Greifswald

Descriptors: emotion regulation strategies, reappraisal and response modulation, amygdala

People differ in their preferred regulation strategies to modulate emotional responses. Among the most commonly used emotion regulation strategies are reappraisal and response modulation. Thus, in the current study comparing these strategies, participants were instructed to regulate their emotional responses induced by pleasant and unpleasant pictures either by varying their interpretation of the picture content (reappraisal) or by varying their elicited tension and expression (response modulation) while BOLD responses were recorded. Region-of-Interest analyses revealed that independent of the applied regulation strategy, orbitofrontal cortex (OFC) activity was increased both during enhancing and reducing the emotional response. As expected, the amygdala generally increased when instructed to enhance the emotional response and decreased when instructed to reduce the emotional response. However, response modulation appeared to be effective to enhance amygdala activity but rather ineffective in decreasing emotional responses elicited by unpleasant pictures. These results confirm the involvement of the OFC in emotion regulation. Furthermore, the findings support the hypothesis that suppression of negative emotion-expressive behavior does not alter the negative emotional significance as indicated by amygdala activity.

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GESTATIONAL AGE PREDICTS NEONATAL STARTLE EYE BLINK
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Descriptors: startle eye blink, gestational age, heart rate

The human startle eye blink response to abrupt and intense acoustic, visual, or tactile stimulation does not depend on voluntary control, can be activated during sleep, and is already present immediately after birth. Startle is based on activation of a brainstem circuit that may not be fully matured in neonates, indicating that gestational age may play a role in neonatal startle. Thus, the present study examined the effect of gestational age on the startle eye blink and heart rate in full-term newborns. Sixty-five healthy full-term infants were tested 72–96 hours after birth. Acoustic broadband white noise stimuli of 50 ms duration and instantaneous rise and fall times were delivered unilaterally with inter-stimulus intervals of 15 s. During the procedure infants remained in a quiet sleep stage. Startle eye blink responses were investigated by surface EMG of the orbicularis oculi muscle. EMG response magnitudes were log transformed and averaged per subject. ECG (lead II) signals were assessed and beat-to-beat heart rate was calculated offline. Mean duration of gestation of the neonates was 40 (SD = 1.3; range 37 to 42) weeks. Startle eye blink response magnitude was positively correlated (r = 0.317; p = .010) with gestational age, but heart rate responses were not. These results show that enhanced acoustic startle reactions in full-term neonates with higher gestational age, suggesting that maturation effects of brainstem structures may play a role in neonatal startle.

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ERROR-RELATED NEGATIVITY AND FEEDBACK-RELATED NEGATIVITY IN OBSESSIVE-COMPULSIVE UNDERGRADUATES
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University of Delaware

Descriptors: anxiety, ERN, FRN

The Error Related Negativity (ERN) is larger in highly anxious individuals than it is in normal controls (Hajack, McDonald & Simons, 2003). Much less is known about the Feedback Related Negativity (FRN) and anxiety. The ERN and FRN share a common source in the anterior cingulate cortex (ACC; Luu et al., 2003). This, together with the functional similarity that errors and feedback may serve in performance monitoring, might suggest that both the ERN and FRN would be increased in anxious individuals. On the other hand, a recent study by Foti and Hajcak (2009) reported a negative relationship between the FRN and negative affect suggesting that the relationship between the ERN, FRN and anxiety may not be straightforward. In the present study, we examined this relationship by measuring the ERN and FRN in an undergraduate population with high and low levels of self-reported Obsessive-Compulsive behaviors. We measured the ERN as the difference between error and correct trials during a flankers task and the FRN as the difference between lose and win trials during a mock gambling task. Our results indicated that the ERN is larger but the FRN is smaller in the high-complexity low-OC group. Furthermore, these relationships were evident even within the group of high-anxious subjects; as OC symptom scores increased, the ERN grew larger and the FRN grew smaller. These results suggest that the ERN and FRN are functionally distinct ERP components and that the role played by the ACC in trait anxiety (and negative affect in general) is more complex than once assumed.

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DISSOCIABLE ROLES FOR EMPATHY AND SYMPATHY IN WILLINGNESS TO SHARE: AN FMRI STUDY
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Descriptors: social neuroscience, neuroeconomics, empathy

Willingness to share monetary benefits has been argued to relate to empathy. Empathy involves activation in neural networks, most prominently the anterior insula (AI) and anterior cingulate cortex (ACC). Sympathy, or caring about the interests of others based on positive interactions with those others, involves activation in neural networks, most prominently the superior temporal sulcus (STS) and posterior cingulate cortex (PCC). Here we show that willingness to share monetary benefits increases after positive interaction in a public goods game, and that this increased willingness to share is predicted by activation of the STS and PCC. Activation of the AI and ACC did not predict willingness to share, not even for people scoring high on empathy scales. These patterns suggest dissociable roles for empathy and sympathy in one’s willingness to share monetary benefits with others.

Post 42

THE N400 AS A SPECIFIC INDEX OF THE SAUSSUREAN ARBITRARINESS POINT IN WORD RECOGNITION
Aniela I. Franca¹, Miriam Lemle¹, Aline R. Gesualdi², Mauricio Cacy³, & Antonio C. Infantoso¹
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Descriptors: neurophysiology of language, word decomposition, N400

This is a priming study of Brazilian Portuguese words, matched for frequency and size, assessed by reaction times (RTs) and event-related brain potentials (ERPs) extracted from 36 college students. The test had 360 prime-target pairs, 120 of which were experimental: 60 pairs made up the Phonological Group (PG), sharing similar onsets (taraˆntula-tartaruga ‘tarantula’–‘turtle’); and 60 pairs made up the Morphological Group (MG): (globo-globalizar ‘globe’–‘globalize’). Both PG and MG were further
PUTTING SYNTACTIC TABS ON SEMANTIC RELATEDNESS: AN ERP STUDY OF BRAZILIAN PORTUGUESE WORDS

Juliana N. Gomes, Aniela I. Franca, Mauricio Caggy, & Antonio C. Infantosi

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Descriptors: semantic decomposition, syntax of semantics, ERP

How much closer is BANANA to BANANA than to PEEL? This is a masked priming ERP experiment, with 4 series of word pairs and 1 series of word/non-word pairs to gauge levels of semantic relatedness. It engaged 40 college students, native speakers of Portuguese in a lexical decision task. Under standard Connectionist assumptions, semantic relatedness maps onto the frequency that two words appear in the same discourse. Challenging this view, we tested the hypothesis that it bears on syntax: when specific semantic aspects of the target are involved in the definition of prime (PEEL-banana), speakers automatically insert the nouns into a structure. This way there is proper connection between the words: BANANA with peel (Series 1). Conversely, if target does not define prime, as in BANANA-fall (Series 2), then more structure might be needed: BANANA with peel/PEEL to fall. If this is true, then BANANA-peel should yield a faster reaction time (RT) and a shorter latency ERP than BANANA-fall. Still if target were completely unrelated to prime, (BANANA-computer - Series 3), connection should be idsyronymous and slower on average across subjects. Results revealed that targets in Series 1 yielded the fastest RTs and shortest latency ERPs. Moreover, since directionality would only matter to a syntactic account, Series 1 was tested in reverse (PEEL-banana - Series 4), and it resulted in slower RTs and ERP latencies than those in Series 1. These findings point to an underlying structure that spontaneously pops up to connect words: the syntax of semantics.

CARDINALITY AND SYNTAX: A BEHAVIORAL AND AN ERP STUDY OF TWO INTERACTING COMPUTATIONS

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Descriptors: pragmatics, number cognition, ERP

A striking investigation in linguistics examines the interface between syntax and number cognitions. A speculation is that the capacity to count springs from the language capacity to merge recursively. Numbers naturally define a range of values that go from a lower bound to a higher bound. If there are 4 chairs in a room, it is fair to say that there is at least 1 chair in the room (lower bound), or that there are 3 or the most 4 chairs (higher bound). But, while adults settle for the highest possible value, children seem to accept all intermediate ones. This study compares two experiments about the pragmatics of numbers: a behavioral study with children and an ERP study with adults. Volunteers were presented a figure, for instance, a saw nursing 4 piglets. Then they heard a sentence: The saw is nursing 3 piglets. This study used a measure describing the brain activity: BANANA with peel/PEEL to fall. If this is true, then BANANA-peel should yield a faster reaction time (RT) and a shorter latency ERP than BANANA-fall. Still if target were completely unrelated to prime, (BANANA-computer - Series 3), connection should be idsyronymous and slower on average across subjects. Results revealed that targets in Series 1 yielded the fastest RTs and shortest latency ERPs. Moreover, since directionality would only matter to a syntactic account, Series 1 was tested in reverse (PEEL-banana - Series 4), and it resulted in slower RTs and ERP latencies than those in Series 1. These findings point to an underlying structure that spontaneously pops up to connect words: the syntax of semantics.

UNILATERAL HAND CONTRACTIONS AND REACTIONS TO CYBERBALL: THE ROLE OF ASYMMETRICAL FRONTAL CORTICAL ACTIVITY IN HOW WE REACT TO OSTRACISM

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Descriptors: frontal asymmetry, approach motivation, social rejection

Previous research has shown that greater relative left frontal cortical activity is associated with approach-related responses to social rejection. To extend and more firmly establish the causal link between frontal asymmetry and these responses, the present research examined the effect of unilateral hand contractions on physiological and emotional responses to ostracism during a Cyberball game. As predicted, right-hand compared to left-hand contractions caused greater relative left frontal cortical activity during the contraction period as well as during ostracism. Right-hand contractions also caused greater self-reported anger but decreased sadness and distress in response to social rejection. Across all participants, relative left frontal cortical activity during ostracism related to greater self-reported anger and decreased perception of inclusion during the game. Greater relative EMG activity in the right arm related to increased left frontal cortical activity during the contractions and Cyberball game. Taken together, results provide further evidence for the role of left frontal cortical activity in approach-oriented responses to social rejection. Furthermore, this study gives additional support for manipulating frontal cortical activity via unilateral hand contractions, which allows for better experimental designs in this area of research.

THE NEURAL SOURCES OF THE FACE-SENSITIVE N170 EVENT-RELATED POTENTIAL

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Descriptors: faces, N170, brain generators

Face perception is subtended by a distributed network of areas in the human brain, as evidenced by fMRI. A subset of these areas presents a selective response to faces...
compared to other object categories. ERP studies of face perception have identified the first reliable face-preferential response at the onset of the N170. However, the relationship between the cortical face network identified in fMRI and the N170 remains unclear. We recorded ERPs (128-channels system) in 15 subjects presented with four kinds of stimuli used in an independent fMRI experiment (50 subjects): pictures of faces and cars, with phase-scrambled versions. Neural generators were determined using the inverse method sLORETA which exhibits a small localization error even in the presence of noise and deep sources. Results were mapped in a 3D regular grid of points that covered the head volume which was co-registered with the electrodes on an MRI from a single individual (Colin27). Relevant sources were determined by imperceptibly altering an activating threshold corresponding to 60% of the highest LS participants during the N170. For faces-scrambled faces, there was a strong right hemispheric dominance, with major contributions of the posterior STS and lateral fusiform gyrus, which were activated the most in the independent fMRI experiment. There was also a strong contribution of the bilateral parahippocampal gyrus, an area that is deactivated in fMRI for faces, but no contribution of the amygdala (a closed electrical field). Perceiving pictures of cars (vs. scrambled cars) activated the posterior fusiform gyrus bilaterally.

Poster 49
RECOGNIZING AN INDIVIDUAL FACE: 3D SHAPE CONTRIBUTES EARLIER THAN 2D SURFACE REFLECTANCE INFORMATION
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Descriptors: N170, face recognition, erp adaptation
A human face is recognized efficiently by means of two main sources of information: three-dimensional (3D) shape and two-dimensional (2D) surface reflectance (texture) (O'Toole et al., 1999). Here we used event-related potentials (ERPs) in a face adaptation paradigm (Jacques, d'Arripe & Rossion, 2007) to examine the time-course of processing for these two types of information. With a 3D morphable model (Blanz & Vetter, 1999), we generated pairs of stimuli that were either identical, varied in 3D shape only, in 2D surface reflectance only, or in both. Sixteen participants discriminated individual faces in these 4 types of pairs, in which a first (adapting) face was followed shortly by a second (test) face. Observers were as accurate and fast for discriminating individual faces based on either 3D shape or 2D surface reflectance, but were faster for the recognition of identical faces using 3D shape only, in 2D surface reflectance or in both. These differences were N170 component (~160 ms following the test face) increased relative to repetition of the same face for changes in 3D shape, but not for changes in 2D reflectance, especially in the right occipitotemporal cortex. At about 250 ms, both kinds of information contributed equally, and the largest difference in amplitude compared to the repetition of the same face was found when both 3D shape and 2D reflectance were combined, in line with observers' behavior. These observations indicate that evidence to recognize individual faces accumulate faster in the right hemisphere human visual cortex from diagnostic 3D shape information than from 2D surface reflectance information.

Poster 50
ELECTROPHYSIOLOGICAL EVIDENCE OF ATTENTIONAL BIAS FOR ALCOHOL CUES IN SOCIAL DRINKERS DIFFERING IN ALCOHOL SENSITIVITY
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University of Missouri, Columbia

Descriptors: attentional bias, alcohol sensitivity, motivational incentive
Research indicates that a low sensitivity (LS) to the acute effects of alcohol is a risk factor for alcoholism. We examined whether LS individuals would differ from high sensitivity (HS) individuals in initial attentional orienting to alcohol cues and in maintaining this initial orienting. Event-related potentials were recorded while LS and HS participants, recruited based on a self-report measure assessing alcohol consumption experiences, performed a modified dot-probe task in which pictures of one alcoholic and one nonalcoholic beverage were presented in each hemifield, followed by a target replacing either alcohol cue locations (AT) or nonalcoholic cue locations (NAT). Participants responded to the color of the target (blue or green) using one of two buttons. Results showed that LS participants showed a larger difference between the AT and NAT conditions than HS participants, (b) the posterior P1 (an index of attentional orienting to a particular location), peaking about 150 ms, was larger for the AT trials than for the NAT trials among LS participants, whereas HS participants showed the opposite pattern; (c) ipsilateral invalid negativity (FIN), reflecting attentional reorienting and occurring about 200–300 ms, was similar for both conditions in the HS participants, yet, the FIN was less negative for the AT trials than for the NAT trials in the LS participants. These results suggest that both groups exhibit attentional biases, LS toward alcohol cues and HS against alcohol cues, but only LS individuals maintained their biases at a later processing stage.

Poster 51
5-HTTLPR, TPH2-703G/T AND THE NEURAL BASIS OF EMOTION REGULATION
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Descriptors: emotion regulation, genetic imaging, serotonin
Previous studies have shown that serotonin-related gene variations are associated with different brain responses to emotional stimuli, in regions such as the amygdala and prefrontal cortex. The goal of this study was to investigate the influence of variations in the serotonin transporter (5-HTTLPR) and the tryptophan hydroxylase-2 (TPH2-703G/T) genes on the neural correlates of negative affect regulation using an affect reappraisal paradigm. Four groups, defined by absence versus presence of the short (S) allele of the 5-HTTLPR and T variant of the TPH2-703G/T polymorphism (S+T+, S+T−, S−T+, S−T−), participated in a functional magnetic resonance imaging study. They were instructed to either look at blocks of aversive or neutral pictures, or to down-regulate their emotions elicited by aversive pictures. Early results show that carriers of the S and T alleles are characterized by stronger subjective emotional responses towards aversive compared to neutral pictures. During effortful down-regulation of emotion, diminished activity in regulation-related prefrontal cortex areas was observed for these individuals. These results indicate that serotonin-related gene variations are not only associated with emotional experience, but also with effortful emotion regulation processes.

Poster 52
UGH! DISGUST CONDITIONING AND THE INFLUENCE OF INDIVIDUAL DIFFERENCES
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Bender Institute of Neuroimaging, University of Giessen

Descriptors: classical conditioning, disgust, insula
Disgust is associated with various anxiety disorders and provokes physiological, behavioral, and neural responses. However, only few studies have been conducted to investigate conditioned responses and whether these responses showed individual differences. The present study investigated SCR's, changes in subjective ratings, and brain activity when conditioning with disgusting pictures. In a differential conditioning paradigm, one picture frame (CS+) was filled out with disgust pictures, while a second picture frame (CS−) predicted the absence of disgusting pictures. Simultaneously, we assessed SCRs and neural responses, yet subjective ratings and contingency awareness were assessed after the conditioning procedure. Each subject also filled out personality questionnaires (e.g.: disgust sensitivity). We found increased activity in the occipital cortex, lateral orbitofrontal cortex, thalamus, and strong bilateral insula activations in the contrast CS+ > CS−. Conditioned SCRs were obtained in contingency aware subjects only. We also found individual differences to have an influence on SCRs. In sum, disgust pictures can be used as unconditioned stimuli to investigate associative learning. Further, the bilateral insula activation underlines its important role for aversive learning, which might be especially important for disgust conditioning.
THE INFLUENCE OF TRAIT ABSORPTION ON EMOTIONAL PICTURE AND ACOUSTIC STARTLE PROCESSING: EVIDENCE FROM ERPs

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Vanderbilt University

Descriptors: personality, P3, absorption

The current study explored the influence of trait levels of Absorption on processing of emotional foreground and distracting background stimuli. EEG was recorded while undergraduate participants watched pleasant, neutral, and aversive pictures, and acoustic startle probes were presented during the picture viewing period. P3 waveforms time-locked to the picture onset as well as to the startle probe onset were examined. Consistent with prior research, larger P3s were obtained at the onset of emotional vs. neutral pictures, and smaller P3s were obtained at the startle probe onset for emotional vs. neutral pictures. Parietal P3 amplitude at picture onset was negatively correlated with frontal P3 amplitude to the later startle probe, indicating a transfer of emotional differentiation of the pictures from parietal to frontal regions over the course of picture processing. Additionally, we found that Absorption scores were correlated with the emotion vs. neutral differentiation of the parietal P3 to pictures and of the frontal P3 to startle probes. Absorption was also negatively correlated with parietal P3 magnitude to the startle probe, irrespective of picture valence, indicating that those high in Absorption have fewer processing resources to devote to a second stimulus while their attention is absorbed by a previous, concurrent stimulus. Thus, Absorption may facilitate focusing on initial salient information, thereby inhibiting processing of subsequent incoming information.

REDUCED APPETITIVE POSTAURICULAR REFLEX POTENTIATION IN DEPRESSED UNDERGRADUATES

Stephen D. Benning
Vanderbilt University

Descriptors: postauricular, startle, depression

In prior studies, severely depressed patients have exhibited blunted overall modulation of the startle blink reflex by emotion, though this pattern has not been observed for less depressed patients or undergraduates. The postauricular reflex may be a more sensitive measure of blunted appetitive processing in depression than the startle blink, given that the postauricular reflex appears to be a relatively sensitive measure of appetitive processing. In a sample of 83 undergraduates (mean Zung depression score = 34.2, SD = 7.06), potentiation of the postauricular reflex to pleasant vs. neutral pictures was negatively related to self-reported depression scores. This negative relationship was particularly evident for the anhedonic features of depression and for postauricular reflexes during nurturant vs. neutral scenes. In contrast, there were no significant correlations between any form of emotional startle blink reflex modulation and depression scores. These findings indicate that blunted appetitive potentiation of the postauricular reflex may be a psychophysiological marker of even low levels of anhedonia in depression.

MENTAL COACHING DURING FLIGHT TRAINING OF MILITARY STUDENT PILOTS: EFFECTS ON SUBJECTIVE STRESS PERCEPTION, FLIGHT PERFORMANCE AND CORTISOL LEVELS

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Descriptors: stress, coaching

Military flight training is known to be a very demanding curriculum, and a high coping ability has been repeatedly named by instructors and former students as one of the key factors for success. Recently, the Royal Military Academy has introduced a coaching module, comprising relaxation techniques and bio-feedback, aiming at teaching student-pilots adequate coping techniques, to allow them to manage their stress reactions and improve their performance in-flight. The present study aimed to investigate whether an individualized coaching technique, based on similar principles, would improve their stress management and flight performance. Twenty-two student pilots participated in the 6-month study, where they were assessed once a month. They were divided in two groups, the intervention and the control group, which were matched according to baseline Trait Anxiety scores and flight performance. The intervention group received an individualized coaching for the duration of the study, with mandatory visits to the coach every two weeks, and free access if they felt the need for more. The control group was subjected to normal sport sessions. Measurements, performed once a month, included saliva samples to determine cortisol levels, taken every two hours, the Spielberger State Anxiety Inventory and the Profile of Mood States. Results show higher cortisol levels and higher scores for the control group, despite these results not reaching significance, probably due to the high amount of missing data from the attrition rate. Feedback from students showed they deemed the coaching very useful.

MONITORING AN ANTARCTIC SUMMER EXPEDITION: HOW CONSTANT ILLUMINATION AND PHYSICAL ACTIVITY AFFECT MOOD, COGNITIVE PERFORMANCE AND SLEEP-WAKE REGULATION

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Descriptors: circadian rhythms, antarctica, sleep-wake regulation

The present investigation was conducted during two Antarctic summer expeditions. This study aimed at investigating how well the subjective complaints of participants were related to objective measures of sleep quality. Second, we hypothesized that participants with more intense physical activity would increase their sleep pressure, and therefore suffer less from the possible circadian disruption due to the constant daylight conditions. Eight subjects were investigated in the first expedition. Actigraphy data were collected for 48 hrs every ten days. Sleep efficiency (sleep time/lying down time) as well as a sleep fractionation were computed, and related to the magnitude of active energy expenditure. 23 subjects participated during the second campaign. Data included 24 hours of actigraphy, one night polysomnography, morning and evening Profile of Mood States and Karolinska Sleepiness Scale, morning Psychomotor Vigilance Test. Morning and evening saliva samples to determine melatonin levels. First-year data showed poor sleep efficiency and high sleep fractionation, in concordance with participants’ subjective evaluations. Furthermore, there was a strong correlation between sleep efficiency and active energy expenditure (Pearson’s r = 0.63; p = .015), as well as a strong relationship between active energy expenditure and sleep fractionation. Second year data are still being analyzed, preliminary results showing a deficit in deep sleep and a similar relationship between physical activity and sleep efficiency.

IMPACT OF AGE ON BASAL ACTIVITY OF SALIVARY ALPHA-AMYLASE

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Descriptors: salivary alpha-amylase, cortisol, aging

Recent studies revealed a pronounced diurnal rhythm of salivary alpha-amylase (sAA) characterized by a strong decrease after awakening and steadily increasing values during the day with peaks in the late afternoon in adults and children, but no data on older adults is available, and no direct comparisons between different age groups across the lifespan have been made. To determine salivary alpha-amylase and cortisol basal rhythms, five saliva samples were collected immediately after awakening, 30 minutes after awakening, 11am, 3pm, and 5pm. Controlling for Body Mass Index and awakening time, results showed a pronounced rhythm of sAA as well as cortisol in all age groups. However, older men lack the typical decrease of sAA in the morning and showed the lowest cortisol awakening response. Furthermore, older adults showed a much higher total output of sAA and a group by sex effect indicated a total cortisol output especially pronounced in older men. No associations between sAA and cortisol variables were found, and analyses revealed age and awakening time as the strongest predictors of daily amylase and cortisol. The present findings showed higher salivary alpha-amylase output in older adults, indicating higher sympathetic activity, and implying a possible mechanism for increased susceptibility to cardiovascular events. Furthermore, higher cortisol levels in older men may indicate, for example, an increased risk for metabolic diseases. Our findings in older adults are of particular interest for the increasingly important research area of stress, hormones, and aging.

CENTRAL PAIN PROCESSING AFTER REPEETITIVE INTRAMUSCULAR PROTON/PROSTAGLANDIN E2 INJECTIONS IN FIBROMYALGIA SYNDROME AND HEALTHY CONTROLS

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1Central Institute of Mental Health, 2University of Heidelberg

Descriptors: pain, prostaglandin, fibromyalgia

While the etiology of fibromyalgia syndrome (FMS) remains unclear, it is assumed that both peripheral and central components are involved. It was shown that the release of prostaglandins (PG) in muscle in response to tissue damage is defective in chronic muscle pain. To shed light on the connection between PGE2 release, tenderness, and hype- ralgia we repetitively injected FMS patients and healthy control subjects (HC) with PGE2 in phosphate-buffered isotonic solution in the left extensor carpi radialis brevis muscle. During the injections functional magnetic resonance imaging measurements were conducted and continuous pain ratings were recorded. Continuous pain ratings revealed higher instantaneous pain in HC and higher sustained pain in FMS. Injection
of PGE2 led to activation of the anterior and medial cingulate cortices, contralateral primary sensory cortex, bilateral insula and thalamus, left basal ganglia, left orbito-frontal cortex and the cerebellum in FMS patients. In HC activations were found only in the anterior, medial, and posterior cingulate cortices, and the primary somatosensory cortex. The contrast between the groups revealed significantly more activation for FMS patients in the left insula. In both groups similar concentrations of hypothalamic saline and PGE2 solutions led to a more pronounced perception of pain and more wide spread activation in pain-related brain areas in FMS especially in the left insula despite a delayed perceived pain reaction to PGE2. As PG sensitizes sensory neurons to pain it might be a peripheral contributing factor in FMS.

**Poster 60**

**THE P300- BRAIN-COMPUTER INTERFACE BROWSER: A MUSCLE-INDEPENDENT SURFING TOOL FOR PARALYZED PEOPLE**

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Descriptors: brain-computer interface, P300, amytrophic lateral sclerosis

EEG-based brain-computer interfaces (BCIs) can be used by paralyzed people for communication. To increase the general usefulness of BCI systems applications for particular activities are needed. The presented study evaluated the efficacy of a BCI application for surfing the web. A matrix paradigm based on the event-related potential P300 was used to control the BCI web browser. Ten healthy subjects and three paralyzed patients diagnosed with amytrophic lateral sclerosis (ALS) performed web surfing tasks in several sessions. All participants repeated the BCI browser after use. The healthy subjects achieved an average accuracy of 90% and an information transfer rate (ITR) of 16.5 bits/minute when controlling the web browser. The ALS patients used the browser with an average accuracy of 72% and an ITR of 7 bits/minute. The patients indicated that they would use the BCI browser in everyday life and would participate in more BCI web browser sessions. The results confirmed a decreased ITR in people with neurological disease as compared to healthy controls. A lower P300 amplitude and a longer latency in the ALS patients may account for this difference. This aspect has to be taken into account when designing BCI protocols for patients. Nevertheless, accuracy in patients was still high enough to control the browser reliably.

**Poster 61**

**AFFERENT FEEDBACK INFLUENCES FOR AN ON-LINE BCI FOR STROKE REHABILITATION**

Ander Ramos1, Ernesto S. Soares1, Manuel Agostini3, Doris Broetz1, Boris Benkner1, Massimilliano Rea1, Sebastian Halder1, Andrea Caria1, Surjo Soekader1, & Niels Birbaumer1
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Descriptors: neurofeedback, stroke, learning

The last decade yielded the development of brain-computer-interfaces (BCI) that use neurophysiological signals to control external devices or computers, delivering sensory afferent patterns of activity in response to experimentally controllable CNS events with time delays in the order of tens of milliseconds. Based on the importance of the relative timing of synaptic events in the induction of long lasting changes in neuronal function, BCI-based rehabilitation techniques for patients with motor functionality in such conditions as Stroke, ALS and spinal chord injury constitutes a promising technique. Four sub-cortical stroke patients displaying severe hemiparesis with loss of finger control were submitted to a 16-session BCI-training regime. Having identified the EEG correlates of the Attempt to Move (AM) the affected hand, an online EEG adaptive classifier controlling a robotic device attached to the affected arm generated specific Sensory Feedback (SF) patterns. The effects over instantaneous and long term neurophysiological and behavioral measures of, and caused by, BCI training using distinct 1 sign of AM-SF contingency (Positive Vs. Negative) and 2 degrees of AM-SF anatomical correspondence to SF-Response (SMR responsive vs. P300 responsive SMR and Delta P300 AM) were evaluated. These results will be most instructive for future developments of BCI systems that include using natural afferent sensory information as feedback.

**Poster 62**

**THE ROLE OF TOP-DOWN TASK SET FOR ATTENTIONAL CAPTURE IN VISUAL SEARCH**

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Descriptors: attentional capture, top-down control, n2pc

Studies investigating attentional capture by task-irrelevant singletons in visual search have often used the two-singleton paradigm where a shape target singleton can be accompanied by a more salient color singleton distractor. Previous behavioral and ERP experiments have found evidence that attention is captured by these task-irrelevant singletons, suggesting that capture is triggered by bottom-up salience rather than top-down task set. However, in most of these studies, the identity of target and distractor singletons changed unpredictably across trials, which may have attenuated the impact of top-down task sets. We investigated this hypothesis by employing the N2pc component as a marker of attentional capture in the two-singleton paradigm, and contrasting blocks where target and distractor identity either remained constant or varied unpredictably. Results demonstrate that attentional capture by task-irrelevant singletons is strongly modulated by top-down task set.

**Poster 63**

**THE INTEGRATION OF PERCEPTUAL AND WORKING MEMORY REPRESENTATIONS: EVIDENCE FROM LATERALIZED ERP COMPONENTS**

Silvia Dalvit, & Martin Eimer
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Descriptors: n2pc-spcn, relationship attention - working memory

Previous behavioural work has demonstrated that working memory and perceptual representations can be integrated to guide visual discrimination performance (Brockmole et al., 2002). We used ERP measures to investigate such image-percept integration processes and to compare them to percept-percept integration. In a temporal integration task, participants were asked to combine information from two successively presented visual displays which were separated by a variable interval (0–900 ms). Both displays contained lateralized semicircles, whose orientation varied pseudo-randomly. The task was to detect whether the combination of the two successive semicircles presented at the same location resulted in a complete circle. Detection performance was good when the two displays followed each other immediately and also when the interstimulus interval was 300 ms or longer, demonstrating the effectiveness of percept-percept and image-percept integration, respectively. Prior mental manipulation of the ERP components were elicited in both conditions, suggesting that both types of integration are based on retinotopically organized representations. However, they emerged later and were more sustained for image-percept integration. In a follow-up experiment, we studied the role of spatial correspondence between images and percepts, and the impact of working memory load on image-percept integration.

**Poster 64**

**CARDIAC AUTONOMIC FUNCTION AND RESPONSE CONTROL DEFICITS IN OLDER ADULTS**

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Brook University

Descriptors: aging, cardiac autonomic function, attentional control

The anterior cingulate cortex (ACC) is involved in the control of attention as well as the modulation of autonomic activity. Despite the observation that both processes decline with age, they are very rarely studied together, so it is not known whether an age-related reduction in the ability to control sympathetic arousal would be implicated in the attentional control problems experienced by older adults. To examine this, we recorded event-related potentials (ERPs) and cardiac activity while older and younger adults completed a Go-NoGo task that involved withholding a response when probe trials matched the information being held in working memory. We varied working memory load to include 2, 4, or 6 items, and expected that autonomic regulation would become increasingly important for older adults at higher load, when fewer attentional resources were available. We found that a higher memory load resulted in an increased error rate and a reduction in error-related ERP amplitude (ERN & Pe). ERP amplitude did not relate to errors rate, but higher rate pressure product (RPP), an index of sympathetic predominance, was associated with increased NoGo error, especially for NoGo trials that unexpectedly repeated, and only for older adults. Results suggest that a decline in the autonomic control of sympathetic activity is linked to response control problems in older adults, and generally support Thayer’s model of neurovisceral integration in that age-related change in ACC must be considered with respect to both its cognitive and regulatory functions.

**Poster 65**

**N170 IS SENSITIVE TO SEVERAL FACTORS IMPORTANT FOR DIFFERENTIATING INDIVIDUAL FACES**

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Brook University

Descriptors: N170, faces, eye colour

Using event-related potentials, we investigated whether the face-sensitive N170 component varied with dimensions previously shown to influence adults’ face similarity judgments. Nishimura et al. (in press) collected similarity ratings for 36 female faces with identical hair. A 4–5 dimensional face-space solution accounted for adults’ judgments.

The anterior cingulate cortex (ACC) is involved in the control of attention as well as the modulation of autonomic activity. Despite the observation that both processes decline with age, they are very rarely studied together, so it is not known whether an age-related reduction in the ability to control sympathetic arousal would be implicated in the attentional control problems experienced by older adults. To examine this, we recorded event-related potentials (ERPs) and cardiac activity while older and younger adults completed a Go-NoGo task that involved withholding a response when probe trials matched the information being held in working memory. We varied working memory load to include 2, 4, or 6 items, and expected that autonomic regulation would become increasingly important for older adults at higher load, when fewer attentional resources were available. We found that a higher memory load resulted in an increased error rate and a reduction in error-related ERP amplitude (ERN & Pe). ERP amplitude did not relate to errors rate, but higher rate pressure product (RPP), an index of sympathetic predominance, was associated with increased NoGo error, especially for NoGo trials that unexpectedly repeated, and only for older adults. Results suggest that a decline in the autonomic control of sympathetic activity is linked to response control problems in older adults, and generally support Thayer’s model of neurovisceral integration in that age-related change in ACC must be considered with respect to both its cognitive and regulatory functions.
bottom face half. In the current study we presented 9 male faces among the 36 female faces; participants pressed a button when they detected a male face. We measured N170 amplitude to see if it varied with each of these dimensions and its associated facial feature for female faces only. The right N170 amplitude had a linear relationship with eye color ($p < .01$), and a curvilinear relationship with face width ($p < .05$), but no relationship with the other features ($p > .1$). The left N170 amplitude had a linear relationship with both height of top face half: height of bottom face half ($p < .05$) and eye size ($p < .05$), but not with the other features. Thus, the N170 relates to the factors important for differentiating individual faces, and our results suggest that the scalp-recorded N170 component can be affected by a variety of factors and is likely produced by multiple neural sources.

**Poster 66**

**ERPs CORRELATES OF EMOTIONAL FACE PROCESSING IN PSYCHOPATHY**

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Brock University, MIND Research Network

Descriptors: psychopathy, ERP, emotional faces

One proposed aspect of the affective deficiency in psychopathy is a deficit in the processing of emotional facial expressions. To date, research in this area has produced inconsistent documentation of these deficits. We recorded event-related potentials (ERPs) in a sample of incarcerated psychopathic offenders and a nonoffender control sample during an emotional flanker task containing fearful and angry facial expressions. From these data the N170 ERP component, commonly associated with face processing, and the P2 and N2/P3 were examined. Although we observed no significant difference in the average amplitudes of the N170 and P2 components between groups, there was a trend indicating a difference between groups in the descending arm of the P200. Similarly, the N2/P3 component (average voltage between 300 and 400 ms) differentiated groups in the ascending arm of the P300 component with a slower ascent in the psychopaths, $F(1, 23) = 15.5, p < .001$. These data are compatible with psychopaths showing intact structural processing of emotional faces despite their poor performance in identifying facial fear expression in this task, with the poorer perceptual processing emanating after 300 ms.

**Poster 67**

**PROCESSING REWARD MAGNITUDE AND VALENCE: DISSOCIATIONS AND INDIVIDUAL DIFFERENCES IN THE FRN AND P300**

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Brock University

Descriptors: gambling, FRN, P300

Yeung & Sanfey (2004; Y&S) reported that, in a gambling paradigm, valence (winning versus losing) and magnitude (large versus small wager) are dissociable in the human electrophysiological response, namely, the feedback related negativity (FRN) and the P300 components, respectively. Our goal was to further examine this dissociation as well as evaluate the role of individual differences in the processing of this feedback. A modified version of the Y&S gambling paradigm was used to evaluate these relationships. The separation between valence and magnitude at the scalp was found but not as simply as suggested by Y&S: (1) The P300 component at Cz was sensitive only to the wager magnitude (replicating Y&S), while at Fz the P300 differentiated between wins and losses. Fitting the P300 to dipole sources using BESA, we found symmetric dipoles in dorsal ACC, one pointing toward Fz and active only in loss conditions and the other pointing to Cz and active for both wins and losses. (2) The FRN at Cz differentiated valence and magnitude with complication due to the P300 effects, with best fit dipoles in the rostral Cz and active for both wins and losses. (3) The FRN at Cz differentiated valence and magnitude with complication due to the P300 effects, with best fit dipoles in the rostral Cz and active for both wins and losses.

**Poster 68**

**DOES TARGET LETTER POSITION AFFECT ERP AMPLITUDES AND CLASSIFICATION ACCURACY IN THE P300 BASED BCI? IMPLICATIONS OF A PRINCIPAL COMPONENT ANALYSIS**

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Descriptors: brain computer interface, P300

The P300 Brain Computer Interface (BCI) presents a user with a matrix of options for communication. The user focuses attention on the desired character, the rows and columns of the matrix are randomly highlighted and, by detecting which row and column flash elicit a P300, the BCI identifies the target character. Some users report having difficulty attending to characters in particular areas of the matrix. Therefore, using principal component analysis (PCA) on the event-related potentials (ERPs) from six participants, we investigated whether the position of the target character in the matrix, such as the row and column it is located in, influences amplitudes of elicited ERPs. The PCA revealed a P300 factor and an earlier frontal positivity whose amplitudes strongly differed between target and non-target flashes. The factor scores of both factors were compared as a function of target position in the matrix. Two significant effects were found: for the column flashes the P300 was smallest when the target character was located in the top rows compared to the bottom rows, while for the row flashes the frontal factor was smallest when the target was located in the bottom rows. We conducted a similar analysis on the scores computed by a stepwise discriminant analysis, which is the classification method currently used online by our BCI system. Thereby, we investigated whether the results from the PCA may translate into differences in classification accuracy as a function of matrix letter position. Implications for the optimal matrix organization and BCI performance are discussed.

**Poster 69**

**IDENTIFYING THE FUNCTIONAL ROLE OF THE INTERFERENCE-ELICITED MEDIAL FRONTAL NEGATIVITY**

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Brock University

Descriptors: interference effects, medial frontal negativity, N450

Using event-related potentials (ERPs) to examine neural responses to cognitive interference (CI) has consistently revealed a medial frontal negativity (MFN) 450 ms following interference eliciting stimuli. However, it is unclear whether the MFN reflects CI detection or CI resolution. Our goal was to probe the nature of the processes that give rise to this MFN by manipulating cognitive load, thus limiting available executive resources. We elicited CI by using a modified Sternberg task that involved the strategic repetition of recent probes. Cognitive load was manipulated by using 2, 4, & 6 items in the memory set. We hypothesized that CI effects would increase with greater cognitive load. If the MFN reflects CI detection, its amplitude should increase as load (and thus CI) increases. Alternatively, if the MFN reflects CI resolution, its amplitude should decrease as load increases and executive resources become limited. Behavioural data supported a clear pattern of increased CI, errors to lures increased linearly with load. ERP data were surprising in that two CI-related negativities were observed. At low load (maximal resources available) a RIGHT-frontal negativity occurred, while at high load (minimal resources available) an earlier, LEFT-frontal negativity was apparent. We suggest that the typically observed MFN is actually a composite of two functionally distinct responses: An early left-lateralized response reflecting interference detection, and a later, right-lateralized response reflecting the application of executive resources for interference resolution.

**Poster 70**

**FRONTAL EEG ASYMMETRY IN HIGHLY AGGRESSIVE 5-6 YEAR OLD GIRLS**

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Pennsylvania State University, Brock University

Descriptors: externalizing, eeg asymmetry, girls

Greater relative left frontal activity has been associated with approach-related emotion (e.g., happiness and anger) and behaviour, whereas greater relative right frontal activity has been associated with withdrawal-related emotion (e.g., fear and sadness) and behaviour. We investigated whether highly aggressive 5 and 6-year-old girls would differ from controls on frontal EEG activity. We measured frontal and parietal EEG alpha asymmetry in 30 girls (18 identified as high on aggression and 12 controls) during baseline and during the presentation of three emotion-evoking film clips (fear, happy, and anger). There was a significant condition x hemisphere x group interaction ($p = .001$). Decomposing this effect, we found that girls identified as high on aggression showed significantly different patterns of frontal asymmetry both in baseline ($p = .002$) and anger conditions ($p < .05$) compared to controls in that they showed greater amounts of left frontal activation in both conditions. No such differences in asymmetries were found in parietal regions or for fear and happy conditions. This is the first investigation of electrophysiological asymmetry in highly aggressive girls in this age group. The findings suggest dysfunction in approach motivation and affect regulation in those identified as high on aggression. Early patterns of physical aggression in children often remain stable and are indicative of risk for on-going behavioral problems over the lifespan. These findings have possible implications for the identification of children at risk for externalizing disorders.

**Poster 71**

**I AM POSITIVE I AM GOING TO BE CORRECT: CORRECT RESPONSES ARE FORESHADOWED BY INCREASED POSITIVITY IN A LOW INTERFERENCE TASK**

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Waseda University, Brock University, Japan Society for the Promotion of Science

Descriptors: response monitoring, EEG/ERP

Research has suggested that errors are foreshadowed by a positive deflection of the response-locked event-related potential in the trials immediately preceding an erroneous response. However, these studies all employed tasks that had an element of stimulus-response interference in these error-preceding trials. The present study adopted an-
Poster 72
THE EFFECT OF SLEEPINESS ON REWARD-RELATED ELECTROPHYSIOLOGICAL ACTIVITY DURING A GAMBLING TASK
Timothy I. Murphy, Diane L. Santesso, Dirk B.H. Homan, Warren Tilbrook, and Cassandra Lowe
Brock University
Descriptors: sleep deprivation, EEG/ERP, risk assessment
Sleep deprivation can adversely affect an individual’s decision-making ability while gambling by elevating the expectation of gains and minimizing losses. Sleepiness has also been shown to have deleterious effects on prefrontal cortex functioning and performance monitoring. The goal of the present study was to examine the effects of sleepiness on reward processing using a gambling task similar to blackjack in young adults. Twenty participants completed the task when alert and after 20 hours of sleep deprivation. We examined the feedback-related negativity (FRN) as an index of anterior cingulate cortex (ACC) reward processing and examined low resolution electromagnetic tomography (LORETA) during feedback. Win and loss feedback-related negativity (FRN) did not differ under conditions of alertness. Only slight larger (more negative) FRNs and slightly greater ACC activity (BA 24) compared with money win and loss feedback. Consistent with previous studies, loss feedback elicited larger (more negative) FRNs and slightly greater ACC activity (BA 24) compared with win feedback. Although win and loss FRNs did not differ under conditions of alertness and sleepiness, LORETA analyses revealed that losses were associated with greater activity in the ACC during the alert session compared to the sleepy session. Only slight differences were evident for winning across the alert and sleepy conditions. This indicates that individuals may devote less attention to losses while sleepy. These findings may have implications for individuals who gamble for extended periods or very late at night.

Poster 73
VAGAL REACTIVITY TO STRESS IN SEXUALLY REVICTIMIZED WOMEN
Michelle A. Patriquin, Angela Scarpa, and Kristy E. Benoit
Virginia Polytechnic Institute and State University
Descriptors: vagal augmentation, sexual revictimization
Research suggests that vagal augmentation, or an increase in parasympathetic activation, indicates heightened attention and the ability to detect environmental change. Vagal augmentation may occur in response to physiological (e.g., storing energy) and psychological (e.g., attention) capabilities to face environmental challenge. One hundred and fifteen female undergraduates (aged 18 – 22) were administered a modified Stroop task to assess for physiological differences to an environmental stressor. The following groups were established: revictimization (n = 30), child sexual abuse (n = 24), adult sexual victimization (n = 35), and no sexual victimization (n = 26). The modified Stroop presented three word blocks: neutral (e.g., apple), general threat (e.g., death), and sexual (e.g., rape). Vagal reactivity was quantified as the mean Stroop minus mean baseline difference score in high frequency (HF) power percent heart rate variability (HRV). Revictimized women showed a significant increase in HF HRV (M = 11.39, SD = 74.19) compared to child sexual abuse [M = −11.42, SD = 10.74; F(1, 112) = 1.80, p < .05] and a trend compared to no victimization [M = −9.83, SD = 23.16; F(1, 112) = 1.80, p = .06]. Victimized adults showed HF HRV decrease (M = −5.70, SD = 22.49). These results indicate vagal augmentation in only sexual revictimized women to an environmental stressor. Revictimized women may have developed an adaptive physiological response that allows for necessary engagement to and assessment of environmental challenge.

Poster 74
ERROR-RELATED BRAIN ACTIVITY IN INDIVIDUALS WITH MAJOR DEPRESSIVE DISORDER
Doreen M. Olvet, and Greg Hajcak
Stony Brook University
Descriptors: major depressive disorder (MDD), error-related negativity, symptom severity
Recently, event-related potentials (ERPs) have been used to elucidate neural indices of response monitoring: the error-related negativity (ERN) and the correct-response negativity (CRN) are ERPs that present as a negative deflection approximately 50 ms following an erroneous and correct response, respectively. Some studies have reported an increased ERN in individuals with major depressive disorder (MDD), but others have failed to find such differences when assessing individuals with severe MDD. The purpose of this study is to investigate the ERN in individuals with MDD. More specifically, we sought to examine the relationship between the ERN and depression severity. In the current study, individuals with MDD (DEP; n = 22) and healthy controls (HC; n = 22) performed an arrow version of the flanker task. Although the results show that these groups did not differ on the ERN CRN overall, depression severity appeared to moderate the ERN/CRN in the DEP group. When the DEP group was divided using a median split on self-reported symptom severity, the high severity group (n = 10) had a smaller difference between the ERN and the CRN than the low severity group (n = 9). This study suggests a non-linear relationship between depressive symptom severity and the ERN, such that individuals with mild to moderate MDD have an increased ERN and individuals with severe MDD have a decreased ERN relative to healthy controls.

Poster 75
SPATIAL ATTENTION AND ANXIETY MODERATE THE LATE POSITIVE POTENTIAL
Annamie MacNamara, & Greg Hajcak
Stony Brook University
Descriptors: LPP, spatial attention, anxiety
Recent MRI work suggests that amygdala activity is increased by aversive stimuli, even when presented in spatially unattended locations. Other neuroimaging work indicates that individual differences in anxiety - associated with heightened attention towards threat - may influence the degree to which unattended aversive stimuli capture attention and activate the amygdala. The present study examined whether the LPP elicited by aversive IAPS is modulated by spatial attention and state anxiety. On each trial, four pictures were simultaneously presented for 250 ms: above, below, and to the left and right of fixation. Participants had to indicate whether two of the pictures on each trial were the same or different; a cue presented before each trial indicated whether this decision should be based on the horizontal or vertical pictures. Results indicated that the LPP was larger for aversive pictures, but only when presented in spatially attended locations. Trials in which aversive pictures were presented in spatially unattended locations were associated with increased reaction times and a greater number of errors. Finally, participants who reported higher state anxiety had larger LPPs to aversive pictures presented in spatially attended locations. These data suggest a role for both spatial attention and individual differences in anxiety in the extent to which aversive pictures elicit increased electrocortical measures of perception and attention.

Poster 76
FEAR GENERALIZATION AS A FUNCTION OF BDNF AND 5-HTTLPR POLYMORPHISMS
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Descriptors: startle, fear conditioning, genetics
Recent studies have demonstrated that genetic variation in both the brain-derived neurotrophic factor (BDNF) and serotonin transporter (5-HTTLPR) polymorphism relate to abnormal startle responses in fear conditioning paradigms. In the present study, we simultaneously investigated the effect of both BDNF and 5-HTTLPR genotypes in a fear generalization paradigm. Participants were shocked following a CS+ and were also presented with stimuli that ranged in similarity to the CS+ (20, 40, or 60% smaller or larger than the CS+). Carrying the risky short allele of the 5-HTTLPR gene was uncorrelated with carrying the risky Met allele of the BDNF gene. Individuals who carried both non-risky alleles (n = 17) exhibited potentiated startle only to the CS+. Relative to this group, carriers of either risky allele (n = 30) showed potentiated startle to CS ±20% and CS ±40% stimuli, and a decrease in startle response to the CS+ itself. Thus, carrying either risky allele was associated with increased generalization of fear-potentiated startle. Finally, individuals who carried both the short allele of BDNF (n = 9) also showed greater potentiation of potentiated startle to CS ±20% and CS ±40% stimuli, but exhibited a further reduction in startle to the CS+. Collectively, these data suggest that variation in the 5-HTTLPR and BDNF genotypes have independent and additive effects related to abnormal fear conditioning.
measured brain event-related potentials (ERP) during a 'task-switching' Stroop task in which a pre-stimulus cue instructed participants to either read or name the color of the upcoming target word. Consistent with the idea that color-naming trials require more cognitive control (cf. MacDonald et al., 2000), the cue-locked ERP revealed enhanced preparatory slow-wave activation for color versus word cues. Concurrently, time-frequency (TF) analyses revealed reduced alpha power for 'color' versus 'word' cues just prior to target onset, indicating enhanced alertness preceding more difficult (color-naming) cues. Consistent with prior research, the target-locked ERP showed a significant effect for congruent (color-word match) versus incongruent (color-word mismatch) trials between 300 – 800 ms after target onset. TF analyses of the target ERP data revealed distinct theta (3 – 7 Hz) and delta (0 – 3 Hz) components contributing to the congruency effect. Theta was stronger for incongruent trials (particularly during color-naming), consistent with the idea that theta indexes cognitive effort and conflict monitoring. In contrast, delta was stronger for congruent trials across word-reading and color-naming trials. These findings demonstrate the utility of time-frequency analysis for identifying separable processes underlying brain potential responses in cognitive processing contexts.
component based approach. We found that our correction algorithm produced significantly greater improvement without introducing detectable artifacts.

**Poster 86**
EEG-DERIVED BIOMARKERS FOR DAYTIME SLEEPINESS IN PATIENTS WITH CHRONIC STROKE
Katherine Herron, Derk-Jan Dijk, Philip Dean, Ellen Seiss, & Annette Sterr
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Descriptors: sleep, EEG, stroke
Stroke patients with motor deficits often report daytime sleepiness. While slowing of the EEG during wakefulness has been shown after stroke, it is unknown if and how this is linked to their perception of sleepiness. Using waking EEG and a motor task (associated with mild sleepiness), we examined: 1) differences in the frequency composition and lateralsisation of the EEG between stroke patients and controls, and 2) the relationship between the EEG and subjective sleepiness ratings. EEG and Karolinska Sleepiness Scale (KSS) data were collected from 15 right hemispheric stroke patients and 15 matched controls before and after a motor priming task. Frequency analysis was performed on C3 and C4 channels. Prior to the task, the stroke group revealed increased power density below 10 Hz compared to controls for both hemispheres, with more pronounced effects within the lesioned hemisphere. The motor task significantly increased KSS scores in both groups. Increased beta and alpha activity was observed after the task in the control group. The stroke group showed post task increases in beta activity for the non-affected hemisphere and bilateral increases in alpha and theta activity. An association between KSS and the EEG was observed post task in the stroke patients within the theta and alpha bands. Therefore, slowing of the EEG is related to perception of daytime sleepiness in stroke patients. This effect may not have been observed in the controls due to the way in which the motor task manipulates sleepiness within each group, as it is more challenging for those with motor deficits.

**Poster 87**
FUZZY PICTURE PROCESSING: EFFECTS OF SIZE REDUCTION AND BLURRING ON EMOTIONAL REACTIONS
Andrea De Cesarei, & Maurizio Codispoti
University of Bologna

Descriptors: emotion, engagement, perception
Emotional engagement varies not only as a function of stimulus content, but also depends on stimulus imminence. Consistent with this, the picture-viewing context has it demonstrated that the affective modulation of skin conductance changes increases linearly with picture size, suggesting that stimulus imminence affects action preparation. However, stimuli which lie in the distance appear not only smaller, but also less detailed compared to closer objects. To disentangle the effects of size reduction from the detail loss associated with picture degradation, emotional and neutral images which were either reduced in size or low-pass filtered were presented. Affective modulations of startle reflex, skin conductance and heart rate were assessed, together with subjective ratings of valence and arousal. Loss in picture detail, achieved either by blurring or by size reduction, was associated with less pronounced affective modulation of skin conductance. Moreover, skin conductance change in response to mutilated bodies compared to neutral stimuli was more reduced when viewing small than blurred pictures, indicating that the visual angle may modulate sympathetic activation in response to the most arousing and unpleasant contents. On the other hand, emotional modulation of the startle reflex was not affected by either manipulation. The present results suggest that, as long as picture content can be identified, emotional cues engage the appetitive and defensive motivational circuits regardless of image resolution whereas action preparation varies with stimulus imminence.

**Poster 88**
MAKING SENSE OF HEMISPHERIC DIFFERENCES IN MEANING APPREHENSION
Padmapriya Kandhadai, & Kara D. Federmeier
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Descriptors: erps, semantic processing, cerebral hemispheres
This work examined semantic processing in the cerebral hemispheres by combining the visual-half field (VF) technique with event-related brain potentials (ERPs). Association strength and, in turn, predictability was manipulated between purely associated prime-target pairs, which shared minimal or no semantic features in common. Overall, in both hemispheres, ERPs to lateralized targets revealed significant N400 facilitation for associated pairs relative to unrelated pairs. This N400 facilitation was greater for strongly associated than weakly associated pairs in both VFs, suggesting broad similarity in sensitivity to associative strength across the two hemispheres. However, under passive task conditions, weakly associated pairs that possessed a strong reverse association from target to prime elicited enhanced late positive complex activity in the left hemisphere (LH), suggesting that the LH naturally employed controlled processes to reorder non-canonical meaning relations. The right hemisphere was also able to recruit such strategic
processes with more explicit task support. Further, consistent with findings seen in sentence processing studies, the present study revealed a LH benefit for processing moderately predictable (associated) pairs, suggesting that the LH seems better able to use top-down mechanisms to prepare for upcoming words, especially in contexts that afford only moderate predictions. In sum, these results suggest that the hemispheres differ in how they recruit top-down semantic mechanisms to mold similarly semantic representation and activation over time.

**Poster 89**

INTERACTING EFFECTS OF LEXICAL VARIABLES ON LANGUAGE-SENSITIVE ERPS AT THE SINGLE-ITEM LEVEL

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Descriptors: lexical variables, language processing, EEG/ERP
Effects of lexical variables on ERPs are typically measured on waveforms aggregated over many items and subjects. This approach allows for factorial analysis of the effects of single variables on single components, but cannot detail the interacting effects of lexical variables on single items. We collected EEG from 120 participants who viewed 300 orthographic items (75 each words, acronyms, pseudowords, and illegal strings), which varied systematically in length, orthographic neighborhood size (N), and frequency (words and acronyms only). With this large number of participants, we were able to compute stable ERPs representing responses to single items (e.g., representing only the response to the word “DOG.”) We find that a linear combination of length, N, and frequency explains an amount of variance in N4 amplitude similar to that explained by the same variables in naming latency tasks. Notably, we find that the relationship between N and N4 amplitude is stronger than that between frequency and N4 amplitude, despite the emphasis in the literature on the latter. Frequency instead exerts a smaller effect on the N4, and additionally affects the latency of the Frequency Sensitive Negativity (FSN), and the amplitude of the P2. Our results suggest that while the high level perceptual processing represented by the P2 and FSN is most strongly affected by frequency, the lexical semantic processing indexed by the N4 is more sensitive to N. More generally, our results demonstrate the feasibility of examining effects of lexical variables on ERPs at a single-item level.

**Poster 90**

ON THE FUNCTIONAL NATURE OF THE N400: THE LEXICAL INTERFERENCE CREATED BY NEIGHBOR FREQUENCY EFFECTS

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Descriptors: N400, sentence comprehension, lexical interference
Electrical scalp recordings have revealed the brain’s sensitivity, around 400 ms after the presentation of a stimulus word, to both the lexical properties of that word and its contextual fit with a previous context. This negative deflection (N400) has been suggested to reflect either the lexical processing of the target word or a post-lexical process for integrating a meaning into a context. To contribute further evidence to this debate, in the present study we directly tapped into the lexical recognition mechanism for a target word. The electrophysiological effects due to the lexical interference exerted by orthographically similar lexical units (orthographic neighbors) were monitored during a sentence comprehension study: Critical words could have neighbors of higher frequency or not, and they could follow either a highly constraining or a low constraining semantic context. Only the low constraining context words with neighbors of higher frequency elicited a larger N400 effect compared to words without higher frequency neighbors. In the high constraining contexts, the largely suppressed N400 - compared to the low constraining context - showed no effect of neighbor frequency. These results suggest that the N400 is the ERP manifestation of the lexical recognition mechanism. It is possible that in sentence context the higher predictability of a word leads to a top-down pre-activation of the lexical unit. This pre-activation facilitates the lexical selection mechanism since it cancels out the neighbor interference evident in the low-constraining sentence context.

**Poster 91**

ERP PARAFOVEAL-ON-FOVEAL EFFECTS DURING SENTENCE READING

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Descriptors: parafovea, reading, visual hemifields
During reading, words perceived parafoveally can facilitate their subsequent processing when they are fixated. The impact of parafoveal information on the processing of the word currently fixated is more controversial. Here, we provide electrophysiological evidence for fast integration of parafoveal and foveal information during sentence reading. Seventeen volunteers read 360 German sentences presented word-by-word at fixation. Each of these words (n) was flanked 2 degrees bilaterally by two different words: the next word in the sentence (n+1) to its right, and the previous word in the sentence (n-1) to its left. On 2/3 of the trials, one of the flanks (half the time on the right side and half on the left), sentence medial, was replaced by a word that was semantically incongruous with the overall sentence context. Event-related brain potentials (ERPs) time-locked to the onset of the critical triads showed N400 differences as a function of flanker congruity: Triads with incongruent flankers elicited larger N400s than triads with congruent flankers. The congruity effect for right-sided flankers was larger over right-parietal sites, whereas those for left-sided flankers had a more anterior scalp distribution. These results show that parafoveal information is integrated with the incremental sentence representation very quickly during reading, and that the processing of a word at fixation can be influenced by adjacent words.

**Poster 92**

ERP EFFECTS OF CODE SWITCHES IN LATE SECOND LANGUAGE LEARNERS WHEN READING

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Descriptors: bilingualism, code-switching, ERP
Event Related potentials were used to investigate the processing of code switches during sentence reading in second language learners. Participants were Spanish speakers classified in two groups depending on their English proficiency (high and low). Sentences were presented in English and half of them contained in the midst of the sentence an adjective in Spanish. Both groups showed an early negativity between 200 and 300 ms after word onset in response to code switches, which was localized at the left occipital-temporal electrodes. Also starting at 200 ms, a late negative wave, the P600, which is likely a post-lexical process for code switches from no code switches. In addition, code switching generated an enhanced negativity in the N400 time window. This negativity had a typical N400 distribution for the low proficient and a more frontal distribution for the high proficient. The effect was followed by a late positive component (LPC) with a maximum at the frontal sites for the low proficient and showing a right posterior distribution for the high proficient. This pattern of results could reflect the time-course of code switching processing: an initial detection of the switch attending to orthographic regularities (Left Occipital N250), followed by lexical integration efforts (N400) and reanalysis processes (LPC). The differences in topography suggest that high and low proficient bilinguals may use different strategies for integration and reanalysis. Finally, the common frontal effect could be associated with the executive control system monitoring the change from one language to another.

**Poster 93**

THE EFFECT OF FREQUENCY CHANGE DETECTION IN THE AUDITORY BRAINSTEM AND MIDDLE LATENCY RESPONSES

Lavinia Slabu, Sabine Grimm, Jordi Costa-Fadella, & Carles Escera
University of Barcelona

Descriptors: novelty detection, middle-latency potentials, auditory brainstem potentials
Humans are able to detect unexpected new events in the auditory environment. The neural correlates of change detection are commonly studied through the oddball paradigm that elicits a negative potential approximately 100 – 300 ms after the stimulus onset called mismatch negativity (MMN) response. Besides the temporal and possible frontal and parietal contribution to MMN generation, few animal studies reported a MMN called mismatch negativity (MMN) response. Besides the temporal and possible frontal and parietal contribution to MMN generation, few animal studies reported a MMN called mismatch negativity (MMN) response. The goal of the preliminary study is to investigate the effect of auditory frequency deviance detection in humans, in the time range of the auditory brainstem (ABR) and middle latency (MLR) responses. Broadband noise bandpass-filtered from 500 to 3000 Hz in steps of 50 Hz was delivered to the right ear. Left ear was masked with white noise. Three blocked conditions were presented: an oddball block with a deviant probability of p = .2; a reverse oddball block; and a control block in which stimuli of five different frequency bands were presented randomly, each with a probability of p = .2. The responses were recorded from 10 participants at Cz using right ear lobe as the reference. Our results indicate the absence of significant differences in the ABR. In the MLR time range differences were observed for the MLR latency at about 31 ms for deviants compared to standards, t(9) = 2.40, p < .04, and controls, t(9) = 3.14, p < .01, for the 500 – 1000 Hz frequency range. This might reflect a probability-sensitive index, clearly preceding MMN, even though not at the level of the auditory brainstem.

**Poster 94**

ULTRAFAST NOVELTY DETECTION IN THE HUMAN AUDITORY SYSTEM

Sabine Grimm, Lavinia Slabu, Jordi Costa-Fadella, & Carles Escera
University of Barcelona

Descriptors: novelty detection, middle-latency potentials, auditory processing
The rapid detection of changes in the acoustic environment is a crucial function of the auditory system allowing for prompt adaptive behavior to potentially relevant novel
events. Change detection is usually related to the elicitation of the mismatch negativity (MMN) – a component of the scalp potential evoked 100 – 250 ms after the onset of a rare stimulus. On the single-unit level, specific responses to new stimuli can already be seen at earlier latencies in so-called novelty neurons even in subcortical structures, suggesting that novelty detection is a pervasive property of the auditory hierarchy. In the present experiment we test this hypothesis by measuring long-latency (LAEP) and middle-latency auditory evoked potentials (MAEP) to frequency deviants in two ranges (800 Hz, 3730 Hz) in an oddball paradigm. Deviants were compared to physically identical stimuli presented frequently in a reversed oddball block (standard) and in a block intermixing randomly five equally rare tones of different frequencies (control). Latencies and amplitudes of the components P0, Na, Pa, Nb, and MMN were analysed. In addition to a clear MMN component, deviants elicited already in the time range of MAEP a present frequently in a reversed oddball block (standard) and in a block intermixing 800 Hz (MMN) – a component of the scalp potential evoked 100 – 250 ms after the onset of a rare stimulus. On the single-unit level, specific responses to new stimuli can already be seen at earlier latencies in so-called novelty neurons even in subcortical structures, suggesting that novelty detection is a pervasive property of the auditory hierarchy. In the present experiment we test this hypothesis by measuring long-latency (LAEP) and middle-latency auditory evoked potentials (MAEP) to frequency deviants in two ranges (800 Hz, 3730 Hz) in an oddball paradigm. Deviants were compared to physically identical stimuli presented frequently in a reversed oddball block (standard) and in a block intermixing randomly five equally rare tones of different frequencies (control). Latencies and amplitudes of the components P0, Na, Pa, Nb, and MMN were analysed. In addition to a clear MMN component, deviants elicited already in the time range of MAEP a distinct response. Particularly, the Nb component peaking at about 40 ms was enhanced for deviants compared to standards and controls in both frequency ranges. This response indexes an early process of novelty detection preceding the higher-order detection index MMN and supports the idea of a multitasking model of novelty detection.

Poster 95

NEURAL AND BEHAVIORAL EFFECTS OF TRYPTOPHAN DEPLETION ON EMOTIVE FACIAL PROCESSING IN DEPRESSION-PRONE INDIVIDUALS

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Descriptors: tryptophan depletion, facial expressions, ERP

Major depressive disorder (MDD) has been linked with disturbed processing of affective stimuli. Altered 5-HT system functioning has been implicated in both the etiology of MDD and in affective processing. This study assessed the effects of acute tryptophan depletion (TD), which transiently lowers CNS 5-HT, on neural responses to emotive facial expressions in individuals with a family history (FH+) of MDD. Within a randomized, double-blind and placebo-controlled design, event-related potentials (ERPs) were acquired in 20 FH+ individuals during a facial recognition task involving the presentation of facial expressions (sad, joy and surprise at 20% (neutral), 50%, and 100% intensities); participants were required to respond to expressions of surprise. Subjective ratings revealed increased depression, tension and confusion scores, and decreased calmness and contentedness with TD. Early positive (P1 and P2) and the face-specific N170 ERP components were differentially altered by emotional intensity and valence. The N170 was not modulated by TD, but was enhanced by expressions of happiness. Sad facial expressions enhanced P2 amplitude, regardless of region, while this effect was regionally-dependent on P1 amplitude. TD was associated with increased P1 and P2 amplitudes to sad expressions. Additionally, TD prolonged P2 latency to sad (100% intensity) expressions. As such, transiently lowered 5-HT levels altered brain activity in a manner suggestive of more sustained processing of sad expressions and impaired processing of positive ones in individuals susceptible to MDD development.

Poster 96

STARTLE BLINK DEFICITS IN PSYCHOPATHY ARE UNIQUELY ASSOCIATED WITH INTERPERSONAL-AFFECTIVE TRAITS

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Descriptors: psychopathy, fear-potentiated startle, low fear

Previous research has shown that psychopaths, relative to non-psychopaths, exhibit reduced startle blink potentiation during viewing of aversive stimuli. Available data have suggested that this deviation is related more to scores on Factor 1 (i.e., interpersonal-affective features) of the Psychopathy Checklist – Revised (PCL-R) than Factor 2 (i.e., impulsivity antisociality). The goal of the current study was to evaluate this idea in a sample of incarcerated offenders (N = 108) spanning a broad range of PCL-R scores, allowing assessment of the startle blink response with continuous PCL-R scores rather than discrete participant subgroups. To accomplish this, we recorded blink responses while participants viewed pictures of pleasant, neutral and unpleasant pictures drawn from the standardized IAPS database. Pleasant contents were further divided into erotic and nurturing scenes, while unpleasant contents were categorized into threat (e.g., spiders, snakes, guns pointed at the subject, etc.) and “victim” scenes (i.e., pictures of vicarious attack). Results indicated that higher overall scores on the PCL-R were associated with reduced startle responses for unpleasant but not pleasant pictures. Additionally, this effect was most marked for threat pictures. Further analyses confirmed that this reduced startle potentiation was selectively related to PCL-R Factor 1 rather than Factor 2. This pattern of results provides strong evidence for the idea that low fear is a key emotional deficit underlying psychopathy.

Poster 97

USING TIME-FREQUENCY ANALYSIS TO DISENTANGLE PROCESSES IN A CUED GO/NO-GO TASK

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Descriptors: cognitive control, ERP, time-frequency analysis

Response inhibition tasks (e.g., go/no-go) have been used to develop cognitive control theories. In the current study, a compound cue preceding a go/no-go target (75% go, 25% no-go) allowed for manipulation of preparatory and contextual effects on cognitive control by introducing several manipulations. These included: a tentative or certain directional cue that modulated anticipation of a left/right hand response, a gain or loss cue that indicated a gain or loss frame (i.e., correct responses result in a gain or avoid a loss), and a monetary cue (zero or ten cents) that indicated whether there was money at stake for the current trial. Event-related potentials (ERPs) were recorded using this cued go/no-go task (undergraduate students; N = 62). P2, N2, and P300 ERP components were measured to target stimuli, as well as a CNV prior to the targets. Results indicated that cue manipulations significantly modulated each time-domain measure. Time-frequency (TF) analysis, conducted to assess potential overlap in processes among these components, parsed target responses into distinctive theta (3 – 9 Hz) and delta (< 3 Hz) TF components. Results indicated that all three target-locked-time-domain components were characterized by a mixture of theta and delta activity. Further, time-domain effects were more parsimoniously described using the TF measures. Overall, findings from this study suggest that conventional time-domain measures represent a mixture of relevant neuro-cognitive processes more succinctly indexed by theta and delta frequency components delineated by the TF approach.

Poster 98

REDUCED P300 AMPLITUDE IN CRIMINAL PSYCHOPATHY IS RELATED TO EXTERNALIZING TENDENCIES: EVIDENCE FROM A SIMULATED GAMBLING TASK

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Descriptors: externalizing, P300, time-frequency

P300 amplitude reductions have been consistently related to impulse dysregulation problems (externalizing) in community samples using oddball tasks. Recently, similar reductions in P300 were demonstrated to feedback stimuli in a simulated gambling task through use of time-frequency (Bernat et al., submitted). This was in contrast to the feedback-related negativity (FRN) response to the same stimuli, which showed no such reduction. The current study investigated whether reduced P300 amplitude to feedback stimuli in this gambling task would be observed as a function of higher externalizing tendencies, as indexed by Hare’s PCL-R, in a sample of prisoners. Findings indicated that P300 reductions were related to higher PCL-R total scores, indicating that psychopathy predicted P300 in the expected (negative) direction. Importantly, the impulsive behavioral deviance factor (F2) was related to reduced P300 whereas the affective-interpersonal factor was not. This further supports the idea that P300 reductions are related to elevated impulse dysregulation across a broad range of individual variation. Interestingly, we found a positive association between the FRN response and F2 which was independent of the P300 reduction. This suggests that processes indexed by the FRN (exogenous monitoring) are operating intact for individuals across levels of impulse dysregulation, although appears to be increased within an incarcerated sample. Together, these findings support the idea that parallel neurobiological deviations may underlie externalizing tendencies across diverse samples.

Poster 99

PSYCHOPATHS SHOW DEFICITS IN SUBCONSCIOUS PROCESSING OF FEAR FACES

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University of Minnesota

Descriptors: psychopathy, ERP

Previous studies have reported that psychopaths have difficulty in recognizing sad or fearful faces, as compared to non-psychopaths (Blair et al. 2001, 2004; Stevens et al. 2001; Dolan & Fullam, 2006). It is unclear whether these deficits are due to difficulties in the explicit recognition of emotion or rather, a more fundamental deficit in the processing of emotional information. In the current study a sample of incarcerated male offenders, we investigated this question by using a binocular rivalry paradigm in which we presented images of neutral and fearful faces with or without interocular suppression noise, while we recorded event-related potentials. We compared the amplitude of the N170 component, which has been linked to facial recognition, between psychopaths and nonpsychopaths. Preliminary results show that for the visible condition psychopaths did not show any differences between fear and neutral faces while nonpsychopaths showed greater reactivity.
RESPONSE INHIBITION AND ERROR DETECTION RELATE TO IMPULSIVENESS

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Descriptors: response inhibition, error detection, impulsiveness

Impulsiveness has been linked to premature responses in attentional time tasks, such as the Eriksen flanker task or the go/no-go task. Premature responses may reflect a failure to properly inhibit prepotent responses or a lack of error monitoring. In the present study, 29 healthy adults were examined. Impulsiveness was determined by the Conners Adult ADHD Rating Scale in order to divide the participants into low impulsiveness (LI) and high impulsiveness (HI) groups. The LI group (n = 15, age = 23.10 ± 2.96) and the HI group (n = 15, age = 23.10 ± 2.96). Electroencephalogram (EEG) was recorded while participants performed both visual letter flanker and go/no-go tasks. Four event-related potential (ERP) components were examined, i.e., error-related negativity (ERN) and error positivity (Pe) from the flanker task, nogo-N2 and nogo-P3 from the go/no-go task. As expected, the results revealed that the HI group had a significantly enhanced nogo-N2 amplitude ($M = 8.14 \pm 5.48 \mu V$) compared to the LI group ($M = 3.31 \pm 3.44 \mu V$) with r(27) = 2.884, p = .004. The HI group exhibited a larger ERN amplitude ($M = 10.27 \pm 5.35 \mu V$) compared to the LI group ($M = 6.31 \pm 5.35 \mu V$), r(27) = 1.742, p = .047. No differences were found between the two groups in either Pe or nogo-P3 amplitudes. Our results suggest that healthy adults with a high impulsiveness tendency exert more effort in response inhibition (nogo-N2) and exhibit a larger error detection (ERN) response. Such effort may be necessary to sustain optimal task performance in daily life activities compared to adults with low impulsiveness.

CHANGING PERCEPTUAL LOAD IN VISUAL FLANKER TASKS AFFECTS ERN AMPLITUDE

William J. Gavin, & Patricia L. Davies
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Descriptors: ERN, perception, development

A diversity of visual stimuli each varying in demands on perceptual and cognitive processing has been used in studies of error-related negativity (ERN) employing flanker tasks. To investigate the effects of task demands on ERN amplitude, we manipulated the level of perceptual load in three paradigms by differencing the number of arrow symbols (1, 3 or 5). All 3 ERN paradigms were administered in a single session with the order of presentation counterbalanced across participants, 23 adults (18–23 years) and 13 children (9–10 years). Each paradigm consisted of 480 trials with a short break after each block of 240 trials. Increasing the perceptual load was successful in producing increased processing demand. Significant increases in mean number of errors and mean reaction times (RT) were found across both groups as perceptual load increased. Children made significantly more errors and had significantly longer RTs than adults. Significant interactions indicated that changes in task demands affected errors and RT more dramatically for children than for adults. ERN peak-to-peak amplitude significantly decreased for both children and adults as perceptual load increased. For 3 and 5 symbol paradigms, children had significantly smaller ERN amplitudes than the adults. However, the effects of perceptual loading and maturation on ERN amplitude were no longer significant when the number of segments (i.e. errors) is utilized as a covariate to control for possible attenuation of the ERN amplitude due to increased noise (e.g., latency jitter) introduced via segment averaging.

RELIABILITY OF ERN IN ADULTS PERFORMING A VISUAL FLANKER TASK

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Descriptors: ERN, reliability, signal processing

Impairment in performance monitoring may result in problems in everyday functioning. A reliable measure of underlying brain processing related to performance monitoring may be helpful in studying clinical populations. The error-related negativity (ERN) has been associated with performance monitoring. The purpose of this study was to examine the reliability of the ERN in a visual flanker task. In the present study, 21 healthy young adults (Mean age = 23.5, SD = 2.5; 10 males) completed a visual flanker task in each of two sessions, one week apart. The ERN peak-to-peak amplitude for session 1 ($M = 11.6$, SD = 5.4) was not significantly different from the ERN amplitude for session 2 ($M = 13.2$, SD = 5.0), F(1, 20) = 3.2, p = .087. The reliability of the ERN amplitude between sessions was significant and very high (Cronbach’s Alpha = .84; Pearson’s r = .72; ICC = .72).

RELIABILITY OF ERN IN CHILDREN PERFORMING A VISUAL FLANKER TASK

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Colorado State University

Descriptors: ERN, reliability, development

This study examined the test-retest reliability of the ERN in children. Fifty-three children ages 8 to 13 years (Mean age = 10.3, SD = 1.5, Males = 23) completed a visual flanker paradigm in each of two sessions one week apart. No significant difference was found between the ERN peak-to-peak amplitude for session 1 ($M = 7.5$, SD = 4.0) and session 2 ($M = 8.1$, SD = 4.7). Moderate reliability in ERN amplitude was found (Cronbach’s Alpha = .54; ICC = .37, p = .003). The reliability was examined after adjusting for trial-to-trial latency variability using an adaptive Woody filter to improve signal-to-noise ratios. The mean ERN amplitudes increased for session 1 ($M = 13.6$, SD = 7.8) and session 2 ($M = 14.6$, SD = 7.1) but difference between sessions was not significant. After adjusting for latency variability minor improvements in reliability was found (Cronbach’s Alpha = .55; ICC = .40, p = .001). To illustrate developmental differences, the 20 youngest children (< 9.6 years) revealed no reliability between session 1 and 2 (Cronbach’s Alpha = .01; ICC = .003, p = .51). For these children the latency adjustment had a large impact on reliability (Cronbach’s Alpha = .56; ICC = .39, p = .04). For the 33 older children, the reliability between session 1 and 2 was stronger (Cronbach’s Alpha = .66; ICC = .49, p = .002) though the adjustment for the latency variability had a similarly reliability lesser as the younger children. The results suggest the reliability of ERN amplitude is moderate for children between 8 and 12 years of age and that reliability improves with age.

PUT IT IN CONTEXT: THE INTERACTION OF AFFECTIVE ODDBALLS WITH EMOTIONAL CONTEXT

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Descriptors: affective oddball, emotional context, P300

The late positive potential (LPP) ERP component varies with valence and arousal in rapid (1/sec) presentation of emotional pictures. Further, we have demonstrated systematic LPP effects in the mood-like context of sustained, rapid presentation of emotional pictures of a single affective valence. Other work using oddball paradigms shows a potentiation of the P3 ERP component in response to visual affective oddballs; however, standard stimuli are almost always non-affective, thus failing to model an emotional context in which the target affective stimuli are processed. The present study employs a contextual affective oddball paradigm in which both standards and oddballs are IAPS images. Participants (N = 50) viewed six blocks, each with one “standard” emotional valence (pleasant, neutral, unpleasant) randomly interspersed with oddballs of a different
EEG ASYMMETRY PATTERNS IN INDIVIDUALS WITH HIGH AND LOW TRAIT ANXIETY
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Descriptors: asymmetry, anxiety

Resting frontal brain asymmetry is a correlate of individual differences in affective and motivational tendencies. Relatively greater left frontal activity is proposed to be associated with approach-motivated behaviors while greater right frontal activity is hypothesized to index withdrawal-motivated behaviors. However, the sparse research on asymmetry in anxious populations has been inconsistent with some researchers finding frontal asymmetry in anxious groups while others do not. Such inconsistencies lead Heller et al. (1997) to propose that anxiety is actually comprised of two distinct processes: anxious apprehension and anxious arousal. Heller et al. found that individuals characterized by anxious apprehension showed greater activity in the left hemisphere. The current study sought to replicate and extend the findings of Heller et al. (1997). In this study, a sample of individuals with high or low anxiety was selected based on their responses to the State-Trait Anxiety Inventory. A mixed-model ANOVA revealed a significant group by region effect for the anterior and posterior areas. Greater relative left parietal and occipital activity at rest was associated with the high anxious group. One hypothesis for the current findings is that anxious participants are engaged in more subvocal, verbal thoughts during the task. The utility of subdividing the alpha frequency range (8–13 Hz) into lower alpha (8–10 Hz) and upper alpha (11–13 Hz) will also be discussed.

DO WE CARE ABOUT THE POWERLESS THIRD? AN EEG STUDY ABOUT SOCIAL INTERACTION IN ECONOMIC DECISION MAKING
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Descriptors: three person ultimatum game, EEG, fairness

We were interested in the role of the player involved in the three-person (passive) player influences the processing of different offers in the ultimatum game. Therefore we recorded event-related potentials (ERP) simultaneously while subjects were playing the three-person ultimatum game; one person in the role of the dummy, the other one in the role of the responder. Nineteen pairs of subjects of the same sex had been tested. Both players were seated in the same room, while DC-EEG was recorded from 61 scalp electrodes. Behavioral data are in behavioral and EEG data. The current study sought to investigate the role of the dummy in the Ultimatum Game. We expected that the dummy would have a small impact on the processing of the offers, as they are not the ones receiving the offers. However, we also expected that the dummy would influence the processing of the offers received by the responder, as they are the ones receiving the offers. Therefore, we recorded ERP data while subjects were playing the three-person ultimatum game and compared the processing of offers received by the dummy and the responder. The results showed that the dummy had a small but significant impact on the processing of the offers received by the responder. This suggests that the dummy can act as a marker of individual differences in empathy.

AUTONOMIC REACTIVITY AS MARKER OF INDIVIDUAL ATTITUDE TO A VIOLENT EVENT: ROLE OF PSYCHOTICISM IN APPRAISAL PROCESSES
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Descriptors: baroreflex, personality trait, information processing

The Eysenkan psychoticism scale is highly utilized in psychological practice to evaluate predisposition to antisocial behavior. A decreased ability for empathy was proposed in subjects with high psychoticism, which would determine low mental rumination coupled with low autonomic load related to processing of affective stimuli with violent content. Sixty-four healthy subjects (35 women) were recruited from the Moscow community by advertisement. The study was composed of three experimental sessions with audio presentation of three short texts with different violent contents. The subjects were evaluated for psychoticism. Heart rate before and as a response to Valsalva maneuver after violent text presentations compared to the rest period, while low scores of psychoticism were associated with enhanced heart rate reactivity during recovery periods. This reactivity was also related to level of violence in the content of the texts. These differences in autonomic reactivity are proposed to reflect personality trait- and text content-dependent variations in level of engagement in processing of information and were associated with individual levels of mental rumination that persisted after exposure to affective texts. Thus the autonomic process traced by Valsalva maneuver appeared to be a physiological component of cognitive activity evoked by violence or violent behavior perception.

ERROR PROCESSING, TASK DIFFICULTY AND MOTIVATION IN SCHIZOPHRENIA: AN EVENT-RELATED FMRI STUDY USING A SPEEDED FLANKER-TASK
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Descriptors: error monitoring, schizophrenia, cognitive control

The rostral cingulate Zone (RZC) is currently associated with processes of error monitoring, effort and error probability. Earlier studies showing activation differences in this area between patients and healthy control subjects had the shortcoming of usually large behavioral differences in the error rates of the two groups. In the present study functional magnetic imaging (fMRI) was applied in a modified Eriksen Flanker-Tank with adaptive
time pressure in order to achieve a comparable number of errors for patients suffering from Schizophrenia and healthy control subjects. Behavioral data supports the assumption of a robust interference effect. Increased activation for error minus correct trials compared to the matched healthy control subjects with comparable behavioral parameters. The results will be discussed referring to the role of task difficulty and the putative motivational deficit of schizophrenic patients.

**Poster 112**

DETECTING RECOGNITION OF FAMILIARITY IN FACES USING SCR IN A PATIENT WITH MINIMALLY CONSCIOUS STATE (MCS):

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Descriptors: skin conductance response, face familiarity, covert recognition

Autonimous variables can be useful to evaluate cognitive functions in cases were verbal and nonverbal communications is impaired. In this study we examined the reactivity of the autonomic nervous system using skin conductance response (SCR) to familiar and unfamiliar faces in a traumatic brain injury patient who transitioned from a vegetative state to a minimally conscious state. An Autogenics AT64 Portable SCR unit coupled to a neurometric system was employed to record SCR (microSiemens) in synchronism with the onset of faces at the screen. Each stimulus was presented for 5 sec and the next was delayed until the SCR recording returned to baseline. The familiar faces included 15 pictures of people with a close relationship with the patient categorized using a familiarity scale. A subset of 11 unfamiliar faces (same distribution of gender and age of the familiar faces) was employed. The average response of all the epochs corresponding to the two experimental conditions showed a marked negativity to the familiar faces with bigger amplitude 6 sec after the stimuli. The SCR structure was different in the two conditions but the recovery time after familiar faces was longer and habituation was not found. ERPs in a similar paradigm showed no significant difference between familiar and unfamiliar faces. Conclusion: in MCS, where physical and verbal answers are restricted and voluntary actions almost inexistent, the preserved SCR provided insight into mental activity related to the perception and processing of recognition of familiar faces even in the absence of observable behavior.

**Poster 113**

DIRECTED ATTENTION TO AUDITORY, TACTILE OR VISUAL STIMULI ACTIVATES MODALITY-SPECIFIC SENSORY CORTEXES AND A COMMON FRONTO-PARIETAL NETWORK IN THE ABSENCE OF STIMULATION

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Descriptors: attention, modality, fmri

We studied the neural correlates of directing attention to the modality of task-relevant stimuli, using event-related (fMRI) to measure brain activity in 24 healthy participants during a simple reaction-time task. A visual cue indicated the modality of the upcoming target stimulus, which could be either a white square, a 1000-Hz tone, or a vibrotactile stimulation at the ring finger. To detect brain areas that mediate top-down attention to stimulus modality, we only analyzed trials without target stimuli (33%) to avoid confounds from bottom-up processes. Auditory vs. tactile or visual attention yielded stronger activity in superior temporal cortices. Analogously, tactile vs. auditory or visual attention yielded stronger activity in anterior parietal areas. Visual vs. auditory or tactile attention produced stronger activity in superior lateral and inferior medial occipital areas. A conjunction analysis across all three conditions revealed a bilateral network comprising posterior parietal, dorsal premotor, supplementary motor and lateral occipital areas as well as unilateral activity in the right anterior insula, temporo-parietal junction, and midle frontal gyrus and in the left basal ganglia. These results corroborate the notion of specific expectancy-related activity in early and late sensory cortices across modalities and modality-independent activity in a bilateral motor-preparation network. The preparatory activity in sensory areas may reflect a top-down bias to facilitate processing of stimuli in the expected modality, which originates from a fronto-parietal network.

**Poster 114**

EFFECT OF WILLINGNESS ON DECEPTIVE AND HONEST RESPONSES IN A TWO-STIMULUS PARADIGM: AN ERP STUDY

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Descriptors: deception, P300, n2b

The current research employed the two-stimulus paradigm to investigate the effect of willingness in truthful and deceptive responses. In the two-stimulus paradigm, subjects are instructed to determine to make deceptive or honest response to the firstly presented word by oneself and should make a opposite response to the second word. If a subject determined to be deceptive in response to the first presented word (self-determined deception), then the subject should respond to the second word truthfully (forced truth). Event-related potentials were recorded while participants were performing a deceptive and honest-task to memorized and new words. Results showed that the reaction times were faster to old words than to new words, truthful responses were faster than deceptive responses. Concerning ERP results, the P300 elicited by old words were larger than new words, yet truthful and deceptive responses could not be distinguished. On the other hand, the cognitive conflict-related N270 component was more negative-going in the forced lying versus self-determined responses. Moreover, there was a strong interaction (willingness and response type): deceptive response elicited more negative N270 compared to truthful response in the self-determined situation. This difference disappeared during forced responses. The dipole analysis revealed that self-determined lies elicited stronger activation in the anterior cingulate cortex than did forced lies. Results suggested that self-determined lies involved more cognitive control and emotional response than did forced lies.

**Poster 115**

THE EFFECTS OF EARLY DEPRIVATION ON THE PSYCHOPHYSIOLOGY OF AFFECTIVE PROCESSING DURING ADOLESCENCE

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Descriptors: adolescence, early adversity, emotion processing

Disturbances in early caregiving (i.e. maternal deprivation due to institutionalization) will affect the affective circuitry that is later challenged by neurodevelopmental change during adolescence. Sample: Adolescents (M age = 12.9, SD = .7); Control condition; born/raised in Minnesota (n = 52); Early Adopted condition: adopted 8 months from orphanages (n = 37). Participants viewed 75 pictures (IAPS: pleasant, neutral and aversive) while listening to auditory probes. The startle response and the post-aural reflex (PAR) were collected as measures of defensive and reward processing respectively. All groups showed heightened startle to aversive pictures and heightened PAR to pleasant pictures. Early deprivation affected overall average magnitude of the startle response, F(2, 97) = 9.76, p < .05. Control < overall PAR magnitude than Early Adopted and Post-Institutionalized adolescents. Early adversity has a non-linear association with affective processing. Moderate early challenges lowers physiological sensitivity to aversive context, (lower startle), while both highly protective and highly adverse contexts result in higher sensitivity (Boyce & Ellis Biological Sensitivity to Context Theory). However, results suggest that early adversity affects sensitivity to rewarding contexts in an opposite direction: moderate early adversity enhances reward sensitivity and both low- and high-early challenges lowers reward sensitivity.

**Poster 116**

INTERACTION EFFECTS BETWEEN LOCATION AND DIRECTION OF STIMULUS IN THREE STIMULUS-RESPONSE COMPATIBILITY TASKS

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University of Santiago de Compostela

Descriptors: stimulus response compatibility, Simon effect, LRP

RT to laterally presented stimuli are faster when the location of the response corresponds with the location of the stimulus than when it does not, even if the spatial location of the stimulus is not task-relevant (Simon effect). In the present study three stimulus-response compatibility (SRC) tasks with response to stimulus color (a red or a blue arrow) were utilized. In the first task two irrelevant stimulus dimensions were considered: location (left or right hemicampus) and direction (left or right) of the arrow, with the aim of determining the behavioral (RT) and psychophysiological (LRP) interference in the conditions in which one or two irrelevant dimensions were incompatible with the response to color. With the same aim another two tasks were utilized, each with one of the irrelevant dimensions. A behavioral interference effect was observed for the stimulus location in both tasks and for the direction in the simple task. The interference was located in the response selection phase (LRP) and was larger for the location than for the direction of the arrow, which is consistent with the higher capacity of the stimulus location to involve attentional resources. In the first task interference effect was not observed when the direction was incompatible; neither interaction effect was observed when both irrelevant dimensions were incompatible with the color response, probably due to an attentional masking of the direction provoked by the different speed that position and direction are processed.
EVENT-RELATED POTENTIALS IN A COLOR-WORD STROOP TASK: AGING EFFECTS

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Descriptors: stroop task, ERP, aging

Reaction Time (RT) and Event-Related Potentials (ERPs) elicited by congruent and incongruent color-word stimuli of a Stroop task in which participants were required to judge the congruence/incongruence of the two dimensions of the stimuli, were recorded in two groups of participants: young adult and older adult group. The RT was longer to the incongruent than to the congruent stimuli (Stroop effect) in both groups. The older adult group showed longer RTs than the young adult group, but there was no Group x Condition interaction. N2 and P300 latencies were longer for the older adult group. P130 amplitude was larger and P300 amplitude was smaller for the older adult group. With regards to the Condition effect in each group, while the older adult group showed larger N2 amplitude to congruent than to incongruent stimuli, the young adult group showed larger P300 amplitude to congruent than to incongruent stimuli. The results would reflect that in spite of the slowing-down in the TR and in N2 and P300 latencies in the older age group, the temporal locus of the semantic conflict, which intervenes in generating the Stroop effect, may occur within the time interval between 300 and 450 ms for both groups, although it is related with different ERP components for each age group: with N2 in older adult group and with P300 in the young adult group.

APPLIED TENSION AND BLOOD DONATION REACTIONS: THE ROLE OF ANXIETY

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Descriptors: vasovagal reactions, anxiety

Applied Tension (AT) reduces dizziness and faintness in people with blood/injury phobias and patients undergoing invasive procedures. This study investigated psychophysiological mechanisms of AT. Healthy adults (N = 132, 51 males) viewed a 30-min video of blood collection procedures and were randomly assigned to control (n = 64) or AT condition. The AT group was shown a video on the AT isometric muscle tensing technique prior to the blood film, and practiced AT constantly. Continuous psychophysiological measures (Systolic/Diastolic BP, HR, EDA) were obtained. Participants completed the Spielberger Anxiety scale, the Blood Donation Reaction Inventory (BDRI), and the Medical Fears Survey - an indicator of fear of needles/injections/blood. A Sex x Condition x High/Low Medical Fears Blood/Injection (MFI) GLM was conducted on the BDRI. A main effect of MFI was found.

VASOVAGAL SYNOECE AND APPLIED TENSION IN THE BLOOD DONATION SETTING: THE ROLE OF ANXIETY

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McGill University

Descriptors: vasovagal syncope, anxiety, blood donation

For the most part, despite the blood loss inherent in blood donation, symptoms such as dizziness and fainting typically reflect classic stress-related vasovagal reactions. Research has increasingly implicated anxiety reduction as a mechanism of the effects of the muscle tensing technique Applied Tension (AT) on blood donation related symptoms. This study investigated the issue further by comparing groups asked to practice AT at different points in the blood donation process. Healthy inexperienced blood donors (N = 136, fewer than 5 previous blood donations) were randomly assigned to groups asked to practice AT Pre-Donation, During Donation, Both (Pre/During), or Neither (Control). Measures of heart rate, blood pressure, and several psychological variables were obtained before and after donation. Questionnaires included the Blood Donation Reactions Inventory (BDRI), a measure of vasovagal symptoms, and the Medical Fears Survey. A 2 (sex) x 4 (condition) x 2 (high/low blood draw fear) ANOVA of BDRI scores produced significant main effects of condition p = .042, sex, p = .030, and blood draw fear, p < .001. Most important, AT practiced pre-donation significantly reduced vasovagal symptoms as compared to no treatment controls. To investigate the physiological data, ANCOVAs of change scores, controlling for the effects of baseline values, were performed. The ANCOVA of heart rate revealed a significant Sex x Condition x Blood Draw Fear interaction, p = .048. The results suggest that AT may function in part by reducing anxiety and maintaining cardiovascular activity.

MODIFICATION OF THREAT PROCESSING IN NON-ANXIOUS INDIVIDUALS: AN ERP STUDY

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Descriptors: emotion, attention, ERP

An attentional bias toward threatening stimuli is thought to underlie the development and maintenance of anxiety. This bias can be induced in non-anxious individuals through training, using a modified dot-probe task. The aims of the current study were to examine changes in ERP components reflecting attention as a function of training, and to examine whether individual differences in ERP amplitude were related to stress vulnerability. The dot-probe paradigm consisted of simultaneously presenting neutral and angry facial expressions, followed by a probe located behind the angry (congruent trial) or neutral (incongruent trial) face. After a pre-assessment of attention bias to threat, the training group (n = 17) received only congruent trials whereas the control group (n = 17) received an equal number of congruent and incongruent trials. After training, participants completed an attention bias assessment and a stress task. Following training procedures, the training group significantly increased their attention bias to threat and showed increased emotional vulnerability to stress compared to controls. The training group showed an increase in P2 amplitude, a component associated with threat processing, whereas the control group showed a decrease in P2. Moreover, in the training group increased P2 amplitude was related to increased emotional vulnerability during the stressor. Thus, induction of attention bias to threat is associated with increased neural response to threatening facial expressions and the magnitude of such neural response is related to stress vulnerability.

EMOTIONAL REGULATION THROUGH FOCUSED ATTENTION: AN EVENT-RELATED POTENTIALS STUDY

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Descriptors: erps, emotional regulation, affect

Event-related potential (ERP) studies have revealed that cortical activity is affected by the emotional arousal value of picture stimuli from around 250 ms (i.e. larger amplitudes for high vs. low arousing pictures; the “late positive potential”, LPP). In this experimental, we investigated whether emotional regulation would modulate the LPP in women and in men. Twenty-two participants (12 F, 10 M) were presented with positive pictures of high and low arousal value to elicit the LPP. The participants were instructed to appraise the emotional value of the pictures without making any overt response, and to gaze at a central fixation point. Pictures were presented for either 3000 ms or 350 ms in a mixed list, and were followed by a visual mask (300 ms). A pre-stimulus cue (3000 ms) indicated whether the picture stimulus had a short or long duration. We hypothesized...
that short stimulation would elicit a larger LPP due to an increased attentional focus during early processing stages. The LPP was analyzed for the Cz electrode site at 250–350 ms latency. Results show that in women, but not in men, short duration was associated with a larger LPP compared to the long duration (a three-way interaction effect of gender × picture duration × picture arousal; p = 0.13). The results indicate that in women, focused attention can amplify the cortical processing of affect on an event-related basis.

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AFFECTIVE REACTIONS IN FINANCIAL DECISION-MAKING: THE CASE OF PROFESSIONAL TRADERS

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Descriptors: decision-making, traders, somatic marker hypothesis

A controversy in economics is whether financial markets are governed by rational or emotional forces, therefore it seems plausible to apply Damasio’s Somatic Marker Hypothesis (SMH) in the field of finance. We tested the role of affective reactions in those individuals who are supposed to be the most rational decision makers in the population: financial traders. Forty-five traders and 45 bank clients underwent the Iowa Gambling Task (IGT) while their skin conductance responses (SCRs) were recorded before and after each card selection. According to Damasio’s hypothesis, each behavioral option becomes associated with an unaware anticipatory somatic response that either encourages or discourages a certain choice. Traders showed a higher sensitivity to punishment compared to controls as demonstrated by bigger anticipatory and punishment SCRs to disadvantageous choices (t = 3.47; p < .0001 and t = 5.77; p < .0001, respectively). Apparently, experienced traders learn to develop hyposensitivity to big gains but not to big losses. A multiple regression model was computed to predict the IGT score by anticipatory SCRs to disadvantageous decks and subject group as predictors. Both predictors were significant (R Square = .21) showing that being trader (b = −.07; p < .0001) and having higher anticipatory SCRs to risky choices (b = −.01; p = .04) were predictors for the best score at the test. Given the need to make rapid decisions, traders asserted to follow their intuition; this insight can be the consequence of such mechanisms.

THE IMPACT OF COLD PRESSOR STRESS ON VOICE PITCH (F0)

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Descriptors: acute stress, cold pressor, voice pitch

The voice is an important carrier of paralinguistic information. Listeners immediately draw conclusions about the speaker's characteristics, especially about emotional state. It is assumed that stress raises the tension of the larynx muscles leading to a higher voice pitch (F0). But until now, there has been no universal empirical evidence. This might be partially due to the application of non-validated tests and/or stress provocations, respectively. In this study, we investigated the influence of a validated stress test (cold pressor) on the voice pitch (mean F0) in 36 healthy subjects. The cold pressor stress test is a well-established and simple procedure with well-documented sympathetic activation and neuroendocrine responses. The heart rate was significantly higher (p = .03) during the cold pressor test procedure (86.53 ± 16.11 bpm) than during a control condition with hand in warm water (79.52 ± 11.77 bpm). The mean F0 was moderately raised (p = .03) while reading a standard text during the cold pressor test compared to the control condition. This result supports findings of a stress-induced acute rise of voice pitch.

CONFOUNDING INFLUENCES ON LONG-TERM ELECTRODERMAL RECORDING

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Descriptors: ambulatory monitoring, skin conductance

Long-term electrodermal recording has rarely been reported in the literature. Theoretically such recording could contribute to the study of emotions (especially anxiety) and stress in people with and without mental disorders. Investigators may have been discouraged by the possibility that long-term recordings in daily life might be subject to uncontrollable influences of electrode deterioration, ambient temperature, physical activity, and time of day. Measures may also vary with individual differences in age, gender, race, body mass index (BMI). We recorded skin conductance level (SCL), the number of non-specific fluctuations (NSFs), ambient temperature, and physical activity in 50 healthy control subjects for a 24-hour period. SCL was much higher and NSFs much more frequent during waking than during sleep. Electrode sensitivity declined 13% over 24 hours. Higher age was associated with lower mean SCL, and women had a higher mean SCL and number of NSFs. Higher ambient temperature was related to more NSFs during the day. Neither race, nor BMI, nor physical activity affected our electrodermal measures. Eighteen participants repeated the monitoring after 8 weeks. They showed high within-subject correlations between days in SCL and in number of NSFs, both during waking and sleeping. In this subgroup, electrode sensitivity declined 24% during the second recording day. Thus, future long-term electrodermal studies should record temperature, and need to correct electrodermal measures for temperature effects and skin electrode deterioration.

IMPLICIT MEMORY AND AUTONOMIC REACTIVITY IN AN ADULT COMPLEX TRAUMA SAMPLE

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Descriptors: trauma, implicit memory, RSA

Survivors of childhood abuse have complex presentations with respect to symptoms, physiology and cognition. Though childhood abuse occurs frequently within our society, few studies have examined psychophysiology and cognition in adult survivors of childhood abuse; instead, studies have focused on survivors of acute traumas, or on abused children. This study examines autonomic reactivity and implicit memory over the course of 16 weeks of therapy in women who have experienced childhood abuse. Participants participated in a word-stem completion task and standardized cue physiological challenge task before therapy and again after 16 weeks of treatment. Therapy occurred in a naturalistic setting and was not manualized. At pre-treatment, participants showed implicit memory biases towards anxiety- and trauma-related words, and against positive words. Participants also evidenced a pattern of elevated heart rate and respiratory sinus arrhythmia, and decreased skin conductance during the challenge task. Lower RSA and higher implicit memory for trauma words were related to increased symptoms of PTSD and interpersonal sensitivity. Following therapy, change in implicit memory and physiology was related to use of therapy techniques which focused on unconscious processes and early relationships, rather than on challenging beliefs. These data provide valuable insight into how severe trauma impacts cognition and physiology over a developmental trajectory.

CAN IMPLICIT MEASURES CONTRIBUTE TO THE PREDICTION OF AVOIDANCE BEHAVIOR AND PHYSIOLOGICAL FEAR RESPONSES TOWARDS SPIDERS?

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Descriptors: implicit measures, prediction study, fear/anxiety

Research with implicit measures has shown that anxiety is associated with a threat-related attentional bias and threat-related associations. However, there is ongoing debate to what extent these measures predict real life behavior. Our study was designed to investigate the predictive power of a spider-flower IAT, a spider dot probe task, a spider interruption task and the Fear for Spiders Questionnaire (FSQ) on the approach of a real spider as well as on physiological responding (heart rate and skin conductance) during an anticipation phase, a picture viewing phase, and a live spider viewing phase. The data of 36 participants show that explicitly measured spider anxiety strongly correlates with avoidance behavior, and with physiological responding in the picture viewing phase. Although we obtained meaningful associations between the implicit measures and the outcome measures, none improved the predictive power of the explicit measures. Our results indicate that explicit measures of fear are still the best predictor of future behavior, and cast doubt on the incremental predictive power of implicit measures.

EFFECTS OF BIOFEEDBACK ON SKIN CONDUCTANCE AND HEART RATE IN DEPERSONALIZATION DISORDER

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Descriptors: biofeedback, SCL, HR, depersonalization disorder

Objectives: Based on previous psychophysiological research outlining hypooxic autonomic response in patients with depersonalization disorder, the objective was to ascertain whether increasing autonomic arousal would ameliorate specific symptoms of emotional blunting, disembodiment and estrangement from self, in such patients using a biofeedback paradigm. Method: Thirty-two patients with a DSM-IV diagnosis of depersonalization disorder received 8 sessions of electrodoscan biofeedback, concomitant to heart rate recording, over a 4 week period. Results: Unlike prior investigation of skin conductance response in people with depersonalization, patients showed significant elevated baseline skin conductance levels compared to healthy controls. Heart rate variability spectra showed significant increases in the low frequency bandwidth following Fast Fourier Transformation, reflecting increased vagal tone and relaxation, consistent with the reductions in sympathetic activity indexed by skin conductance level.
Contrary to our hypothesis, a decrease in autonomic arousal alleviated symptoms of depersonalization. Conclusions: Depersonalized patients were unable to increase physiological levels, suggesting the disorder reflects problems in autonomic arousal regulation, affecting appropriate emotional and physiological responsivity. As baseline skin conductance levels were significantly higher than healthy controls, a future therapeutic target would be to 'normalize' such levels in patients.

**Poster 129**

DEPRESSION AND BIASED ATTENTION: EVIDENCE FROM SKIN CONDUCTANCE RESPONSES

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Descriptors: SCR, attention, emotion
The present study investigated psychophysiological differences in skin conductance responses (SCRs) for attention biases related to anxious and depressive symptomatology. Twenty-one undergraduate students (mean age 22.6 years), participated in a rapid serial visual presentation task (RSVP). Participants' depression and anxiety symptomatology were accessed with the Brief Symptom Inventory. Skin Conductance was continuously recorded during the RSVP task performance. Trials consisted of a stream of 15 images, in which participants had to search for one target (neutral image rotated 90° to the left or to the right). A critical distractor (emotionally negative, positive, or neutral), preceded the target either two or four items in the stream. The largest increase in conductance in a time window from 1 to 4 seconds after onset of the critical image was scored as the SCR elicited by the distractor stimulus. Trials with artifacts were excluded from analysis, while trials with no detectable response were scored as zero. Results showed increased SCRs for emotional critical distractors to be related to depressive but not with anxious symptomatology. Specifically, depressive symptomatology was significantly correlated with larger SCRs to emotional critical distractors, both with positive and negative valence. These findings are consistent with psychophysiological changes in SCR during emotional-information processing, and in line with recent work documenting an association between depression and biased attention.

**Poster 130**

EFFECTS OF EXPOSURE TO NATURAL SOUNDS AND ENVIRONMENTAL NOISE ON PHYSIOLOGICAL STRESS RECOVERY

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Descriptors: stress recovery, positive sounds, SCL
Research suggests that psychological stress reactions may be reduced by visual impressions from natural environments as compared to urban or built-up environments. The present experiment tested whether similar effects may be found by auditory stimulation. Forty university students were tested in an experiment with four consecutive recovery sessions after stressful mental arithmetic tests. The independent variable was type of sessions from natural environments as compared to urban or built-up environments. The main result was that the PEP of depressive subjects not taking antidepressants did not differ from the controls (5.5 ms and 11.1 ms shorter with effect sizes of d = .311 and d = .627 respectively). In contrast, depressed subjects using selective serotonin re-uptake inhibitors (SSRIs) had a longer PEP than the controls. This study shows that depression itself is not associated with increased sympathetic activity in comparison to healthy controls, but that some antidepressants significantly increase sympathetic activity, whereas SSRIs seem to decrease sympathetic activity.

**Poster 132**

HABITUATION RATE AND ADHD SUBTYPE IN A LARGE SAMPLE OF PREArowse1022OS CHILDREN

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Descriptors: ADHD, skin conductance, habituation
Childhood ADHD and decreased electrodermal responding (EDR) have both been associated with increased risk for antisocial behavior later in life and are both highly heritable. Evidence is mixed, however, on whether ADHD is associated with reduced EDR, and whether ADHD subtypes may play a role in moderating these relationships. The present study, therefore, examined the relationship between EDR and ADHD subtypes (ADHD-inattentive, ADHD-hyperactive, and ADHD-combined) during a habituation paradigm. Subjects were 403 male and 414 female twins (mean age 11.9 years; range, 10.9-13.0) from a large population-based sample drawn from the Minnesota Center for Twin and Family Research Enrichment Sample, whose sampling method was designed to increase the number of subjects with externalizing disorders in both sexes, making it particularly useful for the present study. Subjects were separated into four groups: those with one of the 3 ADHD subtypes or those with no disorder (controls). Skin conductance responses (SCRs) were recorded as subjects focused their attention on a series of tones, occurring approximately once per minute, while watching a moderately engaging, closed-caption movie. ANOVA revealed a significant main effect of group, with the ADHD-combined group habituating fastest to the tones and control subjects habituating slowest—a significant difference by post-hoc tests. Preliminary analyses further suggest that comorbid disinhibitory disorders may moderate these results, suggesting that an underlying externalizing factor may help to explain the variation between groups.

**Poster 133**

DIFFERENTIATING ORIENTING AND DEFENSIVE RESPONSES TO CONCEALED INFORMATION: THE ROLE OF VERBALIZATION

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Ghent University

Descriptors: orienting reflex, deception, concealed information test
Using physiological measures, concealed information can be validly assessed. Orienting theory has been proposed to account for concealed information testing. As orienting is characterized by heart rate deceleration, one would expect this type of heart rate response to concealed information. However, with some exceptions, an initial heart rate acceleration to concealed information is typically observed. In the present paper, we examine the role of verbalization to explain the mixed pattern of heart rate changes. Using a within-subjects design, 30 participants were asked to either remain silent or to give an overt verbal response (“yes”/“no”) to concealed autobiographical and control information. The results indicate that verbalization accounts for the initial heart rate acceleration. In line with the orienting theory, initial heart rate deceleration was observed when participants remained silent.

**Poster 134**

PALMAR AND PLANTAR SKIN CONDUCTANCE RESPONSES TO STIMULUS REPETITION AND STIMULUS CHANGE

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Descriptors: palmar skin conductance, plantar skin conductance
Eccrine sweat glands that are intimately involved in the generation of skin conductance responses (SCRs) are primarily located at palmar and plantar surfaces. In psychophysiological research, SCRs are usually recorded from palmar sites, while plantar recordings are only occasionally used in special circumstances. The present study was designed to systematically compare palmar and plantar SCRs to stimulus repetition and stimulus change. For that purpose, pictures of the International Affective Picture System (IAPS) were presented to male subjects (N = 40), while SCRs were concurrently measured from palmar and plantar sites by two constant voltage systems (0.5 V). During the habituation phase one picture (low arousal, neutral valence) was presented 15 times. On subsequent trials, 3 picture sets (5 pictures each) were presented. Here, half of the subjects viewed high arousal pictures (neutral valence), while the other half viewed low arousal pictures (neutral valence). The main findings were: (a) plantar SCR-amplitudes were significantly smaller...
than palmar amplitudes; (b) latencies of plantar SCR-amplitudes were longer than latencies of palmar amplitudes, while there were no differences in rise time between the two recording sites; (c) habituation of plantar SCR-amplitude was slower than habituation of palmar responses; (d) the effects of changes in arousal were more pronounced at plantar sites. These results are discussed with reference to a potential application of plantar measures as well as to the physiology of palmar and plantar sites.

**Poster 135**

CAN AUTONOMIC CARDIOVASCULAR REGULATION PROFIT FROM AEROBIC EXERCISE AND HEART RATE-VARIABILITY BIOFEEDBACK?

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Descriptors: autonomic cardiovascular regulation, aerobic exercise, heart rate variability, biofeedback

Deficient autonomic cardiovascular regulation (ACR) is a concomitant feature of several severe illness states (i.e. depression, hypertension, anxiety and somatoform disorder). The question arises by what means these observed dysfunctions in ACR can be reduced. In our laboratory data of three experimental trials are available. Aerobic exercise was administered in somatoform and anxiety patients (study 1), heart rate variability-biofeedback in hypertensive (study 2) and depressive patients (study 3). ACR was indexed by heart rate variability (HRV) and baroreflex-sensitivity (BRS), established by spectral analysis. In 89 subjects of study 1 BRS-increase was correlated with the relative increase of exercise during the observation period. HRV was higher in the experimental group, reaction latency was slightly diminished. In studies 2 (N = 36) and 3 (N = 45) hypertension and depression were only mildly changed. ACR, however, was positively affected, especially during the first phase of the intervention. Subsequently the counter regulation took place. The findings show that a reduction of ACR dysfunction is possible, but that a high and possibly long-lasting dose of either exercise or biofeedback is necessary.

**Poster 136**

BODY SIGNALS INFLUENCE THE PERCEPTION OF TIME

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Descriptors: time perception, interoception, autonomic nervous system

Although the perception of time is essential for everyday life decisions the basic question of how our sense of time is created is still unsolved. Craig (2009) recently proposed a direct link between the perception of time and visceral processes through temporal integration of bodily signals within the insula. In a fMRI study, Wittmann et al. (2008) found that posterior insula activation increased linearly during the encoding phase of a time estimation task, implicating insula involvement for the encoding of duration. We therefore investigated whether performance in a time estimation task would be linked to changes in visceral activity, and the ability of interoceptive awareness. Thirty-two healthy subjects underwent a heart beat perception task and repetitiously estimated time intervals of 8s, 14s, and 20s duration, while cardiac interbeat intervals (IBI) and skin conductance levels (SCL) were recorded. Results showed that time estimation accuracy was positively associated with heartbeat perception scores ($r = .43, p = .015$). Repeated-measures ANOVAs revealed that IBI increased, while SCL decreased from the beginning to the end of the encoding intervals (main effect of time: $F = 47.7$).

**Poster 137**

POLYGRAPH INDUCED DISCLOSURE IS RELATED TO INTEROCEPTIVE AWARENESS

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Descriptors: polygraph, lie detection, interoceptive awareness

Despite debates about its accuracy, the polygraph has been used for the detection of deception for decades. Among the reasons for its continued use is that it is effective in inducing confessions and disclosure, also referred to as the bogus pipeline effect. In this study, we looked at whether this bogus pipeline effect is related to interoceptive awareness. Interoceptive awareness refers to an individual’s ability to perceive bodily signals and their changes, and has been shown to be a crucial determinant for the subjective experience of emotions and feelings. Importantly, there are differences in the accuracy by which individuals can perceive their own bodily signals, and individuals with more accurate perception of their bodily signals experience more intense emotions. We hypothesized that participants scoring high on interoceptive awareness would perceive the polygraph as more threatening, consequently showing increased disclosure. Forty participants performed a heart beat counting task to establish interoceptive awareness. Next, they executed a mock crime, after which they were subjected to a concealed information polygraph test (CIT). After the CIT, they were asked to write down an alibi, followed by an interrogation. Results showed that the alibis of the participants scoring low on interoceptive awareness experience more intense emotions. We hypothesize that polygraph induced disclosure is related to interoceptive awareness.

**Poster 138**

NEURAL MECHANISMS OF INTERMODAL SUSTAINED SELECTIVE ATTENTION WITH CONCURRENTLY PRESENTED AUDITORY AND VISUAL STIMULI IN THE HUMAN BRAIN

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Descriptors: intermodal attention, SSVEP, ASSR

We investigated intermodal attention effects on the auditory steady-state response (ASSR) and the steady-state visual evoked potential (SSVEP). For this purpose, 40-Hz amplitude modulated tones and a stream of flickering (7.5 Hz) random letters were presented in attention cuing. By means of an auditory visual or visual target detection task, participants’ attention was directed to the respective modality for several seconds. Attention to the auditory stream lead to a significant enhancement of the ASSR compared to when the visual stream was attended. This attentional modulation was located mainly in the right superior temporal gyrus. Vice versa, attention to the visual stream especially increased the second harmonic response of the SSVEP. This modulation was focused in the inferior occipital and lateral occipitotemporal gyrus of both hemispheres. Indications for supramodal attentional modulations were found in the lateral occipitotemporal and the temporal gyrus, in the right inferior occipital gyrus and the left inferior frontal gyrus. To the best of our knowledge, this is the first demonstration of amplitude modulation of the ASSR and the SSVEP by intermodal sustained attention. Our results open a new avenue of research to understand the basic neural mechanisms of intermodal attention in the human brain.

**Poster 139**

BEHAVIORAL AND ELECTROPHYSIOLOGICAL ENDOPHENOTYPES OF THE COMT AND DRD2 GENE-GENE INTERACTION REVEAL HUMAN VARIABILITY IN DISTRACTION AND NOVELTY PROCESSING

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Descriptors: genetic endophenotypes, gamma band responses, dopamine

A wide variability in human distraction by novel events during task performance is paralleled by differences in electrophysiological responses. An optimal range of DA activity at the prefrontal cortex (PFC) is needed for proper working memory (WM) functioning, and might be required for optimal processing of novel events, thus subserving such differences. Forty healthy volunteers were distributed into four groups combining polymorphisms of the genes for the Catechol-O-Methyltransferase (COMT) and the DA receptor D2 (DRD2). All participants performed an auditory-visual distraction paradigm in which task-irrelevant frequent standard and rare novel sounds were followed by a visual target. Behavioral performance and phase-synchronization (PS) of gamma-band responses (GBRs) centered at 35 and 40 Hz to novel and standard sounds were analyzed. Individuals within the optimal balance of COMT levels and DRD2 density (Met A1 – and Val A1 + ) showed longer response times after novel than standard sounds (i.e., distraction: Sound X COMT X DRD2: F(1,29) = 13.815, p < 0.001) and similar PS to novel and standard sounds, while participants displaying lowest or highest PFC DA activity failed to show distraction, but presented a stronger PS of GBRs to novel as compared to standard sounds (Sound X COMT X DRD2: 35 Hz: $F(1,29) = 5.10, p = .032$; 40 Hz: $F(1,29) = 7.62, p = .039$). GBRs might constitute an endophenotype of COMT display and DRD2 density for exogenous attentional functioning, and the combination of behavioral responses and the PS of GBRs might provide a good marker of DA-related attentional dysfunctions.

**Poster 140**

TEMPORAL CUING ENHANCES THE AUDITORY N1

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Descriptors: attention, ERP

Temporal selective attention enhances stimulus processing. Event related potential (ERP) studies using auditory stimuli and a temporal variation of the Hillyard-paradigm consistently reported increased amplitudes for attended compared to unattended stimuli in the early (perceptual) N1-component. By contrast, when visual stimuli and a temporal variation of the Posner-cuing-paradigm were applied, early components were not consistently affected. The goal of the present study was to investigate whether temporal selective attention can modulate the N1-component within an auditory cuing paradigm. In two experiments, two different symbolic cues predicted the onset of a target (white noise bursts; continuous or with a gap) after a 600 ms or a 1200 ms interval, either validly (attended) or invalidly (unattended). In the first experiment, a reaction was only required for validly cued gap-targets. In the second experiment, both valid and
invalid targets required a reaction (discrimination). We observed shorter reaction times for valid compared to invalid targets. Over fronto-central electrodes, amplitudes of the N1 were larger for valid compared to invalid stimuli, but only when the invalid stimuli did not require a reaction (i.e., in the first experiment). It may be concluded that temporal selective attention modulates early processing levels if the unattended stimuli can be completely ignored.

**Poster 141**

**ASSESsing the Construct Validity of ATTENTIONAL MODIFICATION OF PREPulse INHIBITION of STARTLE among Children with Attention-Deficit/HyperACTivity DISORDER**

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University at Buffalo, SUNY

Descriptors: attention, prepulse inhibition, startle

Though prepulse inhibition (PPI) of startle does not require active attention, the effect is enhanced during attended compared to ignored prepulses. While the construct validity of basic PPI has been the focus of many studies, less is known about the nature of attentional modification of PPI (AM-PPI). We examined the relationships between AM-PPI and several relevant constructs in children with ADHD (N = 36 for preliminary analyses; anticipate N = 60), among whom AM-PPI appears impaired. Participants completed a tone discrimination task to assess AM-PPI of eyeblink startle, as well as measures of visual attention (CPT), inhibition (stop task), and working memory. Multiple informants reported on temperament (effortful control on the EAT-Q) and symptoms of inattention and hyperactivity/impulsivity (H/I). Behavioral performance on the AM-PPI task converged with the CPT (hills r = .54) and working memory span (r = .41). However, AM-PPI was only marginally related to behavioral performance on all tasks. Greater effortful control tended to predict greater AM-PPI (r = .30 child, but .22 parent). AM-PPI was marginally and inversely related to teacher-reported inattention symptoms (r = −.32; H/I r = −.27; parent r = −.12, −.17). These data provide initial evidence regarding the construct validity of attentional modification of PPI in children with ADHD. The lack of orderly relations to other lab measures was troubling. There was some evidence of convergent validity with temperament and symptom reports, though it depended upon reporter.

**Poster 142**

**DIFFERENCES IN GRAY MATTER VOLUME ASSOCIATED WITH INSIGHT MEDITATION: A Voxel-based morphometry study**

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Descriptors: meditation, voxel-based morphometry, attention

Meditation practice aims to improve attention and emotion regulation. Previous studies have identified altered brain morphology in brain regions crucial for these functions in groups of experienced meditators. It has also been suggested that meditation practice may slow age-related decline in gray matter. We re-analyzed an MRI data-set of 20 Insight meditators and 15 control participants that was previously analyzed for group differences of interest analysis confirmed higher GMV in meditators in the hippocampus and the cortical gray matter volume (GMV) using voxel-based morphometry in SPM5. A region of interest analysis confirmed higher GMV in meditators in the hippocampus and the putamen bilaterally, consistent with previous reports. A significant age by group interaction was found in these two regions: GMV declined with age as expected in the control group but not in the meditators. Exploratory whole brain analyses revealed significant differences in clusters comprised of the lentiform nucleus, the parahippocampal gyrus, the amygdala and the caudate nucleus. Our results replicate previous findings and further demonstrate that GMV in these regions differs between the groups with age, suggesting that meditation might prevent normal age-related decline. The putamen is strongly implicated in attention processing, while the limbic regions are crucial for emotional processing. Our results suggest that improvements in attention and emotion regulation ascribed to meditation training might be mediated by growth of these neural structures.

**Poster 143**

**EFFECTS OF BIASED COMPETITION on parafoveALLY PRESENTED FlickERING STIMULI**

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Descriptors: spatial attention, biased competition, SSVEP

The steady-state visual evoked potential (SSVEP) is a continuous electrophysiological response driven by a flickering stimulus. It has the same temporal frequency as the driving stimulus. Its amplitude can be modulated by attention. To date, the interaction of SSVEPs elicited by simultaneously displayed stimuli and attention has not been sufficiently investigated. This study employed two reference-SSVEPs driven by two equally lateralized stimuli (eccentricity: 2.5° from central fixation) with frequencies in (10.6 Hz) and above (14.2 Hz) the classical alpha band range. Subjects covertly attended to one of two endogenously cued locations where they had to detect brief changes in luminance. We measured the impact on both reference signals introduced by a third stimulus appearing in their immediate vicinity. As hypothesized, allocating attention to one of the stimuli enhanced its amplitude. Furthermore, the additional stimulus presentation led to a systematic decrease of the reference signal’s amplitude in the respective conditions. These findings corresponded to the assumptions made by the biased competition model (Moran & Desimone, 1995). According to this approach, the reduction reflected the competition of close-by presented stimuli. Influences of an alpha suppression could not account for our data since declining amplitudes were observed regardless of the reference signal’s frequency. Surprisingly, the data also yielded evidence for a dissociation of sources of the fundamental component of the SSVEP and its first harmonic.

**Poster 144**

**ARE FEATURE-SELECTIVE and SPATIAL ATTENTION INDEPENDENT?**

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Descriptors: feature-selective attention, spatial attention, steady-state visual evoked potentials

In three studies we investigated three different possible interrelations of feature-selective and spatial attention. In all studies, we assessed the attentional deployment to multiple concurrently presented random dot stimuli differing in spatial location and/or color by recording steady-state visual evoked potentials (SSVEPs) elicited by these flickering stimuli together with behavioral data. Our results show that 1) features can be directly selected without mediation by spatial attention 2) feature-selective attention and spatial attention enhance stimulus representations independently and additively and 3) splitting feature-selective attention across different locations is not possible, i.e. features are selected across the entire visual field, even when this explicitly conflicts with task demands. Taken together, these results strongly suggest that feature-selective and spatial attention operate independently at early levels of visual processing.

**Poster 145**

**EVENT-related brain potential indices of selective listening to Timbre and Pitch**

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Descriptors: attention, auditory, timbre

Event-related brain potentials (ERPs) were recorded from 62 scalp sites during selective listening to timbre and pitch. Ten healthy young adults listened to random tone sequences consisting of lower-pitched tones (131, 139 or 147 Hz; c, c# or d in musical scale, respectively) and higher-pitched tones (220, 233 or 247 Hz; a, a# or b; respectively), synthesized with the timbre of a piano or clarinet. Their task was to attend selectively to a designated timbre-pitch combination (i.e., low piano, high piano, low clarinet or high clarinet tones), to ignore the other three timbre-pitch combinations, and to respond with a button press to occasional shorter-duration target tones among the attended tones. ERPs to attended but non-target tones called T+P+ tones (tones sharing the timbre and pitch with the target tones) were more negative than ERPs to T+P− tones (differing in timbre and pitch from the attended tones). Smaller attention-related negative differences (Nds) were observed for T+P− tones (sharing the timbre but not the pitch with the attended tones) and T+P+ tones (sharing the pitch but not the timbre with the attended tones). The Nd to T+P− tones had a more frontal scalp distribution than the Nd to T+P+ tones suggesting a difference in cortical mechanisms involved in timbre and pitch selection. Moreover, the modelled sum of these two Nds was smaller than the Nd elicited by T+P+ tones, suggesting that in addition to timbre and pitch selection, the integration of timbre and pitch information contributed to the Nd to T+P+ tones with the attended timbre and pitch.

**Poster 146**

**ELECTROencephalographic measuremenT of Manual pointing in Visually Guided compound search**

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Descriptors: visual search, pointing, sequence effects

Visual Search for pop-out targets is speeded when the target-defining dimension (e.g., color, motion) as well as motor response (e.g., button press with the left, right
index finger) is repeated (relative to being changed) across consecutive trials. Recently, Töllner et al. (2008) observed an electro-cortical dissociation of both previous-trial effects: dimension changes were reflected in the PCN component, whereas response changes modulated LRP activations. In everyday life, however, we typically have specific intentions with regard to the objects we are looking for (e.g., pointing to, reaching, grasping the object), rather than making simple button presses. Thus, the present study was designed to approximate such situations by linking goal-directed pointing movements to a compound-search task: participants first had to find and identify a target object (defined by color or shape) before they could select the appropriate motor effector (defined by the orientation of the target) to point to the target location (using a touch screen). For the onset latencies of the pointing movements (i.e. reaction times), the behavioral as well as electrophysiological results were dependent on the motor effector as well as target-defining dimension of the previous trial, replicating previous findings. In addition, the same factors had a strong impact on the movement (times) of the manual pointing responses, affecting the timing and activation of the LRP. Accordingly, this pattern of effects demonstrates an influence of perceptual (dimension-based) processes even after response initiation.

Poster 147
EFFECT OF ATTENTION ON CORTICAL PROCESSING OF SOUND MOTION: AN EEG STUDY
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Descriptors: spatial hearing, auditory motion, attention
The onset of motion in an otherwise continuous sound elicits a prominent auditory evoked potential, the so-called motion onset response (MOR). Here, task-specific top-down influences of spatial attention on the MOR were tested. Twenty listeners were presented with free-field sound sequences consisting of a stationary part and a subsequent motion part, in which the sound moved in horizontal direction. In a physiological two-alternative forced-choice task, the listeners judged either whether the motion trajectory coincided with the spatial positions of two subsequent test tones; alternatively, they assessed the pitch of the test tones. While the auditory evoked potentials to the onset of the stationary acoustic stimulation did not vary between conditions, especially the late portions of the MOR were significantly increased when the auditory motion was task-relevant. Electrical brain source localization revealed that this extra activation mainly resulted from contribution of bilateral precentral and middle frontal gyrus, left inferior and superior frontal gyrus as well as right cingulate gyrus, suggesting the involvement of additional cortical processes that subserve spatial attention, short-term memory, and sensorimotor action. The present results indicate that the MOR has a supra-modal, task-specific component and support the notion that sound motion processing is based on a complex interaction of stimulus-specific and higher-order cognitive processes.

Poster 148
THE EFFECT OF MUSIC TEMPO AND INTENSITY ON VISUAL SELECTIVE ATTENTION
Frances H. Martin, & Isobel C. Ludford
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Descriptors: visual attention, music tempo and intensity, ERP
The aim of this investigation was to examine the independent and combined effects of music tempo and intensity on visual selective attention to a driving based task. The presence of an auditory distracter is thought to increase the mental workload and reduce the amount of attentional resources available for a given task. Using a repeated measures design, 18 female non-musicians completed a driving based visual attention oddball task in five auditory conditions (fast tempo high intensity, fast tempo low intensity, slow tempo high intensity, slow tempo low intensity, and music absent control), and reaction time and accuracy to the targets were recorded. Amplitude and latency of event-related potential components, N2 and P3b, were also recorded and analyzed as measures of evaluation and resource allocation. In accordance with the hypothesized effect, fast tempo music decreased the amplitude of the visual P3b with a trend towards significance for larger P3b amplitude in the presence of low intensity music found. However, contrary to the hypothesized effect of intensity on N2 amplitude, the component increased with intensity. Significant latency differences were not observed for either component. The results suggest that the impact of distracting music on cognitive processes varies according to the tempo and intensity of the music such that fewer resources are available in the presence of loud, fast music.

Poster 149
MODULATING THE LEFT-HEMIFIELD BIAS IN RAPID SERIAL VISUAL PRESENTATION BY REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION
Kamila Smigasiewicz1, Rolf Verleger1, Friederike Moller1, Michal Kunietzki2, Sergiu Groppa3, & Hartwig R. Siebner4
1The University Leibbeck, 2Jagiellonian University, 3Christian-Albrechts University of Kiel, 4Danish Research Centre for Magnetic Resonance, Hvidovre University Hospital
Descriptors: transcranial magnetic stimulation, rapid serial visual presentation, hemispheric asymmetry
In the two-stream RSVP task, left targets are better identified, possibly reflecting dominance of the right hemisphere. If so, rTMS to the right parietal cortex might boost left hemisphere performance for right hemifield targets, by weakening control of the right hemisphere over the left. Participants had to identify a red letter (T1) and a black digit (T2) occurring within two streams of black letters presented in the left and right hemifield. Simultaneously with T1 presentation, five pulses of TMS, 55 ms apart, were applied, either at P4 or at P3 (right or left parietal cortex), either as potentially efficient stimulation or as sham stimulation. In Experiment 1, the left-hemifield advantage was smaller with rTMS applied at the right than at the left parietal cortex with rTMS. Although no such effect was obtained in the group with sham-rTMS, the mechanism of this influence was not clear. Therefore, in Experiment 2, performance with rTMS and sham-rTMS was compared within-subjects, either (between subjects) at the right or at the left hemispheres. rTMS had an effect only at the left hemisphere, deteriorating identification of the right-side targets. Thus, it seems that only the non-dominant left parietal cortex can be perturbed by rTMS in this task, resulting in increased left-hemifield bias.

Poster 150
NEURAL CORRELATES OF THE EMOTIONAL ATTENTIONAL-BLINK EFFECT: A COMBINED EEG-FMRI STUDY
Ralf H. Trippe, Holger Hecht, Johannes Hewig, Lars Fichtner, & Wolfgang H.R. Miltner
Friedrich Schiller University of Jena
Descriptors: attentional blink, amygdala, P300
When two targets have to be identified in a rapid serial visual presentation (RSVP) paradigm, perception of the second target (T2) becomes significantly impaired if it is displayed 200 – 500 ms after the first target (T1), a phenomenon labelled as “attentional blink” (AB). Here we investigate 28 participants in a combined EEG-fMRI study with two different RSVP paradigms (the first using words, the second using pictures from the International Affective Picture System as stimuli) with neutral T1s, and with T2s which either were neutral or of positive or negative emotional valence. In addition, event-related potentials in response to T2 targets were analyzed. Participants identified positive and negative T2s more often correctly than neutral T2s in both paradigms, indicating a reduction of the AB effect when emotional stimuli were presented. Expected significant larger P300 amplitudes in response to correctly identified T2s were observed as compared to incorrectly identified T2s. In addition we hypothesized a larger activation of the amygdala(s) in trials with emotional salient T2s as compared to trials with neutral T2s. In both paradigms such activation could be demonstrated. Another interesting result of the study revealed that emotionally salient pictures (photographs) led to stronger AB-effects in behavior, P300 amplitude and amygdala activation than emotional words.

Poster 151
INTER-INDIVIDUAL DIFFERENCES IN CHANGE BLINDNESS
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Descriptors: change blindness, visual attention, n2pc
Changes between successively presented pictures are hardly to detect when the transient motion signal induced by the change is masked (change blindness). Interestingly, change detection performance varies widely across participants. Because it is supposed that focused attention is necessary to detect changes, we assessed whether the performance in a change blindness task can be predicted by a more general ability to allocate visual-spatial attention. Eighteen participants performed a detection task and a change-blindness task, and the N2pc component of the ERP, which is known to be related to focused attention, was analyzed. Participants were presented with two successive matrices of differently colored dots. Simultaneously with the presentation of mudsplashes, the color or luminance of one dot changed or both matrices were identical. In a first block, observers were asked to report central color changes, not knowing about lateral luminance changes (detection task). In a second, physically identical block, participants reported color and luminance
changes (change-blindness task). Participants whose accuracy was higher in the detection task (block 1) showed better change detection in the change-blindness task (block 2, $r = .61$). The better performance in block 1, the larger was the amplitude of the N2pc for undetected changes in block 2 ($r = .54$), reflecting a higher sensitivity for the motion transient. These results point to inter-individual differences in the ability to allocate visual-spatial attention, resulting in differences to detect changes in the environment.

**Poster 152**

**DYNAMIC MODULATION OF BRAIN ACTIVATION IN RESPONSE TO VARYING DEGREES OF TOP-DOWN/BOTTOM-UP PROCESSING CONFLICT**

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Descriptors: cognitive control, fnri, dichotic listening

Attending to a less salient stimulus in the presence of a competing stronger one, constitutes a conflict between top-down and bottom-up processing which requires cognitive control to be resolved. The aim of this fMRI study was to examine modulation of brain activation in response to parametrically varying degree of conflict. Twenty subjects performed an auditory speech perception task using dichotically presented consonant-vowel syllables where the degree of conflict was varied by changing the (bottom-up) saliency of the stimuli through interaural intensity differences. This was done in 5 steps from −18 dB in favor of the left ear stimulus to +18 dB in favor of the right ear stimulus, including a no-difference condition. Top-down processing was manipulated by using three attention instruction conditions (focus attention on right or left ear, or no-instruction condition). Event-related fMRI data were acquired using a “silent gap” protocol to allow for scanner noise-free stimulus presentation.

**Poster 153**

**ATTENTIONAL CONTROL AFTER DISTRACTION IS MODULATED BY THE EMOTIONAL CONTEXT**

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Descriptors: attentional control, distraction, emotion

Cognitive processes can be modulated by the emotional valence of the processed information or the context. In the present study, I tested whether the emotional valence of task irrelevant pictures presented shortly before the task relevant auditory stimulus affects attentional control. Attentional control in the present paradigm is measured by means of reaction time costs, caused by the introduction of a distracting change in the auditory stimulus, as well as event-related brain potentials (ERPs) reflecting attentional control (in detail MMN, P3a, and reorienting negativity [RON]). Auditory stimuli were sinusoidal tones with 200 and 400 ms duration (50% of the trials each); task performance was measured in a duration discrimination task. Distraction was triggered by a rare and random change of the pitch while the standard pitch was 600 Hz (88% of the trials) the deviant pitch was 660 Hz (12%). Pictures with negative, positive, and neutral valence (three per class) were chosen from the International Affective Picture System (IAPS) and were presented with 300 ms duration 500 ms before the tones. Nine subjects performed the duration discrimination task. The emotional valence affected attentional control after distraction: distraction costs were half as big with pictures with positive and negative valence compared with neutral pictures. This effect is mirrored in the ERPs in the RON only, by a delayed peak in the neutral compared with the two other conditions. Neither MMN nor P3a reflected the effect of the emotional valence.

**Poster 154**

**DOES STIMULUS-INDUCED TEMPORAL ORIENTING ALWAYS ATTENUATE EARLY AUDITORY PROCESSING?**

Kathrin Lange

Heinrich Heine University Düsseldorf

Descriptors: attention, ERP

It has been shown recently (Lange, 2009) that stimulus-induced temporal orienting leads to faster responding and to an attenuation of the N1 of the auditory event related potential (ERP). In this first study, participants responded to target tones preceded by regular or irregular tone sequences: A regular (but not an irregular) sequence should trigger an entrainment process that orients attention to time points that continue the temporal pattern. In both conditions, the target tone appeared at the same time point (relative to the ending of the sequence), which corresponded to a continuation of the regular sequence. The time of the target tone was thus always predictable. The present study investigated whether the attenuated N1 associated with temporal orienting is still present when the timing of the target is unpredictable. The same paradigm was used as in the first study. Target timing could not be predicted; because targets appeared at one of three different time points. These time points either continued the temporal pattern of the regular sequence (as in the first study; target on time) or violated this pattern (target early/late). Reaction times and ERPs to the on-time target were compared as a function of temporal orienting (regular versus irregular sequence). As in the first study, temporal orienting led to faster responding. In the present study, however, temporal orienting did not attenuate the auditory N1. This finding is consistent with the assumption that target predictability may have been a crucial factor for the N1 attenuation observed earlier.

**Poster 155**

**EEG CORRELATES OF FORCED ATTENTION TO VISUAL AND AUDITORY PRESENTATION OF NARRATIVE TEXTS**

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Descriptors: sustained visual and auditory attention, oscillatory eeg

The purpose of the present work was to check an assumption that oscillatory EEG correlates of forced attention to narrative texts presented either in visual or in auditory modality can be significantly different. The attention to texts was forced by tasks to retell them afterwards. EEG registration took place at 38 healthy volunteers: in a referential state of rest with open eyes; in a state of perception of a text either successively presented on a screen (FAVD) or broadcasted in ear-phones (FAAU). Subject-averaged EEG power and coherence estimations were calculated in each of 19 derivations and in each of 171 pairs of derivations for every of the states. The estimations were made in frequency ranges delta, theta, alpha1, alpha2, beta1, beta2, gamma. Within-subjects dispersion analysis of variance was applied. The results suggest that EEG correlates of visual attention at text viewing and of auditory attention at text listening are essentially different. Multiple significant distinctions in comparisons of EEG power and coherence between FAVD and FAAU are manifested in different frequency ranges. In all the frequency ranges the visual attention is characterized by higher values of power (except for alpha2) and by lower values of coherence, than auditory. The distinctions are not limited to characteristics of corresponding sensory zones involvement, but are manifested on the whole of accessible cortex surface. So modalities of presentation make the most essential impact on oscillatory EEG even during complicated cognitive activity.

**Poster 156**

**FORCED AND NON-FORCED ATTENTION IN A DICHOTIC LISTENING PARADIGM WITH DIFFERENT INTER-aural SOUND INTENSITY LEVELS: AN OSCILLATORY EEG STUDY.**

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Descriptors: attention, dichotic listening test, EEG

The consonant-vowel dichotic listening (DL) test with instructions for forced attention to the right or left ear is widely used for studies of cognitive control in the auditory domain (Hugdahl et al., 2000; O’Leary, 2005). Evidence regarding the underlying brain mechanisms is, however, scanty. One possible avenue is to study the interaction of cognitive control (forced attention) and bottom-up stimulus-related factors. This was done by Tallus et al. (2007) who gradually varied the interaural intensity levels for the right and left ear stimuli. In the present study we used a variant of the Tallus et al. (2007) study. Our objective was to reveal EEG correlates of variation of interaural intensity in the DL paradigm, with different instructions to attend either the right or left ear stimuli, or with no instruction. Forty volunteers listened to simultaneous presentations of two different CV-syllables, one in the right ear and one in the left ear on each trial. EEG was recorded from 19 scalp electrodes in the three conditions: no instruction, instruction to focus on the right ear stimulus, or instruction to focus on the left ear stimulus. Inter-aural intensity level was manipulated with increased intensity in the right or left ear. EEG spectral power and coherence were calculated for seven EEG frequency bands. ANOVA was applied. The results showed that forced attention to the left ear differs from forced attention to the right ear by power and coherence changes. Switching of attention in the forced-right and forced-left conditions caused more expressed EEG changes than in the no-instruction condition.

**Poster 157**

**THE WANDERING EYE OF MEN: AN ELECTROPHYSIOLOGICAL INVESTIGATION INTO DISTRACTION BY ATTRACTION**

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Descriptors: attention bias, gender difference, ERP

The main aim of our study was to find neurophysiological evidence in support of the hypothesis, derived from Darwin’s sexual selection theory, that physical attractiveness plays a greater role in male–as opposed to female heterosexual mate preferences. Reaction time (RT) and event-related potential (ERP) data were collected from 20 male and 20 female participants while they were carrying out an attention orienting paradigm. Pictures of attractive, unattractive, and neutral computer-generated faces of the opposite sex were presented to participants at fixation, while they had to identify a small target (square or
EFFECTS OF EXPERIENCE ON A THREAT DETECTION TASK

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Descriptors: heart rate variability, eye movements, stress responses.

Physiological markers of the effects of expertise on the identification of potential threats have not been well established. Eye movements (EM), heart rates, and button presses were recorded while 12 soldiers who had never been deployed to Afghanistan and 12 experienced soldiers, who had been deployed recently, watched different types of video: walking in a park, driving in Toronto, and driving in Kandahar. Participants were involved in two types of task: identification of non-threatening situations (e.g., identifying a type of neighborhood) and identification of threatening situations (e.g., detecting a higher threat of encountering an improvised explosive device). An analysis of the EM was performed in order to identify differences in the scanpaths that can be associated with more experience detecting dangerous situations. EM analyses revealed that experts had smaller saccade amplitude, more fixations, and wider scanning patterns than novices did. An analysis of heart rate variability (HRV) was performed to investigate whether a higher level of stress is associated with a better ability of experts to recognize dangerous situations. HRV analyses showed that experts experienced higher stress levels than novices. In addition, there was evidence suggesting that stress levels interacted with the similarity of the stimuli to a threatening environment. Taken together, the results support the hypothesis that experts experienced higher levels of physiological arousal than did the novices, and scanned their environment for threat more systematically.

THE ROLE OF THE DOPAMINE TRANSPORTER DAT1 GENOTYPE ON THE NEURAL MECHANISMS OF COGNITIVE FLEXIBILITY

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Descriptors: dopamine transporter, cognitive flexibility, novelty p3 event-related potential.

Cognitive flexibility varies widely amongst individuals, yet its underlying neural mechanisms are not fully understood. A range of neuropsychological and human clinical studies have suggested a critical role for striatal dopaminergic function. The present study aimed at revealing the role of the DAT1 polymorphism in brain response stereotypy underlying cognitive flexibility. A task-switching protocol inspired by the Wisconsin Card Sorting Test was administered to two groups of healthy volunteers formed based on the presence or absence of the 9 repetition (9R) allele of the DAT1 gene, while registering behavioral and electrophysiological novelty-p3 (nP3) response by means of human event-related potentials. The absence of the 9R allele is related to higher gene expression and thus less synaptic dopamine available at the striatum. Individuals lacking the 9R allele showed specific task-switch-related behavioral costs, F(1,36) = 4.4, p = .033, and modulation of a late negative brain response, F(2,72) = 3.5, p = .041, that were not observed in participants with the allele of interest, suggesting that their trial processing depended on immediate local changes, given their more limited striatum DA availability. In contrast, the group displaying higher striatum DA availability was more influenced by novelty-p3 response irrespective of the task condition, F(2,72) = 5.2, p = .023, resulting in a stronger activation of the current task set. These distinct patterns of cerebral responses support the nP3 as an endophenotypic marker of the DAT1 gene for the cognitive flexibility.

VIEWING FINGERS OF THE SAME HAND CAN DISTURB TACTILE ATTENTIONAL SELECTION

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Descriptors: tactile, attention, somatosensory erps

Viewing the body has been shown to enhance tactile spatial resolution by modifying the cortical representation of the viewed body part in primary somatosensory cortex (SI). Here we report that vision can have detrimental effects on tactile spatial processing when adjacent body parts that compete for attentional selection are viewed simultaneously. In Experiment 1, we used somatosensory event-related potentials (ERPs) to demonstrate that viewing two fingers of the same hand substantially delays selecting one over the other. Importantly, a detrimental effect of vision does not arise when selecting between fingers of different hands. In Experiment 2, we replicated the within-hand selection task and manipulated hand posture. We found that the detrimental effect of vision on tactile attentional selection depends on the separation of adjacent fingers in external space. Taken together, we propose that visual exposure disturbs tactile spatial selection by smearing the cortical boundaries of adjacent finger representations in SI, only, when these are viewed close together.

DISTRACTORS IN BCI: CAN HARMFUL COMMANDS BE ACTIVATED AUTOMATICALLY?

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Descriptors: BCI, attention, distractors

In Farwell-Donchin (P300) BCI, attention acts as a factor mediating the operator’s control over a computer. However, attention can be captured by various distractors. In some contexts, a command may be unwanted or even dangerous (e.g., deleting an important file). Is it easy for a user to prevent triggering such commands occasionally? Moreover, can the expected loss associated with a command make it act as an emotional distractor, so that the attention will preferably trigger this command? Eleven normal subjects were trained to use BCI (3 × 3 matrix with simple pictorial symbols) with ~0.7–0.8 accuracy, and then played a game: correctly entering the target symbol gave one point; entering the symbol which was the previous trial’s target (PTT, or dangerous symbol) led to a 5 point loss in the dangerous condition (DC, 21–42 trials) but did not change the score in the control condition (CC, same number of trials); other errors did not change the score. In each trial the target position was adjacent to the target position of the previous trial. All but one subject at least once entered a PTT in the DC. Mean number of PTTs entered was 2.0 in DC and 1.1 in CC; the difference was not significant (p = .16). Among the cases of high numbers of PTTs in DC were a student who had an exam 15 minutes after the experiment, and a person who felt herself especially nervous during a block where she made all such errors. Though we cannot be certain yet that harmful commands may indeed be activated preferably, it is clear that blocking random activation may be not a simple task for a BCI user.

RHETRHYTHMICAL MUSCLE TENSION AND RESONANCE IN THE CARDIOVASCULAR SYSTEM

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Descriptors: cardiovascular system, rhythmical stimulation, resonance

Breathing six times per minute elicits high amplitude 0.1 Hz heart rate, blood pressure, and vascular tone oscillations due to resonance in the cardiovascular system (CVS). This technique has been used to treat asthma (Lehrer, et al., 2004), major depression (Kara-vidas, et al., 2007), and fibromyalgia (Hassett, et al., 2007). Therapeutic effect was explained by high amplitude oscillations which trained and toned reflexes (e.g., the baroreflex). The present study aimed to show that rhythmical muscle tension (MT) as well as respiration can trigger 0.1 Hz CVS resonance. Sixteen young healthy subjects (7 males) completed 5-minute baseline and 0.1 Hz paced breathing tasks, and three randomized 3.5-minute paced respiratory tasks (arm and leg muscle tense-release cycles) at frequencies of 0.05, 0.1, and 0.2 Hz. ECG, finger pulse, respiratory (RV), and skin conductance (SC) were recorded during all tasks. Beat-to-beat RRI and pulse transit time (PPT) were measured. RRI, PTT, RV, and SC spectra were calculated. The power of the spectra at testing frequencies was used to estimate CVS reaction. Only 0.1 Hz MT caused high HR oscillations similar to 0.1 Hz breathing. Subjects’ average RRI reaction to MT at 0.1 Hz was 4–5 times higher than at 0.2 Hz.

THE ASSOCIATION BETWEEN ENERGY LEVEL AND BLOOD PRESSURE RESPONSE TO A VISUAL SCANNING TASK VARIES ACROSS LOW AND MODERATE LEVELS OF DIFFICULTY

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Descriptors: cardiovascular responses, fatigue, task difficulty

Female undergraduates completed self-report measures of naturally-occurring energy and tiredness before performing either a low or moderately difficult visual scanning task. Analysis of cardiovascular responses taken during the tasks showed that, in the low difficulty condition, blood pressure responses increased or tended to increase with decreasing energy. By contrast, in the moderately difficult condition, blood pressure...
responses first rose and then declined with decreasing energy. Energy was not predictive of heart rate responses nor was tiredness predictive of any measured cardiovascular response. The observed associations between energy and blood pressure responses support a recent conceptual analysis of the influence of fatigue on effort-related cardiovascular responses. Moreover, the findings complement those of a previous study that demonstrated that blood pressure responses to a moderately difficult memorization task first rose and then declined with increasing fatigue, whereas blood pressure responses to a high difficulty memorization task decreased with increasing fatigue. Continued investigation of the influence of naturally-occurring fatigue on effort-related cardiovascular responses appears warranted, as these studies provide a degree of external validity lacking in similar studies that induce fatigue via experimental manipulation.

Poster 164

DIRECT AND INDIRECT STEREOTYPE THREATS BOTH AFFECT HEART RATE ON SPATIAL REASONING TASKS

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Descriptors: stereotype threat, arousal, heart rate

Performance may suffer when one feels threatened by a negative stereotype of one’s group. Physiological arousal may mediate this effect. We examined the effect of direct and indirect stereotype threat on females’ performance on two spatial reasoning tests, along with corresponding heart rates (HR). Participants were randomly assigned to one of three conditions, in which they were primed (a) indirectly with remarks of expected outcomes due to the participant’s gender, (b) directly with explicitly set expectations of correct responses due to the participant’s gender, or (c) no prime. Participants then completed two spatial reasoning tasks (mental rotation and matrices), during which HR was measured with electrocardiography (EKG). The directly and indirectly primed groups showed a linear increase in HR across the tasks. However, the no prime group showed no change in HR over the course of either task. Although there was an increase in HR for both tasks, mental rotation scores were significantly lower than matrices scores across priming conditions. Performance on the matrices task, but not on the mental rotation task, was negatively correlated with HR. In addition, the strength of the participants’ identification with their gender was negatively correlated with performance on the mental rotation task, but not on the matrices task. These results illuminate the strength of subtle stereotype threats on physiology and task performance.

Poster 165

THE EFFECTS OF PERSEVERATIVE COGNITION ON CARDIOVASCULAR REGULATION IN A HEALTHY COLLEGE STUDENT SAMPLE: ETHNIC DIFFERENCES

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Descriptors: hemodynamics, ethnic differences, worry

Cardiac output (CO) and total peripheral resistance (TPR) are critical components of blood pressure (BP) regulation. Ethnic differences in the functioning of these regulators may help explain the increased risk for cardiovascular disease observed in African Americans (Cooper & Waldstein, 2004). Research further suggests that forms of negative affect such as anger or depression may play a significant role in BP regulation (Jonas & Lando, 1999). According to the Perservative Cognition Hypothesis (PC; Brosschot, Gerin & Thayer, 2006) worry may also lead to increased duration of negative emotional states and physiological arousal which may detrimentally affect health. The present investigation sought to explore the impact of worry (as an indicator of PC) on BP regulation in a sample of healthy White (WA) and African American (AA) college students. Hemodynamics were measured continuously during a laboratory stressor protocol. To establish high and low worry groups, a median split of total scores on a measure of worry was conducted. WA’s demonstrated significantly greater CO than AA’s across all experimental tasks (p = .04). Additionally, a significant Ethnicity x Worry interaction was observed with High Worry AA’s displaying higher TPR than High Worry WA’s across all tasks (p = .05). Similar effects were observed for diastolic and mean arterial pressure. The current study offers preliminary support for the influence of PC on BP response and suggests that its assessment may be useful in future investigations of ethnic BP differences.

Poster 166

PHYSIOLOGICAL PREDICTORS OF EXECUTIVE FUNCTIONING IN EVERYDAY CONTEXTS

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Descriptors: heart rate variability, neurovisceral integration, frontal inhibition

This project is a cooperation of Roehampton University London (UK), Rikshospitalet University Hospital Oslo (Norway) and University of Würzburg (Germany). The results link to and expand the theoretical frameworks of self-regulation and frontal inhibition by application of psychophysiological measures and self-reports which have been neglected in previous research or not applied in a more comprehensive approach. Self-report measures for executive functions, emotion regulation, depressivity and motivational traits were assessed in 26 healthy adult volunteers. Electrophysiological measures of frontal alpha-asymmetry and event-related potentials (N200) in a stop-signal paradigm, heart-rate-variability and behavioral parameters of motor inhibition were physiological measures assessed in the same session. Significant associations of physiological parameters and self-reports have been shown. Heart-rate-variability is associated with N200 amplitude, several measures of executive functioning in everyday life and components of affective regulation. N200 amplitude predicts executive functioning in everyday context, motor response inhibition, and cognitive reappraisal in emotion regulation. Central and peripheral physiological markers predict self-regulatory performance on behavioral levels in an everyday context. Assumptions developed from central autonomic network theory have been developed and confirmed using a comprehensive methodological approach by predicting executive and emotional functioning from physiological data evoked by a response inhibition paradigm.

Poster 167

BEHAVIORAL AND CARDIOVASCULAR RESPONSES TO FRUSTRATION DURING BLOCK DESIGN AND SIMULATED DRIVING TASKS IN YOUNG ADULTS WITH AND WITHOUT ATTENTION DISORDER SYMPTOMS

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Descriptors: attention, cardiovascular, emotion

A large percentage of automobile accidents are caused by inattention, and for drivers with ADHD the frequency of adverse driving outcomes is even greater. Previous research has shown that the relationship between ADHD and poor driving performance can be explained by factors such as increased trait anger and poor emotion control ability (disinhibition). The present study used cardio-respiratory physiological measures to examine how young adults with and without ADHD symptoms responded to frustration, and to determine how frustration generalizes to simulated driving performance. 42 (n = 20 with high ADHD symptoms and n = 22 with low ADHD symptoms) college students completed a computerized block design task and a simulated driving task designed to elicit frustration. Participants with high ADHD symptoms reported more frustration and exhibited more aggressive behaviors, particularly during driving. Moreover, results from the simulated driving task revealed that young adults in the high group were more likely than those in the low group to commit hazardous errors (i.e., collisions, running a red light). Physiological measures during resting baseline did not differ between groups. Although there was significant suppression of respiratory sinus arrhythmia during both tasks, it did not differ between groups. Based on our results, we propose that training for ADHD populations should focus more on control of negative emotional state rather than on attention and concentration or fundamental driving skills.

Poster 168

CARDIAC PEP RESPONDING TO INCENTIVES AMONG CHILDREN PREDICTS LEVELS OF ALCOHOL USE 3 YEARS LATER

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Descriptors: PEP, adolescents, alcohol use

Cardiac pre-ejection period (PEP) is a well validated index of sympathetic nervous system (beta-adrenergic) influences on the heart. In our previous work, we have demonstrated lengthened baseline PEP and reduced PEP reactivity to incentives among children with oppositional defiant disorder and conduct disorder. As a result of these and other findings, we have proposed that attenuated PEP reactivity to rewards marks low central dopamine responding in the striatum, which is an established risk factor for substance abuse. In this study, we report data collected from 212 children, including those with conduct disorder, depression, comorbid conduct disorder and depression, and no psychiatric condition, at four annual assessment points. Children were 8 - 12 at Year 1. For the first three assessments, participants played a simple video game for monetary incentives, and PEP activity and reactivity were recorded. PEP was scored by ensemble-averaging 32 second epochs, sampled at 1000 Hertz. Multilevel modeling analyses of growth in PEP reactivity across Years 1 – 3 revealed both intercept and slope effects on levels of alcohol use at Year 4, betas = 0.36, p < .001. Those with less growth in PEP reactivity across Years 1 – 3 also reported more alcohol use at Year 4, betas = 0.004, t(525) = 2.03, p = .04. These findings suggest a potential prospective biomarker of risk for substance use among children.
**Poster 169**

**REDUCTION IN PAIN SENSITIVITY DUE TO PHARMACOLOGICAL BLOOD PRESSURE ELEVATION IN CHRONICALLY LOW BLOOD PRESSURE**

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Descriptors: blood pressure, pain, hypotension

Recent studies have revealed evidence for increased pain sensitivity in individuals with chronically low blood pressure. The present trial explored whether pain sensitivity can be reduced by pharmacological blood pressure elevation. Effects of the sympathomimetic midodrine on threshold and tolerance to heat pain were examined in 52 hypotensive persons (mean blood pressure 96 / 61 mmHg) based on a randomized, placebo controlled double blind design. Employing a contact thermode, heat stimuli were applied to the forearm. Possible confounding of the drug effects on pain perception with changes in skin temperature, temperature sensitivity and mood was controlled for. As compared to placebo, higher pain threshold and tolerance, increased blood pressure, as well as reduced heart rate were observed under the sympathomimetic. Increases in systolic blood pressure between measurement occasions correlated positively with increases in pain threshold and tolerance, and decreases in heart rate were associated with increases in pain threshold. The findings underline the causal role of hypotension in the augmented pain sensitivity related to this condition. Pain reduction as a function of heart rate decrease suggests the involvement of a baroreceptor related mechanism in the pain attenuation. Increased proneness of persons with chronic hypotension to clinical pain may be discussed.

**Poster 170**

**THE RELATIONSHIP OF AGGRESSIVE BEHAVIOR TO CARDIOVASCULAR AND HPA AXIS ACTIVITY**

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Descriptors: aggression, hpa axis, heart rate

Results from animal and human studies suggest that basal cardiovascular and HPA axis activity are related to aggressive behavior, as well as reactivity in these systems. We therefore pharmacologically enhanced cortisol levels in 28 healthy subjects by administering 20 mg of hydrocortisone (cortisol) group, while 28 other participants were given a placebo (placebo group). We then induced aggressive behavior with the Taylor Aggression Paradigm in half of the cortisol and half of the placebo group, respectively. We measured cardiovascular activity (heart rate and heart rate variability) and cortisol levels in baseline conditions, during, and after the aggression induction procedure. Preliminary results indicate that the administration of cortisol significantly changed the amount of displayed aggressive behavior. Furthermore, aggressive behavior was associated with heart rate and heart rate variability. Results are discussed in the context of animal, clinical and experimental studies.

**Poster 171**

**EVALUATION OF WORKLOAD CHANGES DURING AN AVIATOR SELECTION TEST BATTERY**

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Descriptors: workload, heart rate variability

The US Navy is validating a PC-based test battery, the Performance Based Measure (PBM), to aid in aviator selection. The PBM consists of seven subsections which have varying workload. This study examined indices of workload across the PBM; namely heart rate variability (HRV) and the NASA-Task Load Index (TLX; Hart & Staveland, 1988). We hypothesized that HRV would differ between PBM subsections and correspond with changes in the TLX. Two hundred one subjects (93 M) completed the PBM. Inter-beat-intervals were recorded continuously. The TLX was completed after each subsection. A fast-Fourier-transform was used to obtain a measure of respiratory sinus arrhythmia (RSA) for each subsection. Respiration changes were controlled by using an RSA residual approach. Two separate repeated measures ANOVAs were conducted for RSA and TLX across all subsections. A main effect of RSA, F(6,195) = 13.93, p < .01, and TLX total workload, F(6,195) = 171.18, p < .01, were found. Post hoc analyses revealed a similar trend of significant differences between several multitasking and single task subsections of the PBM as measured by RSA and TLX. A Pearson’s correlation revealed a significant correlation between RSA and total workload scores, r = -.10, p < .01. The results suggest that RSA distinguished between the workload induced by several subsections of the PBM and provided a gold standard measure of workload. This suggests that RSA could be used to obtain an objective measure of workload during the PBM with the advantage of continuous measurement without task interruption.

**Poster 172**

**HEART RATE VARIABILITY AND SEVERITY OF DEPRESSION BEFORE AND AFTER ELECTROCONVULSIVE THERAPY**

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Descriptors: depression, cardiovascular variability, electroconvulsive therapy

Diminished heart rate variability (HRV), in particular its vagal (high frequency, HF) component, is considered to play a role in the relationship between depression and risk of cardiovascular disease. Electroconvulsive therapy (ECT) is an effective treatment in patients suffering from severe depression, yet little is known about the sustained cardiovascular effects of ECT in relation to clinical state. We studied cardiovascular variability during supine rest and orthostatic challenge in relation to severity of depression before and after a course of ECT in 18 inpatients with a major depressive disorder (mean score Hamilton Depression Rating Scale, HDRS. 28.3). Data were compared with 59 healthy controls with gender, age, and smoking included as covariates.

**Poster 173**

**INSTITUTIONAL SUPPORT OF PERSONS WITH SCHIZOPHRENIA IS RELEVANT FOR THE HEART RATE RESPONSE TO STRESS OF THEIR CAREGIVERS**

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Descriptors: caregivers, stress, institutional support

Caring for a relative with a chronic illness can produce autonomic imbalance in the caregiver (Lucini et al., 2008), but scarce data about the variables involved are available. The aim of this study is to know whether institutional support for patients is a relevant factor on the caregiver’s heart rate response (HR) to stress. With this purpose, 26 caregivers—mothers of persons with schizophrenia, 16 with (CARE+) and 11 without (CARE-) institutional support—were exposed to two stressors while HR was continuously registered before (baseline), during (task) and 5 minutes after stressors (recovery). Time spent in care, caregiver’s burden and the relative’s severity of illness were also evaluated. Results showed a main effect of ‘group’ factor, F(1,24) = 9.79, p < .005, with the CARE+ group displaying higher HR than the CARE- group in all periods registered but especially during baseline and recovery (for all, p < 0.04). While non-significant differences were found in caregiver’s burden, the CARE+ group spent nearly significantly more time in caring and their relatives were less functional and suffered more positive symptoms and general psychopathology than in the CARE+ group (for all, p < 0.01). Although no significant correlations were found between HR and other variables, the existing 35.2% of variance in HR mean is explained by the caregiver’s age and the relative’s symptoms. Thus, although institutional support is relevant for autonomic balance of relative caregivers, further research is necessary to clarify the role played by other variables involved.

**Poster 174**

**EXCITATION TRANSFER IN DECISION MAKING: DOES TRANSFERRED AROUSAL INCREASE DEVIATION FROM RATIONAL CHOICE?**

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Descriptors: excitation transfer, decision making, heart rate

We investigate if and how physiological arousal can become associated with, and influence, decision making. Towards this aim, findings of research on the effect of emotional content on decision making (e.g., Rottenstreich & Hsee, 2001; Hsee & Rottenstreich, 2004) are integrated with previous research of excitation transfer theory (e.g., Zillmann, 1971; Zillmann 1983). In a study with 41 participants, we show that participants are willing to offer significantly more money for a lottery ticket with a small chance to win 500 Euro, if excitation transfer is elicited by physical exercise (exercise bike; n = 21) as opposed to merely sitting on the bike (n = 20). Our findings failed to show a direct mediation of the effect on decision making by either arousal or skin conductance. However, initial evidence appears to suggest an amplification of an acoustic startle blink response immediately following the decision correlated with residually elevated heart rate. These findings may indicate that physiological arousal can interact with decisions, and possibly change emotional properties of the decision, without any changes of the affect richness of the stimulus.
CARDIAC AUTONOMIC REGULATION AND ANGER COPING IN ADOLESCENTS

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Descriptors: cardiac autonomic regulation, emotion regulation, adolescent

The current study investigated cardiac autonomic balance and anger coping in adolescents. We hypothesized that adolescents would use cognitive reappraisal strategies to re-frame the anger-provoking situation in terms of minimalization, extension and humor as well as heart rate variability suggesting increased vagal activity and a less marked cardiac deceleration to anger provocation when compared with participants who emphasized the experienced injustice. Thirteen male and 21 female adolescents (mean age 14.7 years) attended the single experimental session which included monitoring of continuous heart rate and blood pressure responses to anger provocation (i.e., receiving an unfair offer) using a modified version of the Ultimatum Game. Spectral components of heart rate variability were calculated on heart rate data from rest periods using autoregressive analysis. The results showed that adolescents employing cognitive reappraisal strategies were characterized by increased vagal activity under resting conditions. Re-appraisers also responded with a faster recovery in terms of employing cognitive reappraisal strategies were characterized by increased vagal activity.

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ISOLATED CLINIC HYPERTENSION AND ORIENTING/DEFENSIVE RESPONSE PATTERN

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Descriptors: defensive response, arterial hypertension, stress

The causes and significance of isolated clinic hypertension (ICHT) are a matter of debate. It has been suggested that this condition originates as part of the cardiac defense response, which produces cardiac reaction and habituates very slowly. These characteristics of the defense response are very close to those of ICH. In this condition, it is supposed that the clinic-nonclinic blood pressure (BP) difference would reflect the increase of BP and HR which occurs in response to the potentially threatening figure of the physician carrying out the BP measurement at the clinic. The aim is to know if hypertensive patients differing in Orienting/Defensive response (OR, DR) cardiac pattern differ on clinical and ambulatory BP measures. Twenty hypertensive patients participated in this study. OR, DR pattern was identified using an auditory stimuli task. HR increases post-stimuli reflected DR; HR decreases reflected OR. Non-clinic BP readings were taken in three different moments of the day: in the morning, at work, and in the evening at home. Differences between clinic-nonclinic BP readings were calculated. When OR/DR was analyzed, three patterns resulted: OR pattern, DR pattern and OR/DR pattern. Clinic-nonclinic BP differences in every OR/DR group were calculated. ANOVAs showed a difference between groups in clinic-nonclinic contrasts on systolic BP readings and were close to significance on diastolic BP readings. The DR group showed a greater difference between clinic and ambulatory. A relationship between OR, DR pattern and ICH is discussed: it may be a cardiac pattern which increases BP clinic readings.

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MENTAL ROTATION IN PRESCHOOLERS: SEX DIFFERENCES IN HEMISPHERIC ASYMMETRY

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Descriptors: developmental, EEG/ERP

Mental rotation performance has been found to produce one of the largest sex differences in cognition accompanied by sex differences in functional cerebral asymmetry. Performance difference can already be observed in children. However, nothing is known about the hemispheric lateralization of mental rotation at this age. In this study, blocks with rotated pairs of animal drawings versus blocks with upright animals only were presented and the children had to decide whether the two drawings were the same or mirror-reversed. Response time (RT), error rates and average ERP amplitudes were obtained. The response time (RT) error rates and average ERP amplitudes were obtained. Hemispheric lateralization was determined by comparing mental rotation related amplitude modulations between the left versus the right electrode leads. We obtained no sex effects in RT data. Boys outperformed girls in accuracy only when rotated pairs of drawings were presented. For upright pairs neither sex nor hemisphere affected ERP amplitudes. The additional electrical brain activity observed at parietal leads when mental rotation was required, however, differed as a function of sex and hemisphere. Whereas boys revealed a more bilateral pattern of brain activity, girls’ brain activity was clearly lateralized towards the left hemisphere. The results show for the first time, that sex differences in performance are accompanied by differences in cerebral asymmetry in preschool children, i.e., long before puberty.

Poster 178

DEVELOPMENT OF FUNCTIONAL BRAIN ORGANIZATION: HERITABILITY AND STABILITY ACROSS THE LIFE SPAN

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Descriptors: twin study, brain organization, resting state eeg

We examined the development and genetic architecture of several parameters that index temporal and spatial organization of the brain. Temporal structure of EEG oscillations was indexed by the decay of the autocorrelation function spanning seconds of data (long range temporal correlations, LRTC). Spatial structure was indexed by applying graph theory to connectivity matrices obtained by calculating the synchronization likelihood between all pairs of EEG signals. We measured resting state EEG from 160 monozygotic and dizygotic twins and their siblings in six age groups of about 5, 7, 16, 18, 25 and 30 years. Results for EEG alpha oscillations showed that (temporal) LRTC were moderately heritable (3.5 – 6) across the scalp, tapering off for the youngest and oldest age groups. Genetic overlap between age groups was low: age-specific genes were found at all ages. (Spatial) graph parameters showed moderate to high heritability (3.5 – 7). High genetic stability was found in adulthood. Results for other frequency bands were similar. Both LRTC and graph parameters showed a clear developmental trend from a more random (noisy) brain organization in childhood to more ordered/structurally temporally structured in young adulthood. In later life more random noise was observed towards more noise and less structure. Importantly, individual differences in these parameters all reflected separate, non-overlapping sources of genetic variance. We conclude that (temporal) LRTC and (spatial) graph theoretical parameters are good endophenotypes for developmental changes in brain organization.

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DEVELOPMENT OF FACE RECOGNITION IN PRIMARY SCHOOL CHILDREN

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Descriptors: child development, face recognition, N400

ERPs elicited during a continuous recognition paradigm consist of early old/new effects reflecting automatic matching processes, and late old/new effects reflecting memory trace strength. To investigate development of face recognition in primary-school children, 36 younger children (6-9 years old) and 36 older children (11-12 years old) participated in an ERP study with an extended continuous face recognition task. Children were shown 90 pictures of different faces, of which 30 were repeated five times, and were required to make old versus new decisions. Older children responded faster to all faces, and more accurately to new faces, than younger children. Younger children exhibited larger frontocentral N2 and N400 old/new effects than older children when correctly recognizing an old face. No significant old/new effects were found for the later positive complex in either younger or older children. In conclusion, in school-aged children, face recognition is mediated by early and relatively automatic recognition processes that show gradual, quantitative changes during development.

Poster 180

DEVELOPMENT OF AUTOMATIC MUSICAL MEMORY FUNCTIONS IN CHILDREN FROM 2 TO 4 YEARS OF AGE

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Descriptors: music perception

The ability to simultaneously keep track of repetition and change in various aspects of rapidly varying sound sequences is a key component of music processing. We developed a stimulation paradigm termed the Roving Melody paradigm (RMP) to investigate children’s capabilities in recognizing repetition and change in different features of short musical entities during event-related potential (ERP) recordings. Changes included melodic and rhythmic ones, as well as variations in key and timbre. Since all change types were presented within the same sequence, their detection required simultaneous (passive) monitoring of all the corresponding regularities. In addition, the musical entity was repeated in its new form only 2–3 times after each melodic and rhythmic change before the next such change. Therefore, the auditory system had to detect these changes on the basis of rapidly formed and dynamic regularity representations. We used the RMP to record ERPs in a passive condition from children aged 2 and 4 years. The 2-year-olds discriminated several of the repetitive aspects of the sounds, displaying brain responses specific to the detection of change. Compared to the younger subjects, the 4-year-olds showed faster and, for some changes, larger and more adult-like responses.
These results indicate developmental changes occurring between these ages in the processing of musical sounds. Overall, the RMP is a promising tool for assessing the development of short term memory for musical sounds and the automatic detection of repetition and change in different dimensions of music.

**Poster 181**

**BEHAVIORAL AND ERP CORRELATES OF CONCEPTUAL AND PERCEPTUAL REPETITION IN CHILDREN AND YOUNG ADULTS**

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Descriptors: erps, memory, children
ERP measures can be used to distinguish the two processes contributing to recognition memory. In adults, a mid-frontal old/new effect and a parietal old/new effect ~500 ms are taken as the putative ERP correlates of familiarity and recollection, respectively. However, previous studies with children have not reported an ERP correlate of familiarity. In order to distinguish between perceptual and conceptual aspects of familiarity, children (aged 10 – 12 years) and young adults (aged 19 – 27 years) studied pictures and words while ERPs were recorded. During retrieval, participants indicated whether pictures were perceptual or conceptual repetitions of items from a prior study phase or new pictures. In both groups, memory performance was superior for perceptual repetitions, but young adults recognized more pictures than children. ERPs for perceptual item repetitions revealed neuronal correlates of familiarity and recollection in both groups. By contrast, conceptual item repetitions were associated with smaller parietal old/new effects in both groups. For adults only, there was an additional right-frontal old/new effect with longer latencies for conceptual repetitions. Together, early frontal old/new effects in children following perceptual, but not conceptual repetition suggest that perceptual features play a larger role in recognition memory for children than for adults.

**Poster 182**

**THE HEART-BRAKE OF SOCIAL REJECTION: A HEART RATE ANALYSIS OF DEVELOPMENTAL CHANGE IN SENSITIVITY TO PEER REJECTION**

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Descriptors: social rejection, development, heart rate
Children’s concerns about social rejection increase during middle childhood and reach a sensitivity peak at adolescence. The present study examined developmental trends in sensitivity to peer rejection by examining the heart-by-heart heart rate response associated with the processing of social rejection. Eighty-one children participated in the study, equally divided in two age groups which are thought to be associated with distinct phases of development: pre-pubertal children (aged 8 – 11 years) and pubertal adolescents (aged 12 – 14 years). The participants performed a social judgment task adopted from Somerville et al. (2006). Prior to the experiment, a cover story was presented suggesting that their picture was rated by peers on first impression. During the experiment, participants were presented with a series of unfamiliar faces and were asked to predict whether they would be liked by the other person. Each judgment was followed by feedback indicating acceptance or rejection by the person on the picture. A non-social control task was used to examine cardiac responses to feedback outcomes that did not have a social component. Consistent with adult findings, feedback was associated with a transient heart rate slowing and a return to baseline that was considerably delayed when feedback communicated unexpected social rejection. Although no developmental differences were found, this cardiac response was more pronounced in girls. Findings reveal that the processing of unexpected social rejection is associated with a sizeable response of the parasympathetic nervous system across development.

**Poster 183**

**EFFECTS OF AUDITORY NOVELTY AND TASK LOAD ON AUDITORY AND VISUAL BRAIN RESPONSES IN CHILDREN AND ADULTS**

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Descriptors: auditory novelty, event related potentials, working memory
We investigated the influence of memory load (visual 0- vs. 2-back task), novelty of task-irrelevant preceding sounds (novel vs. standard sound), and age (adults 18 – 33 years, children 9 – 10 years) on auditory and visual ERPs. As to be expected, novel sounds elicited the novelty complex, with a transient mismatch response, P3a, and RON. This novelty complex was not significantly affected by load or age initially; however, at around 500 ms all three factors interacted. Interestingly, the visual ERPs revealed a reduced P3b in novel relative to standard trials. This shows that novelty effects are even present in the processing of the visual target. In conclusion, our results support recent research about the similarity of the novelty system in children and adults, but indicate less developed top-down control mechanisms in children.

**Poster 184**

**PSYCHOPHYSIOLOGICAL EFFECTS OF ENHANCED SUSTAINED ATTENTION IN RECURRENTLY DEPRESSED PATIENTS AFTER MINDFULNESS TRAINING**

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Descriptors: major depression, mindfulness-based cognitive therapy, CNV
Rumination, the repeated and excessive engagement in thoughts which focus on possible reasons and consequences of present distress, has been identified as one of the major risk factors for relapse in formerly depressed individuals. Fifteen recurrently depressed patients currently in remission, participated in a course of mindfulness-based cognitive therapy (MBCT), intended to decrease ruminative tendencies through meditation exercises. EEG recordings of patients and twelve healthy controls who did not partake in the intervention, occurred prior to and following the 8-week mindfulness course. The experiment focused on the contingent negative variation (CNV) in a passive paradigm. Participants were confronted with auditory and tactile stimuli and instructed to attend to their own breath, while ignoring the stimuli. The MBCT group showed a significant amplitude increase and the control group an insignificant amplitude decrease of the ERP to auditory stimuli in the late CNV domain (1300 – 1500 ms) at the second measurement compared to the first. The late CNV is associated with the mobilization of perceptual, cognitive and attentional resources. Our results suggest that as few as 8 weeks of intensive mindfulness training can significantly increase participants’ ability to sustain their attention and as such enable them to gain control over ruminative tendencies. Despite the passive nature of the task (ignoring the stimuli and focusing on the breath), participants apparently mobilized more cognitive resources and processed the stimuli more consciously after the intervention.

**Poster 185**

**FACILITATED PROCESSING OF POSITIVE EMOTIONAL INFORMATION BY VERBAL STRUCTURAL PARALLELISMS: AN ERP STUDY**

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Descriptors: ERP, language, emotion
Structural parallelisms are a main characteristic of emotionally involving texts like poems or prayers. They typically involve repetitions of semantic, syntactic, or phonological features. Recent research in social science has shown that structurally parallel non-verbal behavior facilitates the subjective experience of emotion. However, experimental evidence on emotion effects of verbal structural parallelisms is scarce. In the present study we examined the impact of verbal structural parallelisms on subsequent processing of emotional facial expressions in a cross-modal priming task. Event-related brain poten-
tials (ERPs) were recorded while participants (N = 25) classified positive, negative, or neutral facial expressions as emotional or non-emotional. The faces were preceded by verbal stimuli extracted from prayers and the corresponding content words were replaced by nonsense words. Data analysis in a 2 (prime: parallel vs. non-parallel) by 2 (target: emotional vs. non-emotional) factorial design revealed significant behavioral priming effects: Classification of positive facial expressions was accelerated if the preceding verbal prime was parallel. Preliminary analysis of emotion-sensitive ERP components in this primed condition revealed enhanced amplitudes of early posterior negativity (EPN) and late positive potential (LPP), indicating that structural parallelisms facilitate both early and late processing of positive emotional information.

**Poster 186**

**EYE BLINK CONDITIONING DURING PPI MEASUREMENT IN NEONATES**

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Descriptors: startle eye blink, conditioning, development
Recently, it was shown in adults that the pairing of a weak prepulse with a startle eliciting stimulus in a prepulse inhibition (PPI) paradigm induced larger startle eye blinks to intense versions of these pre pulses. This effect was attributed to the pairing of pre pulses with aversive acoustic white noise stimuli. In the present study we asked whether a similar effect may be seen in neonates. Thirty-six healthy full-term neonates were tested while they were sleeping. They underwent PPI testing with unilaterally pre sented 95 dB white noise startle stimuli preceded by weak (75 dB) tones of either 1200 or 1800 Hz pitch. The other tone was presented equally often, but randomly and never paired with startle stimuli. During an extinction phase, intense (95 dB) and brief (50 ms) startle eliciting versions of these tones were presented unilaterally in randomized order,
counter-balanced across infants. EMG eye blink responses were measured at the ipsilateral eye. Startle eye blink responding induced by the intense versions of tones having served as prepauses during the PPI assessment was different (interaction of tone and time during extinction; p = .04) from that to intense versions of tones which had never served as prepauses. This difference was more pronounced in the second half of the extinction phase. Thus, previous pairing with blink inducing acoustic white noise enhances the ability of a tone to induce startle in neonates. Our data show that eye blink conditioning effects are present during PPI assessment in very early life.

**Poster 187**

**DIFFERENTIAL CONDITIONING IN SPIDER PHOBIA: SUBJECTIVE, ELECTRODERMAL AND BOLD RESPONSES**

Jan Schweekendiek, Tim Klucken, Christian J. Merz, Katharina Tabbert, & Rudolf Stark

Justus-Liebig University Giessen

Conditioning processes are believed to play an important role in the etiology and maintenance of anxiety disorders. Although the neural network underlying fear conditioning is understood in considerable detail, only little is known about the neural processes mediating pathological fear. This study was designed to examine the neural basis of aversive conditioning and related extinction processes in spider phobic subjects and healthy controls. Further we were interested in potential differences in conditionability in phobic subjects with disorder specific versus non-specific aversive unconditioned stimuli (UCS). Using a differential picture-picture conditioning approach we investigated the association between anatomical and functional abnormalities of the hippocampal formation and risks for and symptoms of posttraumatic stress disorder. The discussion of the new findings aims at the further development of integrative neurobiological models of abnormal information processing in anxiety disorders.

**Poster 188**

**NEURAL CORRELATES OF EMOTIONAL STROOP INTERFERENCE IN PATIENTS SUFFERING FROM SOCIAL PHOBIA**

Stephanie Schmidt, Wolfgang H.R. Miltner, & Thomas Straube

Friedrich-Schiller-University Jena

Interference effects in emotional stroop tasks are frequently investigated to determine the role of attentional biases in patients with anxiety disorders. A slowing in color-naming performance of phobia-relevant words in comparison to neutral words was shown repeatedly in anxious patients and, in particular, in patients suffering from social phobia. Nevertheless, the neural correlates of this phenomenon in social phobia are far from being clear. In the present study, 14 patients with social phobia and 14 healthy control subjects were exposed to an event-related emotional stroop task while subjects were scanned with functional magnetic resonance imaging (fMRI). The design of the emotional stroop task allowed the investigation of both, fast and slow stroop effects. Results indicate that mainly fast interference effects operate in emotional stroop tasks in patients with social phobia. fMRI data imply a specific involvement of brain regions such as the amygdala and the anterior cingulate cortex in the processing of disorder-related words and the behavioural outcomes. In particular, activation in the anterior cingulate cortex was positively correlated with emotional stroop interference. Results are discussed in relation to actual theoretical concepts concerning the generation and solution of emotional interference in healthy subjects and anxiety disorders.

**Poster 189**

**NEURAL BASIS OF AUTOMATIC PROCESSING OF DISORDER-RELATED STIMULI IN SPECIFIC PHOBIA**

Thomas Straube, Judith Lipka, & Wolfgang H.R. Miltner

Friedrich-Schiller-University Jena

A current scientific debate relates to the question as to whether threat-related stimuli lead to automatic activation of the amygdala even under conditions of unawaresness of stimuli presentation or strong attentional distraction. Several actual studies propose that amygdalar processing of threat signals requires awareness of stimuli as well as attentional resources. Here, we present new findings of event-related functional magnetic resonance imaging studies, which investigated automatic activation of the amygdala to phobicogenic versus neutral stimuli in spider-phobic subjects and healthy controls. Subjects were exposed to experimental conditions that distracted attention from the stimuli or impaired conscious stimulus perception by means of backward masking. Phobic subjects, compared to controls, showed stronger amygdalar responses to phobicogenic versus neutral stimuli even during strong attentional distraction and successful backward masking of pictures. These results support theoretic models predicting a neural alarm system being able to automatically process threat-related stimuli. In particular, the amygdala may have a specific role in pre-attentive threat processing in specific phobia.

**Poster 190**

**THE ROLE OF HIPPOCAMPUS AND CONTEXT CONDITIONING IN POSTTRAUMATIC STRESS DISORDER: A CROSS-SECTIONAL STUDY IN TRAUMATIZED AND NON-TRAUMATIZED PARAMEDICS**

Sebastian Pohlack, Claudia Liebscher, Stephanie Ridder, Slawomira Lipinski, & Herta Flor

University of Heidelberg, Mannheim

Highly stressful experiences such as traumatic events have been shown to be related to severe and enduring impairments and thus to a high incidence of posttraumatic stress disorder (PTSD). To better understand the pathogenic mechanisms of PTSD we investigated a high-risk group for the development of this disorder, in a prospective longitudinal design to participate in physiological assessments as well as in a functional magnetic imaging study of differential aversive context conditioning. In a subset of 21 non-traumatized participants we found increased hippocampal activation and subjective ratings to CS+ versus CS− during acquisition compared to 21 persons with trauma experience but no PTSD. This reduced differentiation persisted during extinction. Preliminary analyses in non-traumatized persons showed a negative correlation between hippocampal volume and extinction learning. These results suggest that already traumatized subjects without PTSD are less able to distinguish between safe and unsafe environments during acquisition and extinction. We will complete the analyses of hippocampal volume for both groups and plan to determine hippocampal size in a longitudinal manner to examine the predictive role of these variables.
Dr. Schedlowski’s presentation will be on the role of classical conditioning in animal and human conditioned immunosuppression. Dr. Zimmermann-Viehoff will present data from a study that investigated autonomic responses after placebo interventions on blood pressure. Together, the presentations will show the impact of placebo responses in pain, autonomic function, cognitive function, and immunology.

**Poster 191**

**THE EFFECT OF AN ACTIVE PLACEBO ON PAIN-INDUCED EVENT RELATED POTENTIALS IN A BALANCED PLACEBO DESIGN**

Espen Bjerkedal, Thomas Nermo, Per M. Aslaksen, & Magne Arve Flaten
University of Tromsø

**Aim:** To investigate whether an active placebo drug, caffeine, could enhance the placebo analgesic response. It was tested whether the subjective, arousing effects of caffeine could enhance expectations that active medication had been administered, and increase placebo analgesia. Methods: Administration of grapefruit juice with or without 4 mg/kg caffeine was crossed with information that the drink contained a potent painkiller or placebo in a balanced placebo within-subjects design. Pain was induced by a Nd:YAG 1340 Stimul laser and electroencephalography was recorded from 32 electrodes. Results: A placebo response was seen on P2 amplitude. Caffeine had no analgesic response, and did not significantly increase arousal. Contrary to the hypothesis, the active placebo caffeine administered with information that it was an analgesic blocked the placebo response on P2 amplitude. Discussion: The EEG data clearly showed a placebo analgesic response to information that a painkiller had been administered, but caffeine did not enhance the placebo analgesic response. This could be due to the weak effect of caffeine on subjective arousal. The surprising observation that caffeine reduced the placebo analgesic response suggests that administration of a stimulant drug may interact with placebo analgesic responding.

**Poster 192**

**THE FULLY-BALANCED AND THE HALF-BALANCED PLACEBO DESIGN**

Paul Enck, & Sibylle Klosterhalfen
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Separation of the “expected” from the “true” drug effect in placebo-controlled drug trials can be achieved by informing half of the subjects in each group (drug, placebo) correctly that they had received the drug or placebo, while the others are misinformation (deception) about the drug they received prior to testing; this is called the “balanced placebo design” (BPD). Methods: We investigated two different modes of the BPD. Study 1 - Half-BPD: 64 healthy subjects (32:32 males:females) balanced for smokers and never-smokers were made to believe that a chewing gum they received may or may not contain 4 mg nicotine to improve vigilance and reaction time, while in fact none received nicotine. Immediately prior to neurocognitive function testing (N-back tasks) they were informed that they belong to the nicotine group or to the placebo group. The student conducting the study was made to believe this was a fully BPD to maintain double-blindness. Study 2 - Fully BPD: A group of 64 subjects balanced for gender were given capsules that either contained 500 mg of ginger or placebo for prevention of motion sickness in a double blinded fashion. Immediately prior to body rotation in a rotation chair (5 × 2 min at 120°/s) they were informed that they received ginger or placebo with 50% each receiving correct and false information. Neurocognitive performance and nausea symptoms, resp. were recorded as efficacy measures, as were psychophysiological responses by saliva cortisol, heart rate variability, and electrocorticography. Both studies have been finished, and data evaluation is ongoing.

**Poster 193**

**PLACEBO EFFECTS ON BLOOD PRESSURE INDUCED BY EXPECTANCY MANIPULATION**

Karin Meissner, & Dagmar Ziep
Ludwig-Maximilians University of Munich

There is growing evidence that organ functions controlled by the autonomic nervous system, such as pulmonary function and gastric motility can be affected by verbal suggestions delivered during placebo administration. In this study we examined expectancy-induced placebo effects on blood pressure. Forty-five healthy participants were randomized into one of three groups and received either a homeopathic drug described as having a hypotensive effect due to its vasodilating properties, or an identically looking placebo drug in a double-blind design, or were assigned to no treatment. Blood pressure, finger temperature, electrocardiograms, electrogastrograms and skin conductance levels were recorded during 30 minutes before and after intervention, and changes in state anxiety were assessed. Results showed decreases of systolic blood pressure and increases in finger temperature in the intervention groups, as compared to no treatment. Heart rate, respiratory sinus arrhythmia, gastric slow wave frequency, skin conductance levels and state anxiety were not specifically affected by the interventions. Multiple regression analyses revealed that the placebo effect on systolic blood pressure was predicted by increases in finger temperature, which in turn could be attributed to reduced skin conductance. Results suggest that the expectation of taking a hypotensive drug with vasodilating properties lowered blood pressure in a suggestion-specific manner by reducing sympathetic vasoconstrictor tone.

**Poster 194**

**THE LEARNED IMMUNE RESPONSE: PAVLOV AND BEYOND**

Manfred Schedlowski
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The latest scientific evidence has demonstrated, that the placebo effect stems from highly active processes in the brain that are mediated by psychological mechanisms such as expectation and behavioral conditioning. During the last years we have developed several protocols of behavioral immunocorticiding in rats, mice and humans. When saccharin taste as a conditioned stimulus (CS) and the immunosuppressive drug Cyclosporine A as an unconditional stimulus (UCS) is paired in rats during aquisition, re-exposure to the CS during evocation induces a significant inhibition of the proliferative capacity of splenic lymphocytes as well as interleukin-2 and interferon-gamma production and cytokine mRNA expression. These behavioral conditioned immuno-suppressive effects are mediated on the effenter arm via the splenic nerve, noradrenaline and beta-adrenoceptor dependent mechanisms. In addition, the insular cortex, the amygdala and the ventromedial nucleus of the hypothalamus have been identified as essential neuronal structures for this associative learning processes. The conditioned immunosuppression is of biological relevance, since behavioral conditioning significantly prolonged the survival of heterotopic transplanted heart allografts and behaviorally conditioned immunosuppression has also been demonstrated in humans. Moreover, the immunosuppression induced by behavioral conditioning can be intensified by increasing the number of acquisition as well as evocation trials, further indicating the potential feasibility of conditioning procedures in clinical settings.

**Poster 195**

**PLACEBO-INTERVENTIONS ON BLOOD PRESSURE - LACK OF AUTONOMIC EFFECTS**

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1Charité University Medical Center Berlin, 2Ludwig-Maximilians University of Munich

We aimed to investigate autonomic responses after placebo interventions on blood pressure (BP). 92 young healthy subjects received a placebo with the previous suggestion of an effective drug to increase BP (condition 1), decrease BP (condition 2), or the information that a placebo was administered (control condition). BP, heart rate, stroke volume, total peripheral resistance, heart rate variability and electrodermal activity were continuously recorded over 30 min before and after placebo administration. Subjects rated their expectations about the drug effect and the subjectively perceived effect by means of visual analogue scales. Groups did not significantly differ with regard to sociodemographic characteristics. There was a trend towards a higher proportion of males in condition 1 (p = 0.06). Subjects in condition 1 and 2 had higher expectations and subjective perception with regard to the drug effect compared to the control condition. Mean BP increased by 1.6±3.15 mmHg in condition 1 (p = 0.01), by 1.21±3.37 mmHg in condition 2 (p = 0.05) and by 1.05±3.91 mmHg in the control condition (p = 0.15). No significant time x condition interaction was found for any of the physiological parameters after adjustment for sex. The data suggested that the interventions induced mild autonomic arousal independently of the suggestion, which was possibly related to the anticipation of adverse drug effects. The lack of placebo effects was possibly due to the absence of symptoms in the subjects. Future research should focus on clinical populations or use designs inducing symptoms.

**Poster 196**

**ATTENTIONAL DEFICITS IN AN ATTENTION-TO-PREPULSE PARADIGM IN ADHD AND THE INFLUENCE OF THE DAT POLYMORPHISM**

Annette Conzelmann, Paul Pauli, Ronald F. Mucha, Christian P. Jacob, Antje B.M. Gerdes, Georg W. Alpers, Andreas Warnke, Klaus-Peter Lesch, & Peter Weyers
University of Würzburg

**Descriptors:** ADHD, attention, startle

The aim of this study was to investigate attentional prepulse inhibition (PPI) and facilitation (PFF) of the startle reflex in adult ADHD patients and controls. Furthermore, we wanted to assess the impact of DAT as a candidate polymorphism associated with ADHD. DAT codons for the dopamine transporter with the 9R variant leading to more dopamine availability compared to the 9R-absent variant. Fifty-seven adults with
ADHD and fifty-seven healthy controls took part in the study. Prepulses of 68 dB were displayed 120 and 240 ms (PPF) and 2000 and 4000 ms (PPI) before the startle stimulus (96 dB), and the startle reflex was obtained by EMG of M. orbicularis oculi. Geometric figures preceding each trial indicated whether to attend (attention condition) or ignore (conditioning) information. We measured preparatory responses in 18 healthy controls. Independent of group, attentional modulation of PPI was only present in the 9R DAT variant but not in the 9R-absent variant. Results show that attentional deficits in ADHD are present in early information processing and disappear over time. Early attentional modulation was only present in the DAT variant associated with higher dopaminergic efficiency. Results are in line with reports of positive methylphenidate effects on early attentional processing whose key effector is the dopamine transporter.

**Poster 2**

**A HUMAN PHEROMONE AS SAFETY SIGNAL?**

Monika Frey, Peter Weyers, Paul Pauli, & Andreas Mülhberger
University of Würzburg

Descriptors: ERP, pheromones

Pheromones, discussed as intersexual communicative signals in humans, might modulate the early automatic evaluation of emotional facial stimuli. Thus, in this study we investigated the influence of the putative human male pheromone 4,16-androstadien-3-one (AND) on the female brain. While our subjects viewed female and male faces with happy, angry and neutral expressions, the odors were presented related to the face. We measured neural responses associated with conditioning. We randomly assigned 14 participants to two groups: one group underwent a forward conditioning (i.e., the CS preceded a painful US). We expected a stronger activation of the neural system of fear conditioning by forward CS+ compared to CS- in the presence of CS+ and higher anxiety, and more negative valence ratings in response to CS+. These results confirm that fear conditioning in a complex VR environment is feasible and therefore offers a capable new tool to study mechanisms of fear and anxiety in humans. Future studies may use immersive VR to compare effects of cue and context conditioning in ecologically valid environments.

**Poster 3**

**THE REWARDING ASPECT OF AN AVERSIVE EVENT**

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University of Würzburg

Descriptors: conditioning, fMRI

To survive, animals and humans avoid pain and approach food. However, previous studies have shown that aversive events can elicit approach. Namely, fruit flies approached an odor (conditioned stimulus - CS+) when the odor had been following a painful electrical shock (unconditioned stimulus - US). Is this because pain-relief has a reward-like effect? We used event-related functional magnetic resonance imaging (fMRI) to characterize neural responses associated with conditioning. We randomly assigned 14 participants to two groups: one group underwent a forward conditioning (i.e., the CS+ preceded a painful US); and the other group underwent a backward conditioning (i.e., CS+ followed a painful US). We expected a stronger activation of the neural system of fear conditioning by forward CS+, but a stronger activation of the neural system of reward by backward CS+. Comparing forward with backward conditioning, we found significant activation of the anterior cingulate cortex (ACC) in the presence of CS+ after forward conditioning; whereas during backward conditioning, we found a significant activation of the posterior cingulate cortex (PCC). According to the literature, ACC may mediate fear expression in humans, while PCC seems to be involved during movement to an acquired reward. However, the temporal difference of CS-US might determine if CS+ acquires punishing or rewarding properties. However, participants reported negative emotional valence for both forward and backward CS+. In summary, such dissociation might explain why sometimes negatively valuated stimuli are approached.

**Poster 4**

**EXPERIMENTALLY PRODUCED CUES FOR SMOKING ELICIT PREPARATORY RESPONSES IN HEALTHY SMOKERS**

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University of Würzburg, 2University of Giessen

Descriptors: nicotine dependence, conditioning, cue-reactivity

Important criteria of nicotine dependence are highly situation-specific, indicating the role of learning processes. The animal literature demonstrates that through pairing with drug consumption, previously neutral stimuli acquire the ability to elicit a plethora of conditioned responses which may promote drug intake. In the dependent smoker, naturalistic drug-related stimuli (cues) such as smoking paraphernalia evoke subjective and physiological responses, indicating positive affect and motivation to consume. Although these responses are probably the result of conditioning, evidence for this assumption stemming from human research is only sparsely needed. Only a few studies have assessed the motivational properties of experimentally produced cues for smoking. Extending these data, we report a study with 29 smokers using a protocol based on the principles of differential conditioning. Abstract pictures served as CsS, and single puffs on a cigarette served as reinforcers. The results showed that the experimentally produced cues for smoking (CS+) elicited stronger skin-conductance responses and more activity of the zygomatic and orbicularis oris muscle (lip-muscle) than the control CS-. These data demonstrate that through pairing with smoke reinforcement, neutral stimuli acquire the ability to elicit preparatory physiological responses, which are assumed to play an important role in the maintenance of addiction.

**Poster 5**

**FEAR CONDITIONING IN IMMERSIVE VIRTUAL REALITY**

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Descriptors: fear conditioning, virtual reality, fear potentiated startle

The fear conditioning paradigm is a very important model and has led to important findings about mechanisms of fear and anxiety as well as involved neuronal structures. The recent use of virtual reality (VR) environments in human fear conditioning allows researchers to control and manipulate cue and context stimuli in analogy to animal models. In the present study we tested 18 participants in a complex immersive VR environment. The VR environment was displayed via a head-mounted display. The line of sight in the VR was adapted to participants’ head movements as they were guided through a virtual office room. Light cues within this room served as conditioned stimuli (CS); one light color (CS+) was always followed by an electric shock (unconditioned stimulus, US), while another light color (CS-) was never followed by the US. Startle response, heart rate and subjective ratings of anxiety, valence and arousal were recorded. We expected higher fear responses to CS+ in comparison to CS-after conditioning. Indeed, we found conditioned startle potentiation, higher anxiety, and more negative valence ratings in response to CS+ compared to CS-. These results confirm that fear conditioning in a complex VR environment is feasible and therefore offers a valuable new tool to study mechanisms of fear and anxiety in humans. Future studies may use immersive VR to compare effects of cue and context conditioning in ecologically valid environments.

**Poster 6**

**CORRUGATOR RELAXATION AS A SIGN OF A FELT SMILE**

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University of Würzburg

Descriptors: duchenne-smile, facial emotional expressions, EMG

The Non-Duchenne smile (i.e., a smile in which the mouth is closed but the eye-regions are involved) is often seen as indicating a posed, unfelt smile. Recent studies, however, suggest that a posed smile can perfectly involve the eye regions. We investigated the hypothesis that the key sign of a felt smile, as measured by facial muscular activity, is not an increase in activity of the Orbicularis occhi but instead a relaxation of the Corrugator supercilii. For this purpose, thirty female participants were informed that they had to perform a virtual job interview training. They were asked to perform as well as possible and were introduced to positive and negative interviewer characters. Before the announced job interview started they had to look through emotional facial expressions (happy, neutral, angry) of the involved positive and negative interviewers while the activity of Zygomaticus major, Orbicularis occuli, and Corrugator supercilii was recorded electromyographically. We found a significantly larger Corrugator relaxation in response to happy compared to neutral interviewers. No differences could be observed between positive and negative interviewers. The relaxation of Corrugator supercilii activation as the criterion for distinguishing felt (Duchenne) and unfelt smiles, and instead emphasize Corrugator relaxation as the crucial indicator.

**Poster 7**

**AUGMENTING CBT FOR GAD WITH BIOFEEDBACK OR PROGRESSIVE MUSCLE RELAXATION YIELDS SIMILAR EFFECTS.**

Stefan M. Schult1, Jenny Murphy2, James L. Spira3, Richard Gevirtz2, Sanna Heering4, Fred Muench1, Paul Pauli1, Georg W. Alpers1, & Stefan G. Hofmann4
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Descriptors: biofeedback, RSA, generalized anxiety disorder

Generalized anxiety disorder (GAD) is associated with low vagal tone. Worry, a characteristic symptom of GAD leads to phasic reductions of respiratory sinus

**Poster 8**

**PROGRESSIVE MUSCLE RELAXATION YIELDS SIMILAR EFFECTS.**

Stefan M. Schult1, Jenny Murphy2, James L. Spira3, Richard Gevirtz2, Sanna Heering4, Fred Muench1, Paul Pauli1, Georg W. Alpers1, & Stefan G. Hofmann4
1University of Würzburg, 2Alliant International University, 3University of California, San Diego, 4Boston University, Helicor, Inc.

Descriptors: biofeedback, RSA, generalized anxiety disorder

Generalized anxiety disorder (GAD) is associated with low vagal tone. Worry, a characteristic symptom of GAD leads to phasic reductions of respiratory sinus
arrhythmia (RSA). In a bi-center randomized clinical trial we compared cognitive behav-
ioral therapy (CBT) with biofeedback aimed at increasing the functional capacity of vagal
activity to CBT with progressive muscle relaxation (PMR). Seventy-nine GAD-
patients (DSM-IV-TR) were assessed pre and post 12 sessions of group CBT, and at 1
and 3 month follow-ups. Dependent variables included questionnaires and interview-
data, as well as physiological indicators of the sympatho-vagal balance during base-
line, and induced relaxation and worry. Our findings indicate that CBT was successful,
independent of the particular relaxation training. In contrast to our hypothesis, bio-
feedback training did not increase vagal tone. Furthermore, neither treatment affected
decreases of RSA found during induced worry, when compared to both baseline and
relaxation. Our findings suggest no particular advantage of the biofeedback training. How-
ever it might comprise a similarly effective training option for individuals who prefer biofeedback over PMR.

**Poster 8**

**PERCEPTUAL CUES VS. CONCEPTUAL INFORMATION:**
**PSYCHOPHYSIOLOGY OF SPIDER PHOBIA IN VIRTUAL REALITY**

Henrik Peperkorn, Georg W. Alpers, & Andreas Mühlberger
University of Würzburg

Descriptors: spider phobia, SCL, virtual reality

Fear reactions in spider phobic individuals can be activated either by perceptual cues or
conceptual information. Our study used virtual reality for a controlled manipulation of
both conditions to identify different patterns of subjective and psychophysiological
reactions, including heart rate (HR), skin conductance (SCL), and carbon dioxide (CO2).
We expected a perceptual cue, a virtual tarantula, to activate intense psycho-
physiological responses. We expected the fear responses to be even stronger when spider
phobic individuals were made aware of a real tarantula’s presence. However, the same
information was expected to elicit weaker physiological reactions when no spider was
presented. Forty-eight spider phobic and forty-eight matched non-phobic participants
were exposed to five trials, each lasting for 5 minutes, consisting of either a perceptual
cue and the phobia-relevant information. Moreover, their SCL was significantly higher in
participants that were made aware of a real tarantula’s presence. However, the same
information was expected to elicit weaker physiological reactions when no spider was
presented. Forty-eight spider phobic and forty-eight matched non-phobic participants
were exposed to five trials, each lasting for 5 minutes, consisting of either a perceptual
cue and the phobia-relevant information. Moreover, their SCL was significantly higher in
the combined than in the perceptual or the information condition, but did not differ
between the latter ones. Systematic differences were found between phobic and control
participants concerning HR and CO2. Furthermore, we observed a decrease in these
parameters over time, but no differences between the conditions. The results show that
perceptual cues are essential for fear reactions in spider phobia. The combination of
fear-relevant information and perceptual cues particularly activates an intense and per-
sistent reaction.

**Poster 9**

**STARTLE POTENTIATION IN FEAR-RELATED SITUATIONS: THE CASE OF CLAUSTROPHOBIA**

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Descriptors: startle, claustrophobia, emotion

That the startle response is potentiated when fearful individuals look at fear-related
pictures has been well documented. Less is known about startle potentiation in indi-
viduals with a specific phobia of the situational type when they are exposed to fear-
related real life situations. However, darkness has been shown to be a situational fac-
tor that also potentiates the startle reflex. Thus, we assessed the startle reflex, heart rate and
skin conductance level while 25 participants with high or low claustrophobia scores were
exposed to a small enclosed space. While measures of ANS activity did not differentiate
between groups during exposure, the startle reflex was significantly more potentiated in
those who were more fearful in that situation. Moreover, repeated exposure resulted in
a reduction of this potentiation. These findings support the use of the startle reflex as a
valuable measure of situational fear.

**Poster 10**

**CONTINUOUS CHANGES IN AFFECT FOLLOWING A DISCRETE STIMULUS: RELATIONSHIPS OF MULTIPLE BEHAVIORAL INDICES TO PSYCHOPHYSIOLOGY AND BRAIN IMAGING DATA IN HEALTHY AND DEPRESSED ADULTS**

Greg J. Siegle, Michelle Horner, & Edward S. Friedman
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Descriptors: affect, pupil, depression

Background. Continuous dynamic affect ratings provide insight into the time-course of
physiological and brain processes underlying emotion. Their analysis has often relied on
correlations of affect-rating waveforms with psychophysiological measures. This tech-
nique assumes that the same brain processes underlying increases in affect also underlie
decreases. Relaxing this assumption may be particularly important for studying affec-
tive disorders, in which brain processes associated with decreasing affect may be differ-
ent from those associated with increasing affect. We thus examined alternate
relationships of dynamic changes in affect to brain function. Method. Dynamic vari-
ation in affect following viewing of a positive idiosyncratic script was measured for seven
minutes in 18 adults (9 healthy never-depressed, 9 unmedicated recurrently depressed)
during concurrent assessment with pupil dilation and functional magnetic resonance
imaging (fMRI). Results. Whereas continuous changes in dynamic affect were not
inherently related to variation in brain function, regressors representing times of in-
creasing, decreasing, or maintained affect were strongly related to brain function.
Smoothing and examination of lagged relationships further improved fit indices. Dis-
cussion. Data suggest that continuous changes in self-reported affect may occur before
or after relevant changes in brain function, and that increases and decreases in affect may
be associated with different brain processes.

**Poster 11**

**EFFECT OF SENSORY MODALITY OF GO STIMULI IN THE STOP-SIGNAL PARADIGM: A BEHAVIORAL AND ERP STUDY**

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Descriptors: stop signal paradigm, event-related potentials, response inhibition

The aim of the study was to investigate the inhibitory control of an ongoing
motor response, manifested in event-related potentials, depending on modality of Go
stimuli used in the task. In the first experiment, 29 participants performed a standard
visual two-choice task with an auditory Stop-signal stimulus, while EEG was recorded.
In the second experiment, they completed an innovatory version of stop-signal task,
where both Go and Stop-signals are presented auditorily. The behavioral results
indicated that the participants performed better in the visual version of stop-
signal task. The amplitude of N2 and P3 components to auditory Stop-signal in visual
task were more pronounced for successful than for unsuccessful stop-signal trials.
Surprisingly, the opposite pattern was observed in the auditory version of the task. The
difference was especially pronounced over the right hemisphere. Additionally, the
latency of N2 and P3 components was longer in auditory two-choice task. Taken together
these findings suggest that neural mechanisms underlying inhibitory control are
different for visual and auditory modalities and manifest in different ways in event-
related potentials. The results are discussed in terms of current neurophysiological
knowledge.

**Poster 12**

**A MULTI-LEVEL MULTI-METHOD ANALYSIS OF CONFLICT RESOLUTION: GENES, PERSONALITY AND ERPS.**

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Descriptors: genetic functional polymorphisms, cognitive control, sensitivity

Conflict resolution is a crucial executive function in cognition. Two components that
affect the ability to cope with conflicts are sensitivity to the environment and cognitive
control. People who are more sensitive detect and act on the conflict more quickly, and
people with better control can better resolve the conflict once detected. Despite previous
research on individual differences and conflicts (Salters-Pedneault, et al. 2007; Greene,
et al. 2008), this is the first study to examine the interaction between genes and per-
sonality dimensions on sensitivity and control using event-related potentials (ERPs).
The current study used allelic variations of MAOA, genetic functional polymorphisms
for encoding products involved in the metabolism and function of serotonin, measures
of sensitivity (anxious apprehension and anxious arousal [Heller, et al. 1997]), and 12
channel ERPs to investigate conflict processing either involving emotional material or
not. Sixty-three participants (M age = 18.8) completed a cognitive Stroop task, an
emotional Stroop task and an emotional flanker task. When predicting a slow positive
component (thought to index conflict resolution), an interaction between MAOA and
levels of anxiety was found, which did not interact with serotonin levels. The behavior
have more difficulty resolving conflicts when high in anxious apprehension but not when high
in anxious arousal. Behaviors of individuals with different sensitivity levels and the role
of serotonin in neural generators of ERPs are discussed.

**Poster 13**

**AFFECTION PICTURES BUT NOT WORDS MODULATE THE LPP**

Keith M. Young, Aminda J. O’Hare, Austin Fitts, & Ruth Ann Atchley
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Descriptors: LPP, arousal, motivated attention

Past research demonstrates that an ERP component called the late positive potential
(LPP) is modulated by exposure to emotional pictures varying on arousal (e.g., Cuthbert,
et al., 2000; Hajek & Nieuwenhuis, 2006; Schupp, et al., 2000). There is little evidence

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showing similar arousal effects for emotional words. The current study directly examines LPP modulation to picture (IAPS) and word stimuli (ANEW), both varying on arousal and valence. Negative and positive pictures had higher activation than negative and positive words, t(15) = 4.219, p < .001; t(15) = 3.925, p < .001. Additionally, there was a main effect of arousal, F(1,15) = 17.622, p < .013, for negative and positive pictures. Words did not result in any significant differences across any stimulus dimensions. These findings support the argument that the LPP is an index for motivational attention of stimuli which are ecologically valid (e.g., Pastor et al., 2008). Differential processing of emotional words has been demonstrated across various paradigms, thus an index of motivated attention to words requires further research.

**Poster 14**

**ANXIETY AND CEREBRAL BLOOD FLOW UNDER DIFFERENT LEVELS OF CO2**

Johan Bresseleers, Ilse Van Diest, Peter Verhamme, Steven De Peuter, & Omer Van den Bergh

University of Leuven

Descriptors: cerebral blood flow, anxiety, transcranial doppler

Only a few studies have investigated the link between anxiety and global cerebral blood flow (CBF), leading to conflicting results. Anxiety has been found to have either no effect, or to cause an increase or a decrease in CBF. A possible mechanism in the relationship between anxiety and CBF is through the sympathetic nervous system. Sympathetic activity has been found to decrease CBF, especially under hypercapnic conditions. In the present study we investigated the effect of anxiety on CBF under different levels of PCO2. Anxiety was manipulated using threat-of-shock: participants (N = 27) were told that they could receive multiple shocks. In fact, only one shock was given in the first two threat trials, near the end of the trial. The experiment consisted of three types of trials: a room-air breathing trial, a 7.5% CO2-inhalation trial, and a hypocapnic trial in which participants were instructed to breathe as deep as possible at 30 breaths/min. Each participant received the three breathing trials in both the safe and the threat-of-shock condition. Breathing behavior and end-tidal CO2 was measured together with CBF velocity (CBFv) using a Transcranial Doppler. Under normocapnia, a significant CBF decrease was found during threat-of-shock. Because threat-of-shock did not increase anxiety in the hypocapnic trials, a regression analysis was performed, which showed a different effect of anxiety under hypocapnic conditions: a decreased CBFv was found with higher anxiety. Because the latter results are correlative, further research on this matter is needed.

**Poster 15**

**INTERCEPTIVE STIMULI AND PREPULSE INHIBITION**

Meike Pappens, Debora Vansteenwegen, Steven De Peuter, Casper Wuys, Omer Van den Bergh, & Ilse Van Diest

University of Leuven

Descriptors: PPI, interception

Prepulse inhibition (PPI) occurs when a relatively weak sensory event (the prepulse) is presented 30 – 500 ms before a strong startling stimulus, thereby reducing the magnitude of the startle response. PPI is generally interpreted as a measure of sensorimotor gating. In humans, PPI occurs in a robust, predictable manner when the prepulse and startling stimuli occur in either the same or different modalities. Until now, mainly visual, acoustic and cutaneous stimuli have been used in PPI paradigms. We investigated whether interceptive prepulses (inspiratory resistive loads, IRL) evoke similar inhibition as exteroceptive prepulses. Participants (N = 32) received 15 randomized presentations of each of the following: a light (5 cm/H2O/l/s) or a moderate (20 cm/H2O/l/s) IRL (each presented during one inspiration), aversive pictures (8 s), or no stimulus. An acoustic startle probe was presented in 66% of the trials 500 or 1500 ms following stimulus onset. Measurements included reaction times to the startle probes, electrode- rmal activity, startle blink responses and subjective fear. Results showed that, compared to the pictures, the interceptive stimuli did not show PPI compared to the no stimulus condition when being 500 ms after (P < .001) or 1500 ms after the potential did not differ between the 500 and the 1500 ms probe for the IRL whereas it did for the pictures. Reaction times showed a mirror image of the startle data. These results suggest that early attentional processing of interceptive stimuli has different functional characteristics than that of exteroceptive stimuli.

**Poster 16**

**THE EFFECT OF AN IMPOSED SIGH FOLLOWING MENTAL STRESS**

Elke Vlemicinck, Joachim Taelman, Steven De Peuter, Ilse Van Diest, & Omer Van den Bergh

University of Leuven

Descriptors: sighing, respiratory variability, mental stress

As randomness in the respiratory system increases, spontaneous sighs reset correlated respiratory variability. Moreover, spontaneous sighs are related to relief. These findings suggest that spontaneous sighs are beneficial both psychologically and physiologically. However, imposing a sigh may have the opposite effect as it may disturb breathing when a sigh is physiologically or psychologically inappropriate. The present study aimed to examine respiratory variability following imposed sighs. Each participant (N = 43) went through a 6-min baseline period, followed by three tasks (presented in randomized order) lasting 6 min and separated by a 6-min recovery phase. The three tasks were two mental arithmetic tasks (MAT, involving 3-digit number calculations) and one control task (indicating the largest number in a series with a mouse). One of two MAT was followed by the instruction to sigh within the next 20 sec. The coefficient of variation (CV) and autocorrelation (AR) of minute ventilation (MV) were calculated as measures of total respiratory variability and correlated respiratory variability, respectively. When an imposed sigh followed the MAT, a significant increase in CV was found, whereas AR did not change. When no sigh occurred after the MAT, no changes in CV were found, nor in AR. These results show that imposing a sigh induces randomness, rather than resetting correlated respiratory variability as spontaneous sighs do. This suggests that an imposed sigh may disturb breathing and may not have the relieving effect that spontaneous sighs evoke.

**Poster 17**

**EGO-ININVOLVEMENT AND MENTAL FATIGUE INFLUENCE ON CARDIOVASCULAR RESPONSE TO A PERFORMANCE CHALLENGE**

Patricia Barreto, Sara Walker, David Stephenson, & Rex A. Wright

The University of Alabama at Birmingham

Descriptors: mental fatigue, cardiovascular response, active coping

Undergraduates first performed two 3-minute segments of an easy (fatigue low) or moderately difficult (fatigue high) mental counting task (the Paced Auditory Serial Addition Test). Shortly thereafter, they were presented a paced version of a scanning task (the d-2 test) with instructions that scores (1) measured concentration ability and potential for academic and career success (ego-involvement high), or (2) revealed nothing of importance about the performer (ego-involvement low). The central expectation was that fatigue would potentiate cardiovascular responsiveness during the d-2 task period when ego involvement was high, but not when it was low. This was predicated on the assumptions that success importance would be proportional to ego-involvement and that fatigue would promote effort only where importance was great enough to justify the extra effort required to overcome it. Participants understood and accepted the involvement instructions, but provided uniformly high success importance ratings. Consistent with the latter, analysis revealed a fatigue effect for heart rate, reflecting stronger responses among High Fatigue participants.

**Poster 18**

**IMPAIRED RECOVERY FROM NEGATIVE STIMULI ACROSS PARADIGMS AND MEASURES**

Stacey M. Schaefer1, Carien M. van Reekum2, Regina C. Lapate3, Catherine J. Norris3, David R.W. Bachhuber1, Matthew J. Sutterer1, Adam M. Koppenhaver1, & Richard J. Davidson1

1University of Wisconsin, Madison, 2University of Reading, 3Dartmouth College

Descriptors: regulation, amygdala, corrugator

Emotional reactivity and recovery were assessed in the same 47 individuals in 2 separate paradigms. Paradigm 1 included presenting positive, neutral, and negative pictures while psychophysiological measures such as corrugator EMG were recorded. Paradigm 2 included presenting different pictures paired with a neutral face during fMRI. The neutral faces were rated on likeability prior to the session and were re-rated after their paired presentation with a valenced picture; faces rated less likeable after following a negative picture suggest the paired presentation “affectively flavored” the face. The test predicted whether those subjects who showed impaired recovery from negative stimuli during Paradigm 1 (indexed by greater corrugator EMG 4 – 8 s following negative picture offset) also showed poorer recovery from negative stimuli during Paradigm 2 (indexed by greater affective flavoring of a face presented 3 s after a negative picture). Indeed, greater EMG after a negative picture predicted less liking of neutral faces presented after a negative picture.

**Poster 19**

**A MOCK TERRORISM APPLICATION OF THE P300 BASED CONCEALED INFORMATION TEST**

John B. Meixner, & J. Peter Rosenfeld

Northwestern University

Descriptors: deception, P300, CIT/GKT

Previous studies examining the P300-based concealed information test commonly test for mock crime or autobiographical details, but no studies have used this test with a counterterrorism scenario. Subjects in the present study covertly planned a mock
terrorist attack on a major American city. They were then given three separate blocks of concealed information testing, examining for knowledge of the location, method, and date of the planned terrorist attack. The testing protocol was based on the Complex Trial Protocol (Rosenfeld et al., 2008). With prior knowledge of the probe items, we detected 12/12 guilty subjects as having knowledge of the planned terrorist attack and detected 0 false positives among 12 innocent subjects. Additionally, we were able to identify 20/36 crime related details with no false positives without any a priori knowledge of what the crime related details were, suggesting that the protocol could potentially identify future terrorist activity.

**Poster 20**

**P300-BASED PROTOCOL WITH ACOUSTIC STIMULI FOR DETECTION OF CONCEALED INFORMATION**

Elena B. Labkovsky, & J. Peter Rosenfeld
Northwestern University

Descriptors: ERP/P300, detection of deception, stimuli recognition, malingering

We showed that event-related potential (ERP) methodology can be used for detection of deception (Rosenfeld et al., 2004, 2008). All previous P300-based detection of deception protocols utilized visual stimuli. In the present study we used 3 types of acoustic stimuli; Probe (P) - subject’s last name, Irrelevant (I) - a last name, NOT relevant to subject, and Target (T) - an irrelevant last name with “assigned significance.” There were 7 different stimuli in the protocol: 5 Irrelevants, one P, and one T. Each name was repeated 30 times in a test run. Subjects responded to All Is and P with a LEFT button on a two-button response box and pressed a RIGHT button when they heard a “target” name. Two groups were tested (total N = 26): a Simple Guilty (SG) group where one of 7 repeatedly presented stimuli was a subject’s last name, and an Innocent (IN) group where all stimuli were irrelevant. Bootstrapped based hit rates in the SG group = 100%, based on P vs all 5 Is combined; and 78% for P vs maximum I. In the IN group there was one (12) false positive (8.3%), for both P vs I and P vs maximum I. A 2 × 2 (Group × Stimulus Type) ANOVA was performed to examine the effects on P300 amplitude. There was main effect of group, F(1,24) = 22.4, p < .001, and interaction, F(1,24) = 33.7, p < .001. The group amplitudes (peak-to-peak), μV, were: SG: P = 12.23, Fall = 4.19; IN: P = 2.14, Fall = 2.20.

**Poster 21**

**ACCURACY OF THE P300-BASED COMPLEX TRIAL PROTOCOL FOR DETECTION OF DECEPTION AS A FUNCTION OF NUMBER OF COUNTERMEASURE IRRELEVANT STIMULI**

Elena B. Labkovsky, & J. Peter Rosenfeld
Northwestern University

Descriptors: ERP/P300, detection of deception, credibility assessment, malingering

We showed Complex Trial Protocol (CTP, Rosenfeld et al., 2008) to be accurate and resistant to use of countermeasures (CMs) with all 4 irrelevant in the CTP a rare Probe (P) or frequent Irrelevant (I) stimulus appears on screen first and is followed (1 – 2 s) by either a target or non-target stimulus in the second part of the same trial. There were 4 different Irrelevants and 1 Probe used. Each subject was instructed to randomly press 1 of 5 buttons on one response box to the first stimulus (P or I). Then the subject pressed 1 of 2 buttons on another response box for Non-Targets or Targets. We tested 6 groups (n = 12 per group): a simple guilty (SG) group, where one stimulus was the subject’s birth date (P); innocent (IN), where all stimuli were irrelevant; and 4 countermeasure (CM) groups: a 1CM group, which was like SG but subjects performed a mental CM to 1 Irrelevant; a 2CM group with CMs to 2 Irrelevants; and 3CM and 4CM groups. Visual inspection showed P900 only in 2 and 3CM groups, and is followed by either a target or non-target stimulus in the second part of the same trial. There were 4 different Irrelevants and 1 Probe included. A subject was instructed to randomly press 1 of 5 buttons on one response box to the first stimulus (P or I). Then the subject pressed 1 of 2 buttons on another response box for Non-Targets or Targets. We tested 6 groups (n = 12 per group): simple guilty (SG), where 1 stimulus was the subject’s birth date (P); innocent (IN), where all stimuli were irrelevant; and 4 countermeasure (CM) groups: a 1CM group, which was like SG but subjects performed a mental CM to 1 Irrelevant; a 2CM group with CMs to 2 Irrelevants; and 3CM and 4CM groups. Visual inspection showed P900 only in 2 and 3CM groups, 2.20.

**Poster 22**

**PUTATIVE NOVEL ERP COMPONENT (P900) AS AN INDICATOR OF COUNTERMEASURE USE IN A MODIFIED COMPLEX TRIAL PROTOCOL**

Elena B. Labkovsky, J. Peter Rosenfeld, & Alex Sokolovsky
Northwestern University

Descriptors: ERP/P300, detection of deception, malingering, countermeasures

In this CTP a rare Probe (P) or frequent Irrelevant (I) stimulus appears on screen and is followed by either a target or non-target stimulus in the second part of the same trial. There were 4 different Irrelevants and 1 Probe included. A subject was instructed to randomly press 1 of 5 buttons on one response box to the first stimulus (P or I). Then the subject pressed 1 of 2 buttons on another response box for Non-Targets or Targets. We tested 6 groups (n = 12 per group): simple guilty (SG), where 1

**Poster 23**

**PSYCHOPHYSIOLOGICAL REACTIVITY TO COMPOSITE BLUE AND WHITE LED LIGHT: CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN**

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Descriptors: heart rate, blue security lighting, LED

Recent reports have described the crime-detering effect of blue security lighting. One possible reason for this effect is said to be the sedative effect of blue light; however, there is little psychophysiological data to verify this hypothesis. In the present study, composite blue and white LED lights and sodium lights were placed outside. Subjects were exposed to each of the lights for 5 minutes, and electroencephalograph (EEG) and heart rate measurements were performed. No significant difference was observed in EEG for the different types of light; however, heart rate decreased when subjects were exposed to the composite blue and white LED lighting. High frequency (HF) value, which reflects parasympathetic nervous system function, was also significantly higher for the composite blue and white LED lighting. These findings demonstrated that blue security lights have a sedative effect. Furthermore, impression evaluation demonstrated that scores for items ‘like’, ‘beautiful’ and ‘new’ were significantly higher for composite blue and white LED lighting.

**Poster 24**

**COMPARISON OF AUDITORY AND VISUAL STIMULUS PRESENTATION DURING THE P300-BASED CONCEALED INFORMATION TEST**

Risa Misaka1, Shinji Hira1, & Isato Furumitsu1
1Fukuyama University, 1University of East Asia

Descriptors: concealed information test, P300, stimulus modality

In the ERP-based CIT studies, the most promising ERP index in terms of practical application to the criminal investigation is the P300 component because it is elicited by rare and meaningful events that are relevant to the subject’s task. In the P300-based CIT protocol, visual stimuli such as photographs, words, or numbers are usually presented as target, probe, and irrelevant stimuli, while the oral presentation is a standard procedure of the field CIT practice with autonomic indices. Thus the present study compared the effect of stimulus modality in the P300-based CIT. Fourteen undergraduates participated in the experiment in which stimuli were presented either visually or on a computer screen or auditory by digitized human voice, and all the subjects experienced both conditions. Results revealed that visual stimuli elicited significantly larger P300 amplitudes than oral stimuli.

**Poster 25**

**EFFECTS OF PREDICTABILITY OF SHOCK TIMING AND INTENSITY ON AVERSIVE RESPONSES**

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University of Illinois, Chicago

Descriptors: predictability, anxiety, psychophysiology

Anticipation of unpredictable aversive events has been shown to heighten aversive responses. However, little is understood about the specific aspects of unpredictability that make it aversive. The present study examined two facets of unpredictable aversiveness: timing and intensity of the aversive stimulus. Participants anticipated shocks that were either predictable or unpredictable in terms of when they would occur (unpredictable timing) and/or their intensity (unpredictable intensity). Startle magnitude and subjective emotions ratings indicated that unpredictable shock timing influenced aversive responses, but unpredictable intensity had no impact. Findings suggest that timing of aversive stimulus delivery (i.e., not knowing when) is a key anxiogenic parameter of unpredictability, but intensity (i.e., not knowing the severity) may not be.
**Poster 26**

**ERP EVIDENCE FOR PRIMING OF YOUNG BUT NOT OLD FACES DURING AGE CATEGORIZATION**

Holger Wiese, & Stefan R. Schweinberger
Friedrich Schiller University of Jena

Descriptors: face processing, priming, age categorization

While humans are often considered to be face experts, such expertise may vary with perceptual experience with a particular class of faces. In young adult participants, a recent study provides evidence for better memory for young compared to old faces, and for differential neural processing in terms of ERP correlates of configural processing (P2) and face repetition (N250). By using an age-priming paradigm, we examined whether the processing of facial age can be facilitated, and whether specifically enhanced processing of young faces in young adult participants is reflected in ERPs. Twenty-four participants categorized clearly old or young adult target faces according to age. Age-congruent or incongruent prime faces of different identity directly preceded the targets. While no behavioral facilitation was observed, the occipito-temporal P2 (210–250 ms) was significantly more positive for young compared to old faces for both prime and target faces. In the subsequent time window (260–400 ms), a significant interaction of age and congruence reflected increased occipito-temporal negativity in the congruent condition for young but not old target faces. With regard to the P2, these results complement previous findings both during age and ethnicity categorization, reflecting larger P2 responses for faces of greater expertise. The subsequent ERP congruence effect demonstrates facilitated access to abstract age representations irrespective of image or identity repetition for young but not old faces.

**Poster 27**

**ERP CORRELATES OF IMPROVED LEARNING FOR SPATIALLY CARICATURED FACES**

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Friedrich Schiller University of Jena

Descriptors: face learning, caricatures, shape

Whereas shape information may be surprisingly unimportant in familiar face recognition, exaggerating individual shape information by spatial caricaturing has been shown to elicit a transient increase of the N170, and a persistent increase of the N250 ERP for unfamiliar faces (Kaufmann & Schweinberger, 2008). As the N250 has been associated with the acquisition of new face representations, these findings were tentatively interpreted as evidence for improved face learning due to increased distinctiveness. However, direct evidence for improved learning of spatially caricatured faces has not been provided yet. Here we report performance and ERP data from 2 experiments that study the influence of spatial caricaturing on face learning. In Experiment 1, we found increased N170 and N250 for caricatures (exaggeration level = 30%) compared to veridical faces during learning. In an immediately following recognition test, we observed an advantage for faces learned as caricatures, which was associated with increased amplitudes of N250. No differences in N170 amplitudes were visible in the recognition test. In Experiment 2, we used more extreme versions of caricaturing (up to 70%). We replicated basic effects of Experiment 1 and demonstrated that both N250 and performance effects were directly related to the amount of caricaturing. Overall, the present results suggest that (i) distinctive shape information is particularly informative to form new face representations for unfamiliar faces, and (ii) this formation of new representations is reflected in the N250 ERP.

**Poster 28**

**LEARNING TASK EFFECTS ON NEURAL CORRELATES OF THE OWN-RACE BIAS**

Johanna Stahl, Holger Wiese, & Stefan R. Schweinberger
Friedrich Schiller University of Jena

Descriptors: own-race bias, ERP, face perception

People are generally better at recognizing faces from their own ethnicity compared to faces from another ethnic group. This Own-Race Bias has been attributed either to lifetime expertise with own-race faces, or to ethnicity-dependent differences in face encoding processes. We explored the influence of the learning task at encoding on the Own-Race Bias by examining performance and event-related potentials (ERPs). During a learning phase, one group of participants categorized Asian and Caucasian faces according to ethnicity (“categorization group”), while a second group of participants rated facial attractiveness (“individuation group”). Subsequent recognition tests indicated clear and similar Own-Race Biases for both groups. In line with earlier research (Stahl et al., 2008), ERPs showed delayed N170-latencies and decreased P2 amplitudes to Asian faces in the categorization group. Intriguingly, the P2 amplitude decrease to Asian faces was absent in the individuation group. These findings demonstrate an influence of the learning task on early face encoding processes. However, the fact that individuation did not decrease the Own-Race Bias in memory performance additionally suggests the existence of an expertise-dependent memory system which is primarily specialized for representing own-race faces.

**Poster 29**

**EFFECTS OF A BENZODIAZEPINE AGONIST ON EMOTIONAL PERCEPTION AND EVENT-RELATED POTENTIALS**

Katarina Gospić1, Jonas Olofsson2, Anders Sand2, Predrag Petrović1, Martin Ingvar3, & Stefan Wiens2
1Karolinska Institute, 2Stockholm University

Descriptors: ERP, emotion, pharmacology

Previous studies have shown that the GABA system is involved in emotional processing. For example, GABA stimulation (i.e. neural inhibition) reduces amygdala responses to emotional stimuli. In this study we investigated effects of GABA-system stimulation on event-related potentials (ERPs) and self-rated emotional perception. We stimulated the GABA system with oxazepam (20 mg) administered orally in a double-blind between-subjects experiment. Of 16 healthy women, half were treated with oxazepam and half received placebo. Neutral and unpleasant pictures were presented for 500 ms to experimentally induce neutral and unpleasant emotions. After every picture, participants rated how unpleasant/pleasant they experienced the picture on a scale from −10 (max negative) to +10 (max positive). Separate ANOVAs were performed for behavioral and ERP data. Results showed that there was a main effect of picture type on both self-ratings and ERP late positive potential (LPP; 300–600 ms; unpleasant > neutral; p < 0.001), consistent with previous findings. Oxazepam treatment did not have a main effect or an interaction effect (picture x drug) on self-ratings and LPP. These results in a limited sample of participants do not support the hypothesis that oxazepam modulates immediate cortical responses to emotional pictures.

**Poster 30**

**ARE LATE POSITIVE POTENTIALS TO EMOTIONAL PICTURES INFLUENCED BY MOVEMENT CUES?**

Anders Sand, Joakim Norberg, & Stefan Wiens
Stockholm University

Descriptors: LPP, emotion

To study effects of motion on affective picture processing, we recorded event-related potentials to negative and neutral pictures that were preceded by different movement cues. These cues were either the actual picture or an annulus (cue type) that decreased or increased in size to induce the illusion of motion towards or away from the observer. Each cue was shown for 500 ms and followed by a 500-ms negative or neutral picture. After each trial, participants rated how unpleasant/pleasant they experienced the picture on a scale from −10 (max negative) to +10 (max positive). Separate ANOVAs were performed for behavioral and ERP data. Results showed a main effect and an interaction effect (picture x cue type) on both self-ratings and LPP. Emotional ratings after negative picture presentations were more negative than ratings after neutral picture presentations (p < 0.001). In parallel, late positive potentials in a 300–500 ms interval over centroparietal scalp regions were larger for negative than neutral pictures across movement cues (p < .01). However, motion cues had no effect on emotional ratings and modulations of late positive potentials. For example, for the annulus cue, effect of movement direction was not significant (p > .10). Although these data replicate previous findings that late positive potentials are affected by emotional picture content, they do not provide evidence that these potentials are affected by movement cues.

**Poster 31**

**LATE POSITIVE POTENTIALS TO TASK-IRRELEVANT THREAT IN SPIDER FEAR**

Joakim Norberg, Nathalie Feira, & Stefan Wiens
Stockholm University

Descriptors: attention, fear, ERP

Previous research has been inconclusive concerning the possible processing of non-at- tended emotional stimuli. To study this question with event-related potentials, participants were high (n = 15) and low (n = 15) in spider fear performed a letter detection task on a circle of 6 letters. Perceptual load was also manipulated: in high load, the circle had six letters, and in low load, the circle had only three letters (with dots as fillers). During the task, pictures of spiders (negative valence) and mushrooms (neutral valence) were presented at fixation (in the middle of the circle). Participants were instructed to ignore the pictures, but despite these instructions, letter detection performance (d-prime) decreased for fearful participants when spider pictures were presented (p = 0.05). In parallel, analysis of event-related potentials showed that fearful participants had larger mean amplitudes in the late positive potential (300–500 ms; p < 0.01) to pictures of spiders. This suggests that emotional stimuli cannot be ignored even when they are task irrelevant.
**Poster 32**

THE INTERACTION OF EXPPLICIT TARGET AND IMPLICIT EMOTION CATEGORIZATION

Alexander Barth, Ralf Schmaelzle, Tobias Flasch, Florian Bublatzky, & Harald T. Schupp
University of Konstanz

**Descriptors:** IAPS, emotion, attention

A large number of studies showed that emotional scenes grab attention due to the significance depicted in the image. In addition, attention can be directed voluntarily towards higher order stimulus categories defined by semantic content. Here, we raise the question of what happens in the brain when these two processes interact. Specifically, in one condition, participants (N = 24) had to indicate whether a natural scene presented in the center of the screen contained an animal or not while pleasant, neutral, and unpleasant pictures were concurrently presented in the background. In a control condition, the same stimuli were passively viewed. Pictures were presented for 24 ms while ERPs (256 channels) were recorded. Results replicate previous findings that emotional picture processing is associated with increased EPN and LPP components compared to neutral pictures during passive viewing. In contrast, while performing the higher-order semantic categorization task, emotional modulation was significantly attenuated, even when considering high-arousing stimulus materials. These results show that explicit target and implicit emotion categorization compete for shared processing resources.

**Poster 33**

PERCEPTUAL ENCODING OF EMOTIONAL SYMBOLIC GESTURES

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University of Konstanz

**Descriptors:** emotion, attention, gestures

The present study used event-related brain potentials to examine the emotional attention capture of symbolic gestures at the level of distinct processing stages. Participants (N = 20) viewed pictures of hand gestures with negative (insult) and positive (appraisal) emotional meaning as well as meaningful neutral control gestures (pointing) while dense sensor ERPs were recorded. Emotion effects were seen as distinct ERP modulations in early and later time windows. Insult gestures elicited increased P1, EPN, and LPP components compared to the neutral control gestures. Processing of approval gestures was associated with an increased P1 wave, and enlarged EPN amplitudes during an early time window, while the LPP amplitude was not significantly modulated. Results are discussed from the perspective of two-stage models of stimulus perception. It is concluded that emotional gestures induce a heightened state of attention during processing stages implicated in stimulus recognition and focused attention.

**Poster 34**

CONCURRENT MODULATION OF THE STARTLE REFLEX BY PHYSICAL THREAT AND AFFECTIVE PICTURES

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1University of Konstanz, 2University of Granada, 3Jaume I University

**Descriptors:** threat-of-shock, emotion, startle reflex

A large body of evidence shows that viewing unpleasant compared with pleasant pictures potentiates the reflexive startle blink. Moreover, the threat of painful shocks also prompts heightened startle reflexes. Integrating both lines of research, the present study examined the interaction of threat of shock and affective picture processing. Specifically, pleasant, neutral and unpleasant pictures (each 4s) were presented as a continuous stream during alternating threat-of-shock and safety periods (each 72s), which were signaled by colored picture frames. Orbicularis EMG to auditory startle probes and electrodermal activity were recorded in 36 participants. Replicating previous findings regarding picture valence, startle reflexes were larger when viewing unpleasant compared to pleasant pictures. Similarly, instructed fear effects were replicated in that startle responses and electrodermal changes were larger during threat-of-shock than safety periods. However, of main interest, anticipating aversive events and viewing emotionally significant pictures additively modulated defensive activation. Specifically, despite overall potentiated startle magnitude in threat-of-shock conditions, the defensive blink reflex remained sensitive to hedonic picture valence. Overall, defensive activation by physical threat operated independently from reflex modulation by picture media.

**Poster 35**

EMOTIONAL SEQUENCE EFFECTS AS A FUNCTION OF PROCESSING DEMAND AND PERCEPTUAL FLUENCY

Tobias Flasch, Florian Bublatzky, Ralf Schmaelzle, & Harald Schupp
University of Konstanz

**Descriptors:** emotion, attention, priming

Viewing emotionally arousing compared to neutral pictures is associated with differential electrophysiological activity in early (“early posterior negativity”, EPN), as well as later time-windows (“late positive potential”, LPP). Previous studies revealed that the EPN and LPP components are reduced when the preceding prime picture was emotional. Extending this research, the present study investigated the temporal extension of emotional sequence effects by presenting pictures at slower rates (1 Hz, 120 ms picture presentation, 880 ms ITI). Furthermore, presenting a single pleasant, neutral, and unpleasant picture reduced processing demand. Previous results were replicated in that emotional pictures were associated with enlarged EPN and LPP amplitudes compared to neutral pictures. Of main interest, EPN and LPP components to emotional and neutral pictures were reduced when preceded by emotional prime pictures. These effects occurred even in conditions when the identical pictures served as prime stimulus. Thus, emotional interference effects sustain in time until unrelated to perceptual fluency and visual working memory representation. Results are discussed within a framework of resource competition among successive pictures.

**Poster 36**

NEURAL CORRELATES OF FOOD PICTURES PROCESSING

Christoph A. Becker, Tobias Flasch, Frank Häcker, & Harald T. Schupp
University of Konstanz

**Descriptors:** food pictures, fmri

Food is a fundamental stimulus category for living organisms. Building upon previous research examining domain-specific patterns of brain activity, we explored the cortical representation of food pictures. In a fMRI block study, participants (N = 12) viewed pictures depicting highly appetizing food items (vegetable dishes, meat dishes, dessert), as well as face and house stimuli. Scrambled versions of these pictures allowed controlling for low-level physical stimulus characteristics. In a further condition, the pictures were presented in black and white. With regard to visual-associative regions, food compared to faces and houses elicited increased BOLD activity in the occipitotemporal gyrus. In addition, food pictures elicited increased activation in the parietal cortex, cingulate cortex (medial and posterior), and frontal structures (anterior prefrontal, inferior and superior frontal). Increased activations to food stimuli in orbitofrontal, medial frontal, premotor, and insular regions appeared right-lateralized. Thus, in addition to mandatory visual representation, food stimuli engage an extensive set of neural structures implicated in the regulation of emotion, motivation, and attention processes.

**Poster 37**

HEART RATE AND SKIN CONDUCTANCE REACTIVITY TO WRITTEN EMOTIONAL DISCLOSURE

Andrea Konig, Alison M. Eonta, Stephanie R. Pitts, & Scott R. Vrana
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**Descriptors:** heart rate, skin conductance, writing

Writing about a personal traumatic event increases anxiety in the short term and produces long-term health benefits. These health benefits are associated with increased physiological reactivity. In this study, subjects wrote for 20 minutes on three occasions about a personal traumatic event (n = 52) or a trivial topic (n = 56) and received either an imagery training (n = 55) or no training (n = 53). Heart rate (HR) and skin conductance (SC) response were assessed in sessions one and three throughout a ten minute baseline, writing, and a ten minute recovery. In session one, response-trained trauma writers showed greater heart rate and skin conductance change from baseline to writing than non-trained trauma writers. This was no longer the case by session three, suggesting that habituation had occurred. For neutral writers, there were no differences in heart rate or skin conductance reactivity between groups at session one. However, at session three, response-trained neutral writers showed greater heart rate and skin conductance reactivity than non-trained neutral writers. Overall, heart rate and skin conductance reactivity mirrored self-reported emotional reactions to trauma writing. Results support previous findings that trauma writing evokes a sympathetic nervous system response and indicate that response training is effective in increasing physiological reactivity to trauma writing, suggesting that response training will likely be beneficial in amplifying the health benefits of writing as well.

**Poster 38**

CROSS-MODAL CONSISTENCY OF REACTION TIME VARIABILITY

Chris W.N. Saville, David Daley, James Intriligator, Stephan Boehm, & Christopher Klein
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**Descriptors:** reaction time variability, ADHD, N2

Increased intra-subject variability of reaction times (ISV) is one of the most consistently found characteristics of task performance in ADHD (Klein et al., 2006). Most present theoretical accounts of the phenomenon (e.g., Sonuga-Barke & Castellanos, 2007) assume that fluctuations in a central neural system, as opposed to peripheral sensory systems, underlie this increased performance variability. In order to test this assumption,
80 healthy participants carried out simple and choice reaction time tasks in both the visual and the auditory domains and participants who showed consistently high (N = 15) or low (N = 15) ISV were recruited for an event-related potential study assessing electrocortical reactions to oddball stimuli in auditory and visual tasks. Preliminary results suggest differences between groups and modalities in electrocortical responses to oddball stimuli.

**Poster 39**

CONTROL AMID CHAOS: ERP INDICATORS OF INCREASED CONFLICT MONITORING UNDER COGNITIVE LOAD

Jason W. Krompinger, Toni Luciano, Jennifer Petrongolo, & Robert F. Simons
University of Delaware

Descriptors: cognitive control, working memory, event related potentials

Lavie et al.'s load theory of selective attention and cognitive control (2004) states that increasing cognitive load increases interference from distractor stimuli in a behavioral task. However, relatively little is known about how the timing of neural activations that subserve cognitive control processes might be affected by load manipulations. Because event related potentials have been proven sensitive to modulations in cognitive control exertion (see Folstein & Van Petten, 2008), we collected ERPs to a modified flankers task with an added working memory component. Each flanker stimulus was preceded by either a long (seven digits) or short (one digit) string of numbers to be remembered, comprising 'high' and 'low' working memory load conditions. Behavioral data showed the expected effects of load on interference, such that the difference between RTs to incongruent and congruent stimuli was much greater under high working memory load. The ERP data showed that increasing working memory load resulted in an increased difference between incongruent and congruent stimulus-locked responses starting at the time region of the N450, a component typically implicated in conflict monitoring and cognitive control (e.g. Liotti et al., 2000). These results imply that increasing cognitive load forces conflict monitoring processes to exert more energy in issuing the call for cognitive control.

**Poster 40**

NEGATIVE BIASES WITH INTACT NEGATIVE INHIBITION IN DEPRESSION: AN ERP STUDY

Jason W. Krompinger, Julia Janes, Toni Luciano, Jennifer Petrongolo, & Robert F. Simons
University of Delaware

Descriptors: depression, attention, LPP

Recently, a number of experimenters have shown that depressive individuals have difficulty inhibiting negative information. This effect is demonstrated through a variety of behavioral tasks, including negative priming, directed forgetting, and in categorizing affective stimuli (e.g., Joormann, 2004; Siegle, Ingram, & Matt, 2002). As it stands, the relationship between deficits in negative emotional inhibition and attentional biases for negative material is unclear. We investigated both processes using a direct measure of attentional/information processing, the late positive potential (LPP). Fourteen undergraduates scoring high on the Suppression and Reappraisal subscales of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Results show that high suppressors displayed decreased performance (e.g., increased error rates and reaction times on incongruent Stroop trials) in comparison to low suppressors. In addition, high suppressors exhibited larger N2 amplitudes and decreased amplitude of the error-related negativity (ERN). Implications for the resource depletion hypothesis of emotion regulation are discussed.

**Poster 41**

THE COSTS OF SUPPRESSION: INDIVIDUAL DIFFERENCES IN EXPRESSIVE SUPPRESSION ARE ASSOCIATED WITH INCREASED N2, DECREASED ERN, AND IMPAIRED PERFORMANCE.

Erika A. Henry, Theresa Becker, John Kerns, & Bruce D. Bartholow
University of Missouri

Descriptors: social, cognitive, neuroscience

Previous research has shown that experimentally manipulating the use of expressive suppression as an emotion regulation strategy can result in impaired performance and increased amplitude of early components of the event-related brain potential (ERPs); e.g., N200). Currently, it is unknown whether similar patterns manifest for individuals who utilize this emotion regulation strategy naturally. Here, 40 undergraduates completed a Stroop task while ERPs were recorded. Participants were categorized as high or low on the Suppression and Reappraisal subscales of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Results show that high suppressors displayed decreased performance (e.g., increased error rates and reaction times on incongruent Stroop trials) in comparison to low suppressors. In addition, high suppressors exhibited larger N2 amplitudes and decreased amplitude of the error-related negativity (ERN). Implications for the resource depletion hypothesis of emotion regulation are discussed.
COMPARISON OF FRONTAL ASYMMETRY BETWEEN DIFFICULT CHILDREN AND NON-DIFFICULT CHILDREN

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Descriptors: temperamental, frontal asymmetry

“Temperamental difficulty” refers to children who are difficult for parents or other caregivers to handle. We tracked 200 pregnant women during three gestation periods and had them complete infant temperament questionnaires and a brief questionnaire on baby-raising for the infants at four months. We screened 7 “difficult” children. EEG frontal asymmetry has been related to approach-withdrawal behavior and positive-negative emotion, and there is potential to explore the relationship between frontal asymmetry and difficult behavior. Accordingly, the purpose of this study was to compare EEG frontal asymmetry between difficult and non-difficult children. EEG was collected from 7 difficult children who were 3 years of age and 7 non-difficult counterparts. The frequency bands of Alpha (7.5 – 12.5 Hz), Alpha 1 (7.5 – 9 Hz), and Alpha 2 (9.5 – 12.5 Hz) at F3/F4 and F7/F8 were derived for each. T-tests indicated no significant difference in asymmetry between the two groups. It would be worthwhile to explore further why there is no difference in frontal asymmetry between difficult children and non-difficult children.

COMPARISON OF GOOD AND POOR DART THROW PERFORMANCE ON EEG ALPHA COHERENCE IN BEGINNING PLAYERS

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Descriptors: motor performance, alpha coherence, motor planning

Deeny et al. (2003) found that the functional connectivity between the left temporal association (T3) and motor planning (Fz) regions of the cerebral cortex as indexed by EEG coherence was lower in more-accomplished marksmen than in lessaccomplished marksmen. The purpose of this study was to examine the relationship between dart throw performance and EEG coherence. Eleven intermediate level dart throwers were recruited and instructed to throw 60 shots while EEG was recorded. Shots were classified into either good or poor performance based on whether each shot was over or less than 9 points. The EEG from two seconds prior to each shot was segmented into 2 epochs. Alpha (8 – 13 Hz) coherence was calculated for 10 sites and Fz, Cz. Results showed that Fz-coherence was significantly higher in the occipital area, and for Cz-coherence, higher in the parietal and occipital areas for good performance than that of poor performance. This suggests that good performance is associated with less cognitive process interference from the parietal and occipital areas to the motor planning and motor executive areas.

COMPARISON OF BEST AND WORST PERFORMANCE ON EEG COHERENCE IN SKILLED DART PLAYERS

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Descriptors: EEG coherence, performance, dart throw

The aiming period prior to dart throw is a crucial time. When examining the cognitive processes underlying the pre-shot period of target sports, researchers have applied EEG coherence to measure concomitant brain activity. This study focused on coherence between the main areas of the motor cortex (premotor area, Fz and supplementary motor area, Cz) and other brain areas. Best performance was predicted to exhibit less cortical communication between motor cortex and other brain areas in comparison to the worst performance. Ten skilled dart players were recruited in this study, with the ten best and ten worst dart throw performances measured for each participant. Coherence was assessed for three frequency bands, (alpha 1, 8 – 10 Hz; alpha 2, 10 – 13; and beta 1, 13 – 22), using sites Fz, Cz, F3, F4, C3, C4, T3, T4, P3, P4, O1, and O2. EEG data were epoched 1 second consecutively for 2 seconds prior to the point of throw execution and three 2 × 2 × 5 (performance by epoch by area) repeated measures ANOVAs were employed. Compared to the worst performance throws, best performance throws exhibited lower coherence in the frontal area on alpha 2 frequencies. This lower coherence may explain why the subjective experience of skilled athletes performing at their best has been characterized as effortless, concentrated, and having a general absence of cognitive analysis of the task.

EFFECT OF T3 ALPHA NEUROFEEDBACK TRAINING ON ALPHA POWER IN OCCIPITAL AND LEFT FRONTAL REGIONS

Tsung-Min Hung
National Taiwan Normal University

Descriptors: eeg neurofeedback, motor performance, psychomotor efficiency hypothesis

The study of the optimal mental state is critical to performance enhancement. The Psychomotor Efficiency Hypothesis suggests that skilled athletes are characterized by their efficient use of mental resources. Mental efficiency is expressed by a simplified neural network that enhances both the speed and stability of information processing in the brain. Psychophysiological studies have found an association between heightened T3 alpha power and better performance. Neurofeedback studies also have been shown effective in increasing T3 alpha power and enhancing motor performance. However, examination of neurofeedback training effects has been limited to the targeted T3 electrode. Thus, the purpose of this study was to examine whether neurofeedback in occipital and frontal regions were changed as a result of T3 alpha neurofeedback training. Twenty pre-elite air pistol shooters were recruited and were assigned to either the experimental or control group. A total of 8 weeks of neurofeedback training aimed at increasing T3 alpha power was administered to the experimental group. Comparison of the groups’ shooting performances showed that the experimental group improved while the control did not. In addition, only the experimental group showed elevated alpha power at frontal and occipital sites in the post test.

DIFFERENCES IN FRONTAL MIDLINE THETA DURING DART THROWING BETWEEN DIFFERENT SKILL LEVELS

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Descriptors: frontal midline theta

Task conditions which require continuous attention to a stimulus usually evoke a specific kind of cortical activation that has been termed frontal midline theta. How the frontal midline theta’s temporal dynamic relates to concentration during demanding precision sports such as dart throw is rarely studied. Accordingly, the purpose of this study was to investigate the differences between high- and low-skilled dart throwers in their frontal midline theta during performance. Twelve skilled and eleven beginning dart throwers were recruited, and required to perform 120 (high-skilled) and 60 (low-skilled) dart throws. EEG was recorded at 5 electrode sites (i.e., Fz, F3, F4, C3 and C4). The recorded EEG of the last 2 seconds prior to the initiation of movement was segmented into two 1-second epochs. Cleaned Theta (4 – 7 Hz) was derived from these EEG epochs. The results revealed that there is a significant interaction effect between skill level and time window. The frontal midline theta of skilled throwers was more stable than that of the beginners. This suggests that the steady attention state of the skilled dart throwers before dart throw aided their performance, whereas it can be deduced that the gradually decreasing frontal midline theta in low-skilled dart throwers was harmful to their performance.

WILL OSTEOARTHRITIS PATIENTS WEARING A KNEE SLEEVE INCREASE THEIR ABILITY TO CONCENTRATE DURING A JOINT POSITION TASK? AN EEG STUDY

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Descriptors: knee sleeve, knee angle reproduction task, attention

Knee osteoarthritis (OA) is a common joint disorder among elderly people. Structures around the knee joint such as collagen fibers in patients with OA; thus, proprioceptive afferent messages from the knee joint may be altered. Patients who wear knee sleeves may improve their sense of joint position due to the increase in proprioceptive input. To determine whether central information processing was influenced after wearing a knee sleeve, spectral features of electromyoecephalography (EEG) were measured. Seventeen patients with knee OA (nine in ‘wearing sleeve’ group and eight in control group) carried out a knee-angle reproduction task in 2 groups × 4 trials design. EEG was recorded and FFT transformed to derive power at theta, alpha-1, alpha-2 and beta-1. Statistics showed significantly higher frontal Theta-power (Fz and F4) in the wearing sleeve group versus the control group. This may reflect a higher state of focused attention during the joint position sense task. It can be deduced that the brain as a central control organ still plays a major role in peripheral injuries such as knee OA.
DIFFERENCES IN SMR AND ALPHA BETWEEN GOOD AND POOR PERFORMANCE IN HIGHLY SKILLED DART THROWERS
Shih-Yuan Tseng1, & Tsung-Min Hung2
1Taipei County Yong Ping Senior High School, 2National Taiwan Normal University
Descriptors: sensory motor rhythm(smr), alpha, dart thrower

Studies have shown that sports performance is highly related to the quality of motor control. This is especially true in sports such as dart throwing, in which athletes must have control over even small movements. Research has shown that sensory motor rhythm (SMR, 12–15 Hz) is relevant to the inhibition of motion and alpha activity has been related to closed skill sport performance. The purpose of this study is to examine differences in SMR and alpha between good and poor performances. Ten male elite dart throwers were recruited and were required to perform 120 dart throws for a standardized dart throw task. Good performance in this study was qualified as the highest ten scores of each thrower, while poor performance was the lowest 10. EEG was recorded at 3 electrode sites (i.e., Cz, C3, C4) and then segmented into two 1-second epochs of the last 2 seconds prior to the initiation of movement. Three frequency bands were derived: alpha 1 (8–10 Hz), alpha 2 (10–12 Hz), and SMR (12–15 Hz). Results showed a significant performance by time interaction in alpha 1. Alpha 1 power decreased significantly just prior to dart throws in good performance, but increased in poor performance. The findings suggest that increasing activation of the sensorimotor area may lead to better motor control and good performance.

DIFFERENCES OF PHYSIOLOGICAL RESPONSES, BEHAVIOR REPRESENTATION AND EMOTIONAL ADAPTATION BETWEEN INHIBITED AND UNINHIBITED CHILDREN
Yu-Chun Tsai1, Tsung-Min Hung2, & Pei-Ling Wang1
1Taipei Municipal University of Education, 2National Taiwan Normal University
Descriptors: inhibited children, EEG, heart rate variability

The purpose of this study was to examine the differences in physiological responses, behavior representation and emotional adaptation between inhibited and uninhibited children. Twenty three inhibited and eighteen uninhibited children, all five years old, participated in this study. Stage I was to measure the variation in the children’s heart rate and blood pressure, and to observe their behavior representation before they were in Kagan’s unfamiliar context. Stage II was to measure the children’s EEG under a resting condition, and Stage III measured the children’s emotional regulation by their recovery of heartbeat interval from when they were in disappointment contexts. The results revealed that in terms of physiological response: (1) the inhibited children’s heart rate was higher than the uninhibited children’s; (2) there was no difference in blood pressure between the two groups; (3) the inhibited children’s right prefrontal activity was greater than their left. The uninhibited children’s left prefrontal activity was greater than their right. Additionally, there were differences in behavior representation between the two groups when they stayed in unfamiliar contexts, and the inhibited children had lower heart rate variability and slower emotion adaptation than the uninhibited children.

PATIENTS WITH POSTTRAUMATIC STRESS DISORDER SHOW STRUCTURAL ALTERATIONS IN BRAIN REGIONS ASSOCIATED WITH CONTEXTUAL AND EPISODIC MEMORY NETWORKS – A COMBINED CORTICAL PARCELLATION/VBM STUDY
Cindy Eckart1, Joern Kaufmann2, Christian Stoppel2, Claus Tempe1mann2, Hermann Hinrichs2, Hank Jochen Henning2, Thomas Elbert1, & Iris-Tatjana Kolassa1
1University of Konstanz, 2University of Magdeburg
Descriptors: posttraumatic stress disorder, structural MRI, episodic memory networks

Posttraumatic stress disorder (PTSD) is associated with severe disturbances of contextual and episodic memory systems. So far, brain structural research has mainly focused on the hippocampus, insula and anterior cingulate cortex. However, symptoms in conjunction with reports of widespread cortical alterations suggest that other regions involved in contextual and episodic memory might be affected as well. To address this issue, we combined an automatic cortical parcellation technique and voxel-based morphometry (VBM), constraining both methods to regions of interest in the frontal, parietal and cingulate cortices. Thirty-nine highly traumatized refugees (20 with and 19 without PTSD) and 13 non-traumatized controls entered the study. Participants were middle-aged and free from psychoactive substances and alcohol abuse. PTSD patients (and to a lesser extent traumatized controls) showed reduced volumes in the bilateral ishmas of the cingulate and lateral orbitofrontal cortex, the left rostral medial frontal cortex and the right inferior parietal cortex. Results from the VBM were partly consistent with these findings (with PTSD patients showing less gray matter density in the vicinity of the left ishmas of the cingulate and right inferiorparietal cortex), but generally suffered from a poorer signal-to-noise-ratio so that conventional statistics did not consistently reach significance. The exact functional significance of these brain structural alterations in regions associated with contextual and episodic memory systems remains to be tested.

DIFFERENCES OF PHYSIOLOGICAL RESPONSES, BEHAVIOR REPRESENTATION AND EMOTIONAL ADAPTATION BETWEEN INHIBITED AND UNINHIBITED CHILDREN
Yu-Chun Tsai1, Tsung-Min Hung2, & Pei-Ling Wang1
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THE INNER VOICE AS AN AGENT OF SELF-CONTROL
Alexa M. Tullett, & Michael Inzlicht
University of Toronto
Descriptors: self-control, inner voice, EEG/ERP

Both the error-related negativity (ERN) and the N2 have become valuable tools in exploring self-control. These two neural signals have been localized to the anterior cingulate cortex (ACC) and have traditionally been viewed as indices of a unitary conflict monitoring process. More recent work, however, has revealed that an ACC lesion can produce a dissociation between these components such that, relative to controls, the magnitude of the N2 increases while that of the ERN decreases. This pattern has been explained by suggesting that the N2 is linked to the processing of distracting information while the ERN is associated with relevant information. As such, the dissociation produced by an ACC lesion reflects a generalized diffusion of attention. The present study uses the ERN and N2 as tools to investigate the role of the inner voice in self-control. Participants did regular and switching versions of the Go/No-Go task while doing either a verbal or spatial secondary task. Compared with the spatial task, doing the verbal task resulted in more impulsive responding, suggesting impaired self-control. We also observed an increased N2 and an unchanged ERN for the verbal versus the spatial task – a pattern similar to that seen following an ACC lesion. This indicates that blocking verbal resources may induce a diffusion of attention resulting in greater focus on distracting cues and weaker focus on task-relevant cues. Broadly, these results suggest that the inner voice helps us to exert self-control by enhancing our ability to attend to the things that matter.

ILLUMINATING AWARENESS: INVESTIGATING THE TEMPORAL AND SPATIAL NEURAL DYNAMICS OF METACONTRAST MASKING USING THE EVENT-RELATED OPTICAL SIGNAL
Kyle E. Mathewson1, Diane M. Beck1, Tony Ro2, Monica Fabiani1, & Gabriele Gratton1
1University of Illinois, Urbana-Champaign, 2The City College of the City University of New York
Descriptors: visual awareness, event related optical signal, preparatory processes

We examined the neural correlates and preparatory predictors of conscious visual awareness. It has been proposed that a positive feedback loop between unimodal and higher visual processing systems is required for consciousness. To address this issue, we combined an automatic cortical parcellation technique and voxel-based morphometry (VBM), constraining both methods to regions of interest in the frontal, parietal and temporal lobes. Participants viewed a metacross contrast masking paradigm in which the target detection of is inhibited by a sub-mesquent mask. On each trial, after a fixation cue, a target-mask pair was presented at a constant SOA such that participants detected roughly half of the targets. Using the event related optical signal (EROS), a brain imaging technique with high spatial and temporal resolution, we examined the differential activity elicited by detected and undetected targets and the preparatory activity before target onset that might predict subsequent detection. The results revealed two cycles of greater activity in a fronto-parietal network before detected targets, which preceded an increase in activity in occipital regions in each cycle and a reduction in pre-target parietal alpha power measured with simultaneous EEG recording. Furthermore, while extrastriate activity ~120 ms after target onset was greater for detected targets, there was no difference in activity in primary visual areas until later intervals (~150 ms), suggesting the dependence of visual awareness on re-entrant reverberation. A combination of the temporal resolution afforded by EROS made it possible to visualize the interplay between top-down attentional mechanisms, alpha oscillations, resultant differences in elicited neural activity, and ultimately visual awareness.

PROBING THE NEURAL CORRELATES OF TEMPORAL PROCESSING OF MULTIMODAL STIMULI: AN ERP STUDY
Marek Binder, & Jan Kaiser
Jagiellonian University
Descriptors: time perception, simultaneity judgments, temporal order judgments

Both temporal order judgments (TOJ) and simultaneity judgments (SJ) are the most commonly used methods for deriving the quantitative measure of the perception of simultaneity. During SJ tasks, subjects report whether pairs of stimuli are “synchronous” or “asynchronous”, while during TOJ tasks, they decide which of the stimuli was perceived as the first. As many studies show, these procedures give different measures of simultaneity. Some researchers suggest that both tasks engage disparate sets of cognitive operations, with the SJ task being more sensitive to temporal resolution afforded by EROS minus. The inner voice was judged as nonsimultaneous, and for which temporal order was determined correctly. Only in the TOJ task, we observed a short negative deflection of ERP in the frontal channels.
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ONLINE PROBING OF BRAIN-STATES: INTRODUCING THE CONSOLE ENVIRONMENT

Thomas Hartmann, & Nathan Weisz
University of Konstanz

Descriptors: EEG, real-time, oscillations

Brain oscillations and associated phenomena, such as interregional synchronization, are gaining an increasing importance in understanding the neuronal basis of cognitive as well as clinical phenomena. The standard approach, however, is correlational, comparing oscillatory measures of interest between different conditions or post-hoc sorting of trials based on behavioral indices. Despite being a necessary step, we think that cognitive neuroscience needs to move on by testing hypotheses regarding brain oscillations in a more causal manner. For this purpose fluctuations of the relevant measure of interest can be used, that putatively reflect fluctuations of a hypothesized brain state. This means that by providing stimulation targeted by an online oscillatory measure, we would be able to directly test our hypothesis regarding its functional relevance. For this purpose we developed CONSOLE (Constance System for Online EEG). This multi-platform system is capable of reading EEG from several systems and performing several online analyses (e.g., source projection, ICA artifact correction, FFT, etc.). Users can either write their own C++ code or interface CONSOLE with Matlab in a first exploratory step. Importantly CONSOLE is already capable of controlling behavioral experiments set up using PsychoX, triggering external devices such as TMS and stimulating on its own. Next to the program environment, we will present some pilot data as proof-of-principle, investigating the probability of inducing phosphodes on occipital background alpha level similar as shown by Röme et al.

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EMOTION PROCESSING DEFICITS IN ALEXITHYMIA: A PSYCHOPHYSIOLOGICAL STUDY

Elena Constantinou, & Georgia Panayiouti
University of Cyprus

Descriptors: alexithymia, reactivity, emotion ratings

This study examines the effects of alexithymia on physiological and subjective reactions to emotions under two levels of processing. Thirty females (15 alexithymics, M age = 21.3), were selected with the Toronto Alexithymia Scale-20 and then participated in an emotional imagery experiment imagining Joy, Fear and Neutral scenarios, under shallow and deep processing instructions. After each imagery task they rated their emotional reaction and then repeated the task to examine habituation. HR, SCR, facial EMG and startle reflex were recorded. Results indicated that alexithymics had longer startle latencies during Fear, and less Zygomatic activity during Joy compared to controls. Significant habituation was observed only for startle latencies (longer at re-exposure) at Fear but with no interaction with alexithymia. Level of processing affected participants' reactions differentially according to valence (P < 0.05, HR for Fear and less at Joy for Deep condition), but not according to alexithymia status. Regarding self-report ratings, alexithymics could accurately assign emotion labels to scripts, but they rated Joy scripts as less positive compared to controls. Deep processing was associated with lower arousal ratings in Fear and more negative valence in Joy for alexithymics. In sum, alexithymics may show deficiencies in emotion processing, surprisingly more for positive than negative emotions. Further research needs to address possible effects of alexithymia on habituation and interactions with levels of processing.

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PERSONALITY AND THE EXPERIENCE OF EMOTION THROUGH MENTAL IMAGERY

Elena Constantinou, Margarita Kapou, Georgia Panayiouti, & Anna Kyriacou
University of Cyprus

Descriptors: psychophysiology, personality, emotion

This study examined the relationships between the Big Five personality factors and additional facets measuring disinhibition with psychophysiological and subjective reactions to emotion. Forty-two participants (22 female, M age = 32.19) completed a mental imagery task to emotional scenarios representing Fear, Joy, Sadness and Pleasant Relaxation, while the startle reflex, HR and EMG were recorded. Participants also rated their emotional reaction to scenarios and completed the NEO-FFI, and the Short Questionnaire on Mental Imagery (QMI). Significant correlations between personality and subjective ratings of different emotions were observed. QMI was positively related with Neuroticism, and more intense subjective ratings for specific emotions. Personality was associated with intensity of psychophysiological reactivity, but did not differentiate between emotions, which were hence collapsed together. QMI was negatively related to startle latency, which may be indicative of more emotional reactivity. Higher Impulsivity scores were associated with lower startle latency, higher startle amplitude and lower corrugator. Deliberation was associated with lower startle amplitude, and Excitement Seeking with higher startle amplitude. Overall, personality appears more related to subjective reactions and less to psychophysiological reactions to emotions. To the contrary, mental imagery ability may be significant for processing and experiencing emotional scenarios. Possible differentiations of reactivity as a result of specific emotions should be examined using larger samples.
While elderly subjects performed worse than younger participants in terms of response latency, age had no influence on the activation of the hippocampal sources. However, there was a significant relationship between cognitive competence and hippocampal activity: Better performance in several tests of verbal memory and executive function were associated with higher hippocampal source strength. Our results suggest that in non-pathological aging, hippocampal function does not decrease with age but is related to individual performance in memory and executive function.

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**EVENT-RELATED BRAIN DYNAMICS OF CHANGE DETECTION VERSUS CHANGE BLINDNESS USING INDEPENDENT COMPONENT ANALYSES**

Paula Pazo-Alvarez,1 Alvaro Darriba,1 Almudena Capilla,2 & Elena Amenedo1  
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Descriptors: change blindness, ICA  
Event-related brain dynamics of electroencephalographic (EEG) activity in a one-shot change blindness paradigm were analyzed by means of independent component de-composition (ICA). Participants were requested to detect changes, across a visual disruption, between a pair of successive displays composed of four sinusoidal gratings varying in orientation. Analyses were performed on epochs containing both the pre-change display (S1) and the change, no-change itself (S2). Distinctiveness of independent components associated with successful and unsuccessful detection were tested by means of time-frequency analyses (wavelet transform). Comparison of EEG power relative to baseline (measured by Event Related Spectral Perturbation) of frontal and posterior independent components isolated by ICA revealed differences in activity among change blindness, change detection and correct no-change. Differences in brain activity were observed both before and after change onset.

**Poster 64**

**NEURAL PROCESSING OF MASS, COUNT AND DUAL NOUNS: AN ERP INVESTIGATION**

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1University of Verona, 2University of Sussex  
Descriptors: language processing, mass/count distinction, N400  
Our aim was to examine differences in lexical processing of verbs and nouns by manipulating noun type: count (e.g. pen), mass (e.g. milk) and dual (e.g. lamb), the latter representing either mass or count qualities. A covert judgment task (verb/noun) was administered to 20 participants from Sussex University using a within participants design. Behavioral analyses revealed a main effect of noun type, i.e., significantly faster RTs for dual (794 ms) and count nouns (881 ms) compared to mass nouns (934 ms) and verbs (926 ms). EEG was recorded using a 128-channel Net connected to an AC-coupled 128-channel high-input impedance amplifier. Electrode impedance was kept below 50 kOhms. Voltage was digitized at a rate of 250 Hz and band-pass filtered between 1 and 30 Hz. EEG was segmented into windows from 100 ms before to 2000 ms after stimulus onset. Segments were baseline corrected to the average of the pre-stimulus epoch and re-referenced using an average across all channels. Noun type had a main effect on voltage change with dual nouns differentiated at posterior sites between 400 and 600 ms and count nouns eliciting greater negative activation in the N400 component over centroparietal sites. Verbs showed an increased positivity between 400 and 600 ms, particularly in frontal regions. The results distinguish the processing of dual and count nouns from mass nouns at a semantic level and nouns from verbs at the level of motor processing. We submit that differential responses for nouns reflect numerical quantification and verbs (926 ms). EEG was recorded using 128-channel hydrocel nets. A spatio-temporal PCA was utilized to parse the complex waveforms into components. Alcohol expectancy violations elicited the P300 in some cases, but there were no differences between the alcohol context pre-exposure condition and the neutral condition. Therefore, altering the context of the ERP task with the pre-exposure did not alter ERP responses stemming from participants’ alcohol expectancies.

**Poster 65**

**CARDIOVASCULAR AND SKIN CONDUCTANCE RESPONSE TO COOPERATION**

Luis Moya-Albiol, Sara de Andrés-Garcia, David Castillo-Pelegrín, Patricia Sariñana, María Victoria Sanchis, María José Martínez-Morató, & Esperanza González-Bono  
University of Valencia  
Descriptors: cooperation, autonomous nervous system, emotion  
Analyzing cooperation in the lab is a valid model for understanding how we act in real-life situations. To the best of our knowledge, no study has analyzed psycho-physiological response to cooperative behavior. Hence, this work is aimed at comparing cardiovascular and skin conductance response to a building house task (lego) in 76 healthy young woman cooperating or competing with others and those who only complete their task (simple task). Heart rate (HR) and skin conductance level (SCL) were continuously registered before, during and after the task, and subjects were informed on their performance. A significant effect of “period x group” interaction was observed, with higher HR reactivity in cooperation than in the other two groups. No significant effects for SCL were found, but the anticipatory response to the task was higher in the cooperation and competition groups when compared with the simple task one. In the case of phasic skin conductance, a significant effect for both “group” and “period x group” was found, the highest number of responses being shown by the competition condition in all periods, apart from the instructions one. No significant effect of task outcome was found in any case. Cooperation induces lower HR and SCL reactivity than competition, but higher than carrying out the task without social interaction; these effects are independent of task performance. These results should be taken into account for understanding real-life situations in which subjects cooperate or must decide between cooperating and competing to attain a goal. This study is supported by the Ministry of Business, Research and Science of the Valencian Regional

**Poster 66**

**AN EXAMINATION OF THE EFFECT OF ALCOHOL CONTEXT PRE-EXPOSURE ON ERPS ELICITED BY ALCOHOL-RELATED SENTENCES**

Ty Brumbach, Sri-Maria Kamp, Mark S. Goldman, & Emanuel Donchin  
University of South Florida  
Descriptors: context cuing, expectancy, P300  
If the terminal word of a sentence violates a subject’s expectations it will elicit a P300 (Fishman et al., 2008). As pre-exposing individuals to alcohol context cues influences subsequent behavior (e.g., increases consumption in an alcohol taste test task; Roehrich & Goldman, 1995) we examined whether such context pre-exposure would affect the P300 elicited by expectancy violations. The participants were 60 students. One group viewed a video clip set in a bar with several alcohol cues, the other group viewed a video clip set in a coffee shop. Participants then attended to three categories of sentences: Alcohol Positive (e.g., Alcohol makes me feel happy), Alcohol Negative (e.g., Alcohol makes me feel sick), & Semantically Incongruent (to elicit the N400). The ERPs were locked to the terminal word in the sentence. We hypothesized that subjects with higher positive and arousing alcohol expectancies would exhibit P300s in response to alcohol negative sentence endings and this effect would be larger in the alcohol context pre-exposure condition compared to the neutral condition. EEG was recorded using 128-channel hydrocel nets. A spatio-temporal PCA was utilized to parse the complex waveforms into components. Alcohol expectancy violations elicited the P300 in some cases, but there were no differences between the alcohol context pre-exposure condition and the neutral condition. Therefore, altering the context of the ERP task with the pre-exposure did not alter ERP responses stemming from participants’ alcohol expectancies.

**Poster 67**

**MISMATCH NEGATIVITY GENERATORS IN HEALTHY PARTICIPANTS: IMAGING WITH sLORETA**

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1Carleton University, 2University of Ottawa Institute of Mental Health Research  
Descriptors: mismatch negativity, source modelling, sLORETA  
The mismatch negativity (MMN), a well established event-related potential (ERP) index of preconscious auditory change detection, is elicited by any discernable change in auditory stimulation. While most studies choose to focus on one or two MMN-elicitng stimuli, the recently developed multi-feature MMN paradigm (Nätänen et al., 2004) allows for assessment of MMNs to five different deviants (pitch, duration, intensity, location and gap) within a relatively short time frame. Using this paradigm, MMN peaks were assessed in 12 healthy controls and then mapped onto the cortex using standardized low resolution electromagnetic tomography (sLORETA), providing a model of MMN source generators. sLORETA imaging of each deviant type included significant cortical activation at: Duration- Left superior temporal gyrus, left postcentral gyrus and bilateral insula. Intensity- Right superior temporal gyrus, right precentral gyrus and right postcentral gyrus. Pitch- Right orbital gyrus, right inferior frontal gyrus, and right rectal gyrus of the frontal lobe. Gap- Left superior temporal gyrus, left inferior temporal gyrus, and left fusiform gyrus of the temporal lobe. Location- Right superior temporal gyrus, left precentral gyrus, and left inferior parietal lobule. This paper is significant in that, to our knowledge, it is the first to document MMN generators using the multi-feature MMN paradigm and allowing for the identification of five generators within the same population.

**Poster 68**

**ENHANCEMENT OF N2PC BY NICOTINE IN RESPONSIVE NON-SMOKERS**

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1University of Ottawa Institute of Mental Health Research, 2Carleton University, 3University of Ottawa, 4University of Santiago de Compostela  
Descriptors: nicotine, attention, event related potential  
Nicotine, the main alkaloid found in tobacco, has proven to be a highly addictive substance, in part due to its cognitive enhancing effects on attention. However, the nature of how nicotine modulates attention (i.e., whether this occurs at early or late...
EMOTION AS A CENTRAL THEME IN PSYCHOPHYSIOLOGY RESEARCH
Maria Isabel M.I. Viedma-de-Jesus1, Miguel Angel M.A. Muñoz1,2, Pandelis P. Perakakis1, & Jaime J. Vila1
1University of Granada, 2University of Balearic Islands
Descriptors: emotion, psychophysiology, co-words analysis
A bibliometric and visual study of the research in the Psychophysiology field is presented. Bibliometric maps showing the associations between the main concepts in the field are provided for the period 1990 to 2007. The maps provide insight into the structure of the psychophysiology research, visualize the division of the field into several subfields, and indicate the relationships between these subfields. The maps are created by co-word analysis. Co-word analysis was applied to the keywords of published original papers by four international journals focused on psychophysiology related concepts: “Psychophysiology”, “Journal of Psychophysiology”, “International Journal of Psychophysiology” and “Applied Psychophysiology and Biofeedback”. These journals were selected because they are the unique journals with the word “psychophysiology” in the journal title at ISI Web of Science. The results show the theme EMOTION was an important theme in the psychophysiology research community in the studied period (1990–2007). Results indicated that EMOTION has become one of the most studied themes and it has been related to different topics such as AMYGDALA, FEAR, AFFECT, ANXIETY, EXPRESSION; paradigms such as IMAGERY and PICTURES; measurement such as STARTLE RESPONSE, SKIN CONDUCTANCE; and other keywords such as AROUSAL and VALENCE. The implications of the EMOTION theme on the psychophysiology research community are discussed.

INFANTS ORIENT MORE QUICKLY TO THREATENING VOICES
Cat Thrasher, Vanessa LoBue, James A. Coan, & Judy S. DeLoache
University of Virginia
Descriptors: infants
Infants may rapidly orient to evolutionarily threat-relevant stimuli. In a sample of 28 infants aged 7 to 9 months, we examined stimulus orientation, using change in interbeat interval (IBI) over time, during the presentation of voices speaking in threatening and non-threatening tones. In a 2 x 2 design, infants were presented with threatening versus non-threatening voice tones in combination with video clips of animals that were either evolutionarily threat-relevant (snakes) or non-threatening (elephants). IBIs were measured during the three second period leading up to the startle probe, which was presented 3 or 4.5 seconds after the foreground onset. These data were then used to calculate IBI change slopes, revealing the speed with which IBIs shifted during foreground orientation. Results revealed a significant main effect of voice valence on IBI slopes, F(1, 347) = 6.24, p = .013. IBI slopes during stimulus orienting to the fearful voice were about twice as steep as those to the neutral voice, indicating that IBIs were decelerating about twice as fast during the fearful voice. These results suggest that fearful voice tones elicit more vigorous attentional orienting in infants, and further that the developing defense cascade response can be observed in infants as early as 7 to 9 months of age.

RELATIVELY GREATER RIGHT PREFRONTAL ACTIVITY CORRESPONDS WITH HIGHER LEVELS OF EMPATHY
Amanda R.W. Steiner, James A. Coan, & Elizabeth A. Bendeyki
University of Virginia
Descriptors: empathy, prefrontal asymmetry, EEG
Empathy refers to a critical interpersonal capacity to understand and interpret another person’s emotional experience. Individual differences in empathic responding abound, possibly due to the many underlying processes empathy requires, such as affective sharing, self-awareness, mental flexibility, and effective emotion regulation (Decety & Morriguchi, 2007). Because the prefrontal cortex (PFC) supports many of these abilities, it is likely that the PFC serves an important role in empathic responding. For this study, we investigated hemispheric asymmetries in PFC activity, as assessed by EEG activity averaged across a number of emotion-elicitng laboratory tasks, to predict empathy self-ratings using the short form of the Empathy Quotient instrument developed by Baron-Cohen and colleagues (Wakabayashi et al., 2006). We observed that higher Empathy Quotient scores corresponded with relatively greater right prefrontal activity across two lateral prefrontal scalp regions, F(78, r = - .24, F(1,129) = 33.96, p < .001; and F(56, r = - .34, F(1,144) = 19.07, p < .001. These results tentatively suggest that a strong capacity for putatively withdrawal- or avoidance-based motivational responding facilitates empathic behavior. We suggest this is possibly due to a strong motivation among highly empathic individuals to assist others in the reduction of negative affect.

BRAIN ACTIVITY RELATED TO POSITIVE, NEGATIVE AND NEUTRAL FEEDBACK IN OBSESSIVE-COMPULSIVE DISORDER
Thomas S. Hiller, Alexander M. Nitsch, Wolfgang H.R. Miltner, & Thomas Straube
Institute for Psychology, Friedrich Schiller University of Jena
Descriptors: obsessive-compulsive disorder, performance monitoring, feedback
Cognitive models of obsessive-compulsive disorder (OCD) suggest that patients are characterized by abnormal activity of fronto-striatal-thalamic loops, leading to increases in performance monitoring and error detection. Additionally, intolerance of uncertainty was associated with OCD symptomatology. Here, functional magnetic resonance imaging was used to investigate feedback-related neural activity during a modulated version of the time-estimation task in a sample of patients suffering from OCD. Positive, negative and neutral feedback (the latter delivering no information content concerning previous performance) were given. Results show increased activation of different cortical areas, including nucleus accumbens and insular cortex on feedback-related brain activation in OCD relative to a sample of matched control subjects. The results might be understood as further expressions of altered action monitoring processes in patients with OCD.

MANIPULATION OF AWARENESS DIFFERENTIALLY MODULATES AMYGDALA RESPONSES TO PHOBIC STIMULI
Judith Lipka, Wolfgang H.R. Miltner, & Thomas Straube
Friedrich Schiller University of Jena
Descriptors: fmri, fear, consciousness
Within the field of affective cognitive neuroscience, there is an ongoing debate as to whether processing of emotional stimuli can occur without reaching conscious awareness. Using event-related functional magnetic resonance imaging, we investigated the neural responses of the amygdala associated with the subliminal and supraliminal processing of phobic versus neutral stimuli in spider-fearful subjects and normal controls. Participants were exposed to pictures of spiders, birds and mushrooms, presented briefly during two backward masking conditions used to manipulate stimulus awareness. Following each target-mask pair, participants had to perform a forced-choice task by indicating whether they perceived a spider or not. On each trial, subjects also rated the confidence in their response. Functional imaging data were analyzed as a function of the subjects’ perceptual performance on each single trial. Phobics, compared to controls, showed stronger neural responses within the bilateral amygdala during conscious perception of spiders versus non-spider targets, whereas in the subliminal condition, enhanced activation was apparent in the right, but not left, amygdala. These results support theoretical models predicting a neural alarm system being able to automatically elicit affective responses to crude representations of external danger signals. In particular, the right amygdala may have a specific role in pre-attentive threat processing. Activity of the left amygdala, however, may be bound to elaborate stimulus perception.

SOMATOSENSORY EVOKED MAGNETIC FIELDS OF SELECTIVELY ACTIVATED C-FIBERS
Alexander Ritter, Marcel Franz, Wolfgang H.R. Miltner, Stefan Debener, & Thomas Weiss
Friedrich Schiller University of Jena
Descriptors: pain, MEG, c-fibers
While the cerebral mechanisms for the processing of Adelta-fiber input are well-understood, cerebral structures processing the input of C-fibers still represent an open issue. Therefore, laser-evoked ultralate event related potentials (ULEP) and ultralate event related fields (ULEF) in response to the stimulation of tiny skin areas (STSA, Bragard et al., 1996) were investigated in 20 healthy subjects using a whole head magnetoencephalograph (MEG). STSA has been shown to be a useful tool for the activation of
unmyelinated C-fibers. The onset-latency of the early component of the ULEF started at 800 ms post stimulus on average and the onset latency of very late components were observed at around 1000 ms. Source analysis revealed multiple dipoles located bilaterally in the secondary somatosensory cortex (SIH), in the insular cortex and in the anterior cingulate cortex. Some of the participants showed additional activity in the contralateral primary somatosensory cortex (SII). These results confirm former findings from the processing of second pain (Qiu et al., 2004).

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**SOMATOSENSORY DEAFFERENTATION OF THE STROKE-AFFECTED ARM IMPROVES ITS MOTOR RECOVERY IN STROKE PATIENTS**

Thomas Weiss, Elisabeth Sens, Winfried Meinssner, Otto W. Witte, & Wolfgang H.R. Mittner

Friedrich Schiller University of Jena

Descriptors: motor rehabilitation, functional deafferentation, constraint-induced movement therapy

Hemипaresis and hemihypesthesia are common consequences of stroke. The impairment of somatosensory represents one of the best predictors for poor rehabilitation outcome. The new approach used in this study builds on the effects of functional deafferentation (FD) of neighboring ipsilateral body parts on the sensibility and motor capacity of stroke-affected lower and upper extremities. Here, FD was tested against a placebo procedure during two consecutive days while patients underwent Constraint-induced Movement Therapy. Verum FD was achieved by application of an anesthetic cream onto the skin of the lower arm during one day while placebo FD was applied by the application of an inert cream on the other day. Before and after each training day, patients’ sensation and motor capacity of the stroke-affected arm were tested by a Grating orientation task (GOT) and a motor function task. Additionally, MEG was used to assess functional changes of the somatosensory cortex (SI) on both days. Results revealed significant better performances during the GOT and motor function task after verum FD as compared to placebo FD. During verum FD somatosensibility and motor capacity of patients’ upper limb was significantly increased. MEG data revealed significant increases of somatosensory-evoked magnetic fields in SI indicating increased cortical activation and functional cortical reorganization. These observations also indicate that motor rehabilitation of stroke-affected extremities might improve when they are temporarily and functionally deafferented.

**Poster 76**

**DO WORDS HURT? BRAIN ACTIVATION DURING THE PROCESSING OF PAIN WORDS**

Maria Richter, Judith Eck, Thomas Straube, Wolfgang H.R. Mittner, & Thomas Weiss

Friedrich Schiller University of Jena

Descriptors: pain, priming, fnir

Previous studies suggest that areas of the pain matrix of the human brain are activated by environmental cues such as pain-related words. However, whether such activation is related to the pain-relevance of stimuli or to activations induced by negatively valenced and arousal qualities is not settled. Here, we address this problem by comparing the neural activation while 16 healthy subjects processed pain-related, negative, positive, and neutral words. Pain unrelated negative words were matched for valence and arousal to pain words and pain unrelated positive words were matched for arousal to pain words. Subjects were scanned during two attention tasks (implicit, explicit attention to words) using functional MRI. When subjects’ attention focused on pain-related words (explicit task) we found increased activation within the dorsolateral prefrontal cortex, inferior parietal gyrus, and prefrontus compared to neutral, negative, and positive words. However, when subjects’ attention was focused onto the structure of words (implicit task) and pain descriptors were presented in the background, we found decreased activation within the dorsal anterior cingula but a relative increase in activation within the subgenual anterior cingulum, as compared to negative words. Thus, activations to pain-related words are strongly modulated by the type of task. Most remarkably, the differences in processing pain words and non-pain words are specific to the pain-relevance of the words and cannot simply be explained by their valence or arousal qualities.

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**THE MODERATING ROLE OF NEED FOR COGNITIVE CLOSURE ON CARDIOVASCULAR REACTIONS TO INTERCULTURAL ENCOUNTERS: A BIOPSYCHOSOCIAL ANALYSIS**

Liesbet Mous1, Jakub Samochowiec1, Arnd Florack2, Michaela Wänke1, Wendy B. Mendes2, & Frank H. Wilhelm1

1University of Basel, 2University Hospital Basel, 3Stanford University

Descriptors: social interaction, cross-cultural, impedance cardiography

Interactions with social out-group members can be stressful, mostly due to the unpredictability of the situation. Depending on whether the situation is being appraised as a challenge or threat, different psychophysiological stress response patterns may be elicited (Blascovich et al., 2001). The threat pattern is characterized by increased cardiac response and increased vascular resistance, whereas the challenge pattern is characterized by increased cardiac response with reduced vascular resistance. We investigated the extent to which the personality trait Need for Cognitive Closure (NCC), defined as desire for definite knowledge on an issue and the avoidance of confusion and ambiguity, may moderate this effect. People high in NCC should perceive unpredictable situations more as threats, whereas people low in NCC should perceive them more as challenges. Cardiovascular responses (blood pressure, cardiac output, vascular resistance, preejection period) were assessed in 36 participants before, during, and after interaction with a foreign-looking confederate. Results indicate that high NCC was associated with a particularly pronounced threat appraisal pattern after the interaction, whereas low NCC was associated with a challenge pattern. The findings underline the importance of personality variables in the study of stress responses during and after social interactions, and the relevance of cognitive appraisals in intercultural and stress research.
PHYSIOLOGICAL INSTABILITY AND COHERENCE AMONG EXPERIENCED ANXIETY, DYSPNEA, AND PSYCHOPHYSIOLOGICAL MEASURES IN PATIENTS WITH PANIC DISORDER: EVIDENCE FOR EMOTION REGULATORY DEFICITS

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Descriptors: anxiety, panic disorder, emotion

Psychophysiological research has identified respiratory variability as a prominent and specific characteristic of panic disorder (PD). It is unclear whether this is related to concurrent variations in experienced anxiety and dyspnea, representing emotional activation that encompasses multiple systems. Twenty-five PD patients, nineteen social phobia (SP) patients, and twenty healthy controls (HC) were instructed to sit quietly for 15 minutes. Within-subject correlations (coherences) of respiratory, cardiovascular, and electrodemeral measures with concurrent ratings of momentary anxiety and dyspnea every 30 seconds were computed. PD showed higher variability (RMSSD) in dyspnea than SP and HC, and anxiety varied most in PD. In PD, dyspnea and anxiety cohered negatively with end-tidal PCO2 and interbeat interval but positively with tidal volume and minute ventilation. Dyspnea cohered positively with inspiratory flow rate in PD. Anxiety cohered positively with respiratory duty cycle in PD, and with skin conductance in PD and SP. These results are the first to show that spontaneous psychophysiological variability relates to moment-by-moment fluctuations in anxiety and dyspnea, particularly in PD. In part they are consistent with the cognitive model of panic that perception of bodily changes triggers anxiety, which leads to higher physiological activation, yet our results indicate that this does not necessarily result in escalation to panic intensity. From a systems theory perspective, larger variation implies poorer emotion regulatory capacity.

COGNITIVE ENHANCERS AS ADJUNCTS TO PSYCHOTHERAPY: USE OF GLUCOCORTICOIDS IN PHOBIC INDIVIDUALS TO FACILITATE EXTINCTION OF FEAR

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1University of Basel, 2Interactive Media Institute, 3University of Zurich

Descriptors: anxiety, classical conditioning

Glucocorticoids inhibit recall of emotional memories and enhance consolidation of new emotional experiences in memory. This twofold effect makes glucocorticoids an ideal candidate for augmenting exposure treatment. This study is the first clinical study in investigating the combination of glucocorticoid administration and exposure in the treatment of anxiety disorders. Forty patients with a DSM-IV diagnosis of Specific Phobia (heights) were randomized to exposure + cortisol vs. exposure + placebo (double-blind). Cortisol (20 mg) or placebo was administered orally 1 hour before each of the three 20-minute exposure sessions in virtual reality. Treatment outcome was evaluated with the acrophobia questionnaire (AQ) and a behavioral test (BT) in virtual reality before treatment and at follow-ups 3 days and 1 month after the last exposure session. Both exposure conditions led to considerable reductions of phobic fear. Cortisol administration resulted in significantly greater fear reduction than placebo in the AQ both at the 3 day and 1 month follow-up assessments.

INTERACTION EFFECTS OF VISUAL AND AUDITORY DISTRACTIONS ON PAIN THRESHOLD AND TOLERANCE IN OLDER ADULTS

Tim Wright, & Bryan Raudenbush
Wheeling Jesuit University

Descriptors: pain, attention

Past research has examined the effects of music and visual distractions on pain; however, no study has ever assessed the interactive effects of the two stimuli. Considering that these past studies have all used college-aged students as their samples, and that the older population is the main sufferer of pain, new research is required in order to make externally valid conclusions. The present study obtained 75 participants, 23 of whom were over the age of 35 (mean age = 50). Each participant completed a cold pressor task, while watching different combinations of music (classical, heavy metal, none) and video (action, romantic, none). Physiological measurements (pulse, blood pressure), mood, and workload were assessed. The pain intensity ratings were analyzed with a 3 within (music) × 10 within (30 second time intervals) × 3 between (video) × 2 between (sex) ANOVA. Participants reported the least pain in the romantic/classical condition, and, over time, the pain ratings increased less severely for this condition. An independent samples t-test showed that the older participants liked classical music more than the younger participants, and showed decreased physiological reaction (pulse, blood pressure) in this condition, which may account for the greater effects of classical music. Thus, perceived pain is closely associated with the presence of preferred stimuli, and such information can be used as a non-pharmacological adjunct to pain management.

EFFECTS OF GRAPEFRUIT SCENT ON ENHANCING COGNITIVE PERFORMANCE

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Wheeling Jesuit University

Descriptors: memory, scent

Certain scents have been found to influence mood, mental functioning, and physiological responses. However, the effectiveness of citrus scents has been minimally studied. In the present study, the effect of grapefruit scent on cognition was examined. Participants completed two conditions: scent/cognitive evaluation and no-scent/cognitive evaluation. Participants completed questionnaires related to mood (POMS) and workload (NASA-TLX), as well as a neurological cognitive assessment (Impact Applications, Inc.) which evaluated verbal memory, visual memory, motor skills, reaction time, and impulse control. Physical demand was significantly lower during the grapefruit scent. Cognitive visual scores on the Impact test were significantly higher, and reaction time was significantly faster during the grapefruit condition. Thus, not only were participants better able to discriminate between the visual stimuli, but they also responded more quickly to the appropriate stimuli. During the grapefruit condition, participants perceived the cognitive assessment to be less physically demanding, and their physiological responses (pulse, blood pressure) were lower. Grapefruit scent may have many implications, being used as a means to improve stimulus discrimination and reaction time, and producing a physiological calming effect.

SHAM INTOXICATION: EFFECTS ON PERFORMANCE AND PHYSIOLOGY DURING NINTENDO WII FIT BALANCE GAMES

Megan Foutty, Keith Fleischmann, Tim Wright, & Bryan Raudenbush
Wheeling Jesuit University

Descriptors: sham intoxication, balance

Past research has shown sham intoxication leads to an increase in pain tolerance, anger, confusion and fatigue. In addition, cognitive performance is significantly affected. The present study examined the effects of sham intoxication on balance via the Wii Fit video game for the Nintendo Wii console. Participants underwent two conditions. In the experimental condition, participants consumed four, twelve-ounce, non-alcoholic beers. They then played a series of four balance games on the Wii Fit, including Ski Slalom, Soccer Heading, Tight Rope Walk, and Table Tilt. In the control condition, participants completed the Big 5 Personality survey and an aggression survey prior to playing the Wii Fit balance games. Their performance was recorded in each condition, in addition to monitoring their physiological responses (blood pressure and pulse). Paired sample T-tests were used to analyze performance scores. In all cases, performance diminished in the sham intoxication condition when compared to the control condition. However, no physiological differences were found. These results indicate alcohol’s perceived effects on balance are not entirely physiological, as they depend on individual expectations of intoxication.
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NEURAL MECHANISMS OF LONG-TERM PRESERVATION OF VISUAL PERCEPTUAL LEARNING: AN ERP STUDY

Zhe Qu1, Yan Song2, & Ding Yulong1
1Sun Yat-Sen University, 2Beijing Normal University

Descriptors: perceptual learning, event-related potential (erp), long-term preservation
Behavioral studies have shown that perceptual learning (PL) occurs not only within the first training session but also between sessions when no actual training is conducted. Once acquired, the learning effect can last for a long time, from months to even years, without further training (for reviews, see Karni & Bertini, 1997; Stickgold, 2005). It is not clear, however, whether both fast (within-session) and slow (between-session) learning contribute to the long-term preservation of PL. In the present study, we addressed this question by observing the time courses of learning-associated ERP changes over a period of six months. A simple visual task, as used in our previous studies (Ding et al., 2003; Song et al., 2005), was adopted. Each subject first participated in 3 training sessions on different days within a 1-week period, and then was given 1 test session six months later. Results showed that while posterior N1 decreased and posterior P2 increased within session 1, posterior N1 increased and frontal P170 decreased between session 1 and session 3. Both the fast learning effects (decrement of N1 and increment of P2) were preserved in training session 3 but not in the test session. However, both of the slow learning effects (increment of N1 and decrement of P170) were retained completely in the test session. This study indicates that PL induces different changes in human adult brain during and after active training, and only the delayed changes of brain activity can be preserved for a long term.

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ROLE OF GOAL-DIRECTED ATTENTION ON SHORT-TERM VISUAL PERCEPTUAL LEARNING

Yulong Ding, You Wang, Xiaoli Chen, & Zhe Qu
Sun Yat-Sen University

Descriptors: perceptual learning, attention, event-related potential (erp)
This study investigated the role of goal-directed attention on short-term visual perceptual learning. Thirty subjects were randomly divided into two groups: active & passive learning. Each subject received 1.5 hrs of training while ERP was recorded. Subjects in the active learning group were trained to discriminate line orientation, while those in the passive learning group just passively viewed the stimuli used in the active learning group. All the subjects received tests on line orientation discrimination just before and after the training, as well as on the next day. Subjects in the active learning group exhibited greater performance improvement than those in the passive learning group. While the learning effect of the passive group transferred to different stimulus orientations, that of the active group was orientation-specific. ERP results showed that for the passive learning group, both posterior P1 (90 – 110 ms) and N1 (120 – 160 ms) decreased in amplitude over 1.5 hrs of training, while posterior P2 (210 – 250 ms) did not change. In contrast, for the active group, both early components (P1 & N1) did not change, while the late component (P2) increased in amplitude with training. This study implies that goal-directed attention does modulate short-term perceptual learning, leading to a stimulus-specific learning effect in behavioral performance, as well as an increment of goal-directed attention does modulate short-term perceptual learning, leading to a late component (P2) increased in amplitude with training. This study implies that the attentional blink phenomenon was closely related with fundamental limit on the consolidation of information in working memory. However, recent study showed that the P3 was not delayed during attentional blink period, indicating that the consolidation of each target information was finished immediately after it was presented. In the present study, we examined the delay of the P3-time-locked T2 onset more in detail. T1 was a white digit, T2 was a black letters and the other stimuli were black digits, and participants were asked to report both T1 and T2 at the end of the stream. It was suggested that the P3 delays seen in previous studies were results of superimposing of another component like N400 elicited by T2's not being presented.

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NEURAL MECHANISMS OF LONG-TERM PRESERVATION OF VISUAL PERCEPTUAL LEARNING: AN ERP STUDY

Zhe Qu1, Yulong Ding2, & Yan Song2
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Descriptors: perceptual learning, event-related potential (erp), long-term preservation
Behavioral studies have shown that perceptual learning (PL) occurs not only within the first training session but also between sessions when no actual training is conducted. Once acquired, the learning effect can last for a long time, from months to even years, without further training (for reviews, see Karni & Bertini, 1997; Stickgold, 2005). It is not clear, however, whether both fast (within-session) and slow (between-session) learning contribute to the long-term preservation of PL. In the present study, we addressed this question by observing the time courses of learning-associated ERP changes over a period of six months. A simple visual task, as used in our previous studies (Ding et al., 2003; Song et al., 2005), was adopted. Each subject first participated in 3 training sessions on different days within a 1-week period, and then was given 1 test session six months later. Results showed that while posterior N1 decreased and posterior P2 increased within session 1, posterior N1 increased and frontal P170 decreased between session 1 and session 3. Both the fast learning effects (decrement of N1 and increment of P2) were preserved in training session 3 but not in the test session. However, both the slow learning effects (increment of N1 and decrement of P170) were retained completely in the test session. This study indicates that PL induces different changes in the human adult brain during and after active training, and only the delayed changes of brain activity can be preserved for a long term.

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WHY IS THE P3 LATENCY DURING THE ATTENTIONAL BLINK DELAYED?

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Descriptors: attentional blink, p3 latency, consolidation in working memory
Perceivers often miss a distinct target presented in a sequence of distractors. One of the remarkable examples of this is attentional blink phenomenon. This phenomenon occurs when participants are asked to report two targets embedded in rapid serial visual presentation, if a temporal lag between the first target (T1) and the second target (T2) is short (0 – 600 ms). In such a paradigm, participants often miss T2. In many of the above experiments, during the attentional blink period, the P3 component of the event-related potential waveform to track the processing of T2 was delayed. These results showed that the attentional blink phenomenon was closely related with fundamental limit on the consolidation of information in working memory. However, recent study showed that the P3 was not delayed during attentional blink period, indicating that the consolidation of each target information was finished immediately after it was presented. In the present study, we examined the delay of the P3-time-locked T2 onset more in detail. T1 was a white digit, T2 was a black letters and the other stimuli were black digits, and participants were asked to report both T1 and T2 at the end of the stream. It was suggested that the P3 delays seen in previous studies were results of superimposing of another component like N400 elicited by T2's not being presented.

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FEEDBACK RELATED NEGATIVITY: TEMPORAL PARAMETERIZATION AND RELATIONS WITH PERCEIVED STRESS

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Descriptors: reward, stress, feedback
The feedback related-negativity (FRN) is a neural feedback event thought to be generated when transient dips in mesencephalic dopamine signal disinhibitory neurons in the anterior cingulate cortex. Animal models indicate that glucocorticoid levels and stress increase drug self-administration. At the same time, recent human behavioral work suggests that perceived life stress and acute stress dampen reward responsiveness. A first goal of this study thus was to examine the relation between perceived life stress and FRN amplitude. A second goal, drawing on our past work indicating that the FRN is reduced with increased delay of feedback from 1 to 2 s was to further parameterize the decay in the FRN over delay time. We studied reward processing and the FRN in a young adult sample (18 – 22 yrs, N = 18). Participants chose among 4 colored balloons, which randomly changed positions in a line from trial to trial. Drawing on our past work indicating that the FRN is reduced with increased delay of feedback (Crowley et al., 2009), we sought to further parameterize the decay in the FRN over delay time. Feedback on win or loss trials was delayed 800 ms, 1600 ms or 2400 ms. We observed that 1600 ms produced a larger FRN than 800 ms or 2400 ms, suggesting that rather than mere decay, the FRN may also be sensitive to “earlier than expected” or “later than expected” manipulations. Furthermore, FRN stress relations were only observed for the 1600 ms delay (r = .46) with smaller differentiation between gain and loss associated with greater perceived stress.

Poster 91

VISUAL PERCEPTION AND OCULOMOTOR CONTROL BY DEVELOPMENTAL DYSLEXICS IN A PARAFOVEALLY CUED SACCADIC TASK

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Descriptors: dyslexia, eye movement, parafovea
Dyslexics are known to show an abnormal pattern of saccadic eye movements during reading, but it remains unclear whether the abnormalities in eye movements are deficits confined to the oculomotor system, a result of a problem in visual processing, or a consequence of difficulties in language processing. In the present study, saccadic eye movements of ten dyslexic children and thirteen normal control children were measured in two experimental sessions using an electro-oculogram. In the first experiment, the subjects were instructed to fixate two locations on the screen alternately. Contrary to previous findings, accuracy of such successive saccades did not systematically differentiate dyslexics from controls, indicating that the dyslexics’ oculomotor control itself is relatively unproblematic. In the second experiment, the subjects’ saccadic eye move-
ments were measured while they were engaged in a visual matching task that did not involve higher language processing. On half of the trials, the pre-target stimulus was accompanied by an arrow cue which was placed about three degrees either to its left or to its right; the target stimulus was then presented at a location that the arrow cue had pointed to. It was found in this experiment that the saccadic latency of dyslexic children was prolonged when parafoveal cues were available. This finding suggests that reading of dyslexics is less efficient because they are not capable of using parafoveally provided information about upcoming words in addition to possibly having problems with phonological processing.

**THE NEUROPHYSIOLOGY OF SUBJEC COMPUTATION: AN ERP LANGUAGE STUDY**

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Descriptors: neurophysiology of syntax, ERP, language

We carried out an ERP experiment in Brazilian Portuguese to analyze the course of the syntactic derivation. We looked for physiological cues concerning the bottom-up hypothesis, a standard pillar in Generative Grammar argumentation: that the subject-vP merge would happen later than the verb-object one. Twenty-nine healthy adult native speakers were visually stimulated by kinetic presentation of 160 S-V-O congruous (O menino comeu a maçã/THe boy ate the apple) and incongruous (A caneca bejeou o homem/THe mug kissed the man) sentences. The electrophysiological activities of the volunteers were collected during stimulation using a 36-channel digital EEG. Digital signal processing techniques, such as filtering and grand-averaging, were applied to estimate the individual ERPs for each anatomic region. After plotting the graphs, we also treated the results statistically, in order to assess ERP amplitude and latency differences. Researchers have been relating semantic violations coinciding with object merge to post-stimulus negative waves peaking at around 400 ms (N400). Our results showed three negative ERPs at around 200, 400, and 700 ms (after the target-word: the verb complement noun). By analyzing the electrophysiology during the syntactic/semantic integration efforts, since the only manipulation in the experiment referred to the semantic congruity of the subject, we assume that the amplitude differences between the ERPs are related to the subject computation: at 700 ms, subject merge to vP, even though the subject is the earliest constituent in the external linear order.

**ELECTROPHYSIOLOGICAL CORRELATES OF DECISION MAKING IN RAPIDLY CHANGING ENVIRONMENTS**

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Descriptors: uncertainty, volatility, decision making

In an uncertain and ever changing world we must continuously adapt our behavioral responses in order to obtain the most advantageous outcome. An integral part of human cognition must therefore involve the ability to optimize behavior and make complicated inferences about when or how quickly change is occurring within the reward environment (Coulville, et al., 2006). Despite a growing body of fMRI studies elucidating the neural correlates of uncertainty (Behrens et al., 2007) the electrophysiology of uncertainty has yet to be addressed. Here we examined the electrophysiological correlates of decision-making under different forms of uncertainty. We recorded event-related potentials (ERP) from thirty-two participants using a high-density EEG setup. Participants performed a reward-based decision task in which the error likelihood and the volatility of changes in stimulus-response associations were manipulated. Results revealed clear correlates of decision-making under uncertainty with volatile conditions producing more positive ERP waveforms compared to low volatility, particularly when the error likelihood is high. Effects were more prominent in 300 – 500 ms, and post-500 ms time windows with effects larger in frontal sites. This is likely to reflect the recruitment of executive control during uncertainty, particularly when the environment is volatile and changeable.

**AGE DIFFERENCES IN WORKING MEMORY CAPACITY AND SELECTIVITY**

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Descriptors: visual working memory, aging

Visual working memory (WM) capacity is commonly assumed to be limited to about 3 to 4 items. However, recent studies provide evidence for large age-related, inter-individu-al, and even intra-individual differences in WM capacity. Still, the underlying cognitive and neuronal mechanisms are only vaguely understood. Theories of cognitive aging suggest the decline in processing speed and/or the inability to suppress task-irrelevant information to account for widespread age-related changes in general cognitive functioning, including WM. We investigated the influence of perceptual processing time on WM capacity and information selection abilities with behavioral and EEG measures in groups of younger (20 – 25 years), and older adults (70 – 75 years). Within a change detection task, memory set-size and encoding – duration were varied for displays including either targets only or targets and distractors. Our behavioral results suggest that increasing encoding time increases WM capacity. This effect is differentially expressed across age groups and conditions. ERP and oscillatory EEG results were used to differentiate sources of inter-individual and age-differences. Our results underline the importance of an age-fair and process-pure comparison of neuronal mechanisms limiting WM capacity as measured with EEG.

**DIFFERENT WAYS TO PREPARE FOR MEMORY ENCODING**

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Institute of Cognitive Neuroscience, University College London

Descriptors: episodic memory, pre-stimulus, cognitive control

It has recently been demonstrated that effective memory encoding relies on neural activity just before an event. In a previous experiment, we have shown that such preparatory activity is under strategic control. A widespread, positive-going ERP modulation preceded words that were recalled versus forgotten in a later memory test, but only when there was a high, not low, monetary incentive to memorize the word. Here, we ask whether this effect is still evident if there is no need to switch between low and high reward conditions. Electrical brain activity was recorded while healthy adults remembered series of words, each of which was preceded by a high-value cue. This was followed by a recognition memory test with five-way judgments to dissociate recollection and familiarity. Results showed that activity just before a word predicted whether the word would later be confidently remembered. In stark contrast to the previous study, this activity took the form of a more negative-going waveform preceding recognized words. This effect started earlier for words that were later recollected, as opposed to those only judged as familiar. The findings emphasize that there are multiple ways to prepare for effective encoding, and that preparatory activity is not restricted to switch situations. The findings also highlight the differential role of preparatory activity in recollection and familiarity.

**AUTOMATIC ACCESS TO TASK-IRRELEVANT SOUND FAMILIARITY**

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Descriptors: sound familiarity, environmental sounds, auditory ERP

The recognition of familiar, meaningful sounds is usually accomplished very promptly and effortlessly. However, to what extent is the familiarity of sounds accessed automatically? Using auditory event-related potentials (ERPs), we tested the involuntary access to sound familiarity when participants performed an auditory task in which the familiarity of the sounds was task-irrelevant. Participants listened to a sequence of
complex sounds and were to detect rare sound repetitions (17% of trials). Sounds were (a) twelve different animal sounds previously rated as highly familiar sounds and (b) twelve complex control sounds that were acoustically matched to respectively one of the animal sounds. Familiar targets elicited an enhanced P2, which confirms results we previously observed for unattended sounds. Moreover, familiar targets elicited enhanced processing in the time window of the N2, indicating additional stimulus evaluation for familiar sounds when sounds were attended. Although no effects on behavioral performance were observed for the sound repetition task, an automatic analysis of sound familiarity was indicated even when only an acoustic analysis is required. For unfamiliar target sounds, an increase in the N1 was observed from the first to the second measurement session, possibly indicating an incipient buildup of a memory representation for the unfamiliar sounds. We argue that the analysis of perceptual sound familiarity occurs rapidly and automatically and promotes effortless recognition of sound meaning in the case of familiar environmental sounds.

Poster 98

AGE-RELATED CHANGES IN THE ACTION POINT OF EMOTION ON RECOGNITION MEMORY: AN EVENT-RELATED POTENTIAL STUDY
Maria Gruno, Sandro Knorr, Norbert Kathmann, & Katja Werheid
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Descriptors: memory, emotion, aging

The present study examined age differences in the effect of negative emotion on recognition memory by using event-related potentials (ERP). Specifically, we dissociated the effect of negative emotion at encoding and retrieval on the ERP old/new effects of studied animal pictures, which were cued with pictures, but a posteriorly-distributed effect when cued with words. These findings provide electrophysiological evidence that the neural correlates of encoding memory for the items was tested with a remember/know recognition test. Half of the studied items were cued in the alternative format (picture-word; word-picture) and half in the same format (word-word; picture-picture). For both words and pictures, study-test overlap affected ERP correlates of encoding. This was especially prevalent for studied pictures, which demonstrated a frontally-distributed effect when later cued with pictures, but a posteriorly-distributed effect when cued with words. These findings provide electrophysiological evidence that the neural correlates of encoding depend on both the type of stimulus material and the degree of overlap between study and test.

Poster 99

THE IMPACT OF TRANSFER-APPROPRIATE PROCESSING ON NEURAL CORRELATES OF ENCODING
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Descriptors: episodic memory, transfer-appropriate processing, subsequent memory effect

The principle of transfer-appropriate processing states that memory benefits from overlap between the processes engaged during encoding and retrieval. It is largely unknown how neural correlates of memory formation depend on how memory for an event is later probed. Here, we investigate the influence of study-test overlap on event-related potential (ERP) correlates of encoding by manipulating the congruency between the format of study and test items. In an incidental learning paradigm, electrical brain activity was recorded from the scalps of healthy adult volunteers while they made size judgments on intermixed series of pictures and words. After a one-hour delay, memory for the items was tested with a remember/know recognition test. Half of the studied items were cued in the alternative format (picture-word; word-picture) and half in the same format (word-word; picture-picture). For both words and pictures, study-test overlap affected ERP correlates of encoding. This was especially prevalent for studied pictures, which demonstrated a frontally-distributed effect when later cued with pictures, but a posteriorly-distributed effect when cued with words. These findings provide electrophysiological evidence that the neural correlates of encoding depend on both the type of stimulus material and the degree of overlap between study and test.

Poster 100

THE SUSTAINED POSTERIOR CONTRALATERAL NEGATIVITY WAS ELICITED DURING VISUAL MENTAL IMAGERY
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Descriptors: visual mental imagery, visual working memory, SPCN

Previous ERP studies showed that the Sustained Posterior Contralateral Negativity (SPCN) reflects visual representations maintained in working memory. In order to investigate the relationship between visual mental imagery and working memory, we examined whether the SPCN was also elicited during visual mental imagery. Participants memorized four kinds of shapes named “A”, “B”, “C”, and “D”, two of which were SIMPLE shapes composed of two segments, and the others were COMPLEX shapes composed of five segments. A catch trial, a left or right arrow cue was followed by the central imagery cue (one of “A”, “B”, “C”, or “D”), and then by bilateral 5 x 5 grids with an “X” probe mark in one cell of each grid. Participants visualized the shape corresponding to imagery cue on the cued-side grid, and decided whether or not the probe mark fell on the visualized shape. Choice reaction time for the ON trials was shorter in the SIMPLE than in the COMPLEX trials, confirming that participants visualized the shapes to perform their task. The SPCN was elicited from 300 to 700 ms at posterior electrodes. This result indicates that visual mental imagery engaged a common neural substrate of visual working memory, suggesting that generated representations during imagery were maintained in visual working memory.
NEUROPHYSIOLOGICAL MARKERS OF RETRIEVAL INDUCED FORGETTING IN COGNITIVE ARITHMETIC

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Descriptors: retrieval induced forgetting, cognitive arithmetic, ERP

Two different accounts have been proposed to explain practice effects in arithmetic facts retrieval. According to the integrated structures model, retrieving arithmetic facts related to practiced material should be enhanced. In contrast, the retrieval induced forgetting (RIF) account predicts that practice should inhibit the retrieval of related material. Only a few studies have been conducted so far to investigate this topic. These have only used behavioral measures and the results seem more consistent with the RIF account. In the present study, we tested the viability of the RIF account in the arithmetic domain by using ERPs. Participants were administered a multiplication verification task on a test phase, after having taken part to a practice phase on a specific set of operands. The critical independent variable was the relationship between material presented on the test and the practice phase. Specifically, operands in the test phase could be 1) both practiced in the previous phase 2) one practiced and one unpracticed 3) both unpracticed. We found that practice effects were reflected in neurophysiological differences around 200 ms after the onset of the result in the multiplication verification task. In this timing, neurophysiological data seem to indicate that, consistent with RIF, the condition in which multiplications involved one practiced operand was associated with a smaller positivity (decreased activation, likely due to inhibition) over anterior-central sites with respect to the other two conditions.

THE RACE IS IN THE BRAIN: NEURAL ACTIVITY PREDICTS INDIVIDUAL DISPOSITION TOWARDS MEMBERS OF A DIFFERENT RACE

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Descriptors: other-race effect, visual working memory, sustained posterior contralateral negativity

Members of a particular ethnic group found it difficult to distinguish faces of members of a different ethnic group. This so-called other-race effect has been ascribed to a number of mental components, but the debate revolving around the functional and neural localization of this selective difficulty in humans is still raging to date. Using the ERP approach, the present study investigated whether a possible functional source of the other-race effect resides in processing occurring in visual working memory. In a standard change-detection paradigm, subjects were cued to memorize one or two faces displayed to the left/right of a fixation point. This design was employed to elicit a standard change-detection paradigm, subjects were submitted to a test phase, after having taken part to a practice phase on a specific set of operands. The critical independent variable was the relationship between material presented on the test and the practice phase. Specifically, operands in the test phase could be 1) both practiced in the previous phase 2) one practiced and one unpracticed 3) both unpracticed. We found that practice effects were reflected in neurophysiological differences around 200 ms after the onset of the result in the multiplication verification task. In this timing, neurophysiological data seem to indicate that, consistent with RIF, the condition in which multiplications involved one practiced operand was associated with a smaller positivity (decreased activation, likely due to inhibition) over anterior-central sites with respect to the other two conditions.

HUMAN FRONTAL MIDLINE THETA AND ITS SYNCHRONIZATION TO GAMMA OSCILATIONS DURING VERBAL WORKING MEMORY

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Descriptors: cross-frequency interaction, electroencephalogram, executive processes

The involvement of oscillatory activity, especially theta and gamma oscillations, in human working memory has been reported repetitively. Therefore, we investigated whether frontal midline theta activity is linked to gamma oscillations during the performance of a verbal working memory task and whether it might be attributable to a specific cognitive process. The electroencephalogram was recorded from 15 subjects while they performed a delayed-match to sample task with two different conditions (manipulation, retention). The results of the study indicated higher frontal midline theta activity for the manipulation compared to the retention condition. Moreover, cross-frequency phase synchronization between frontal midline theta activity and gamma activity was predominant during manipulation of verbal stimulus material compared to pure retention of verbal stimulus material. This effect was mainly apparent at frontal brain areas and was restricted to the first part of the delay period. We suppose that frontal midline theta/gamma coupling reflects some kind of updating process in the context of executive processes.

RECOGNITION MEMORY IN AUTISTIC INDIVIDUALS WITH OUTSTANDING MEMORY: AN MEG STUDY

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Descriptors: autism, magnetencephalography, recognition memory

Savant syndrome is a rare condition in which persons with various developmental disorders, including autistic disorder, have astonishing islands of ability that stand in contrast to their overall limitations. The aim of this study was to investigate memory encoding in autistic individuals with reported extraordinary memory skills. In a continuous old-new paradigm eight autistic and eight healthy participants were presented with 300 pseudo-words and 300 meaningless shapes that were either shown for the first (“new”) or for the second time (“old”). Participants were required to indicate by button press whether an item was new or old, while their brain activity was recorded with 151-channel whole-head magnetoencephalography. Unexpectedly, memory savants did not perform better than controls, but were outperformed in the recognition of pseudowords. In memory savants, N100 and P200 components of event-related magnetic fields of correctly recognized old stimuli were attenuated at parietal and occipital sites during the recognition of pseudowords. Controls exhibited enhanced amplitudes between 450 – 500 ms during the recognition of shapes. Attenuated early magnetic fields in memory savants were attributed to attentional, pre-mnemonic processes. Decreased later magnetic fields, as well as a different factor structure of neuropsychological tests point to a different organization of memory.

FAMILIAR VOICES MODULATE THE N170 ELICITED BY UNFAMILIAR FACES

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Descriptors: N170, face processing, voice recognition

We examined processing of novel visual stimuli when they were preceded by auditory stimuli that could be categorized at the individual level, or by auditory stimuli that could be categorized at the basic level only. In an initial training phase, participants learned to identify auditory recordings of dog barks by dog name (e.g., “This is the bark of Bounce”). The next day participants completed a visual oddball task, during which EEG was recorded. The standard stimuli were novel photographs of dogs' faces, preceded by either a dog bark that had been learned during training (known bark), or a novel dog bark (unknown bark). The N170 ERP amplitude was smaller when a novel dog face was preceded by a known bark as compared to an unknown bark. Moreover, this N170 amplitude decrease was larger for participants who had relatively more experience with dogs. Prior work has shown that if participants explicitly learn semantic information about an individual portrayed in a photograph, the N170 response elicited by that photograph is reduced in amplitude. The present experiment suggests that a reduction in the N170, and hence an effect on object categorization, also occurs in the absence of an explicit association between the semantic information and a visual object. Here, individually identifiable auditory information that could be used to make an inference about object identity (i.e., Bounce’s bark was heard, therefore the dog face is likely that of Bounce) influenced processing of a visual stimulus that it had not been explicitly associated with.
irrelevant associations had to be suppressed. Second, the topography of event-related slow potentials differed in a material-specific way depending on the type of irrelevant information. Finally, material-specific fMRI activations were found for the irrelevant material type in posterior brain areas that are assumed to house the representations of positions and faces. In addition to the posterior differences, stronger fMRI activation was found in the left prefrontal cortex during conflict trials, suggesting a role of this region for control processes that serve to solve conflict and interference during LTM retrieval.

**Poster 109**

**AGE DIFFERENCES IN VISUAL WORKING MEMORY CAPACITY: AN EFFECT OF REDUCED FILTERING EFFICIENCY?**

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Descriptors: visual short-term memory, aging, contralateral delay activity

It is well-known that working memory (WM) functions decline with age. The reasons, however, are not completely understood. Here, we tested whether the ability to prevent irrelevant information from being stored is a critical factor for age differences in WM. We compared younger and older adults’ performance in a visual WM task. In each trial, participants were presented with an array of colored rectangles and had to remember only the red ones. During the retention interval, the contralateral delay activity (CDA) of the EEG was recorded, whose amplitude increases with the number of stored items. Participants who are good in filtering should show CDA amplitude increases for red items only, whereas the amplitude for participants who are less efficient in filtering should depend on the numbers of both relevant and irrelevant items. In both groups, filtering efficiency, quantified by CDA amplitudes, substantially varied across individuals and was correlated with WM capacity: individuals with low capacity were less efficient in filtering out irrelevant information than high-capacity individuals. Age effects were also found, however, in a time window much earlier than the individual differences: older adults’ filtering started delayed when compared to younger adults. This indicates that the age-related WM decline could result from an “early” filter deficit. Moreover, the findings also show that older adults are not simply like less efficiently performing young adults and that age and individual differences in working memory do not have the same basis.

**Poster 110**

**WORD FREQUENCY EFFECTS IN LEFT INFERIOR PREFRONTAL CORTEX ARE RELATED TO LATER RECOGNITION MEMORY, NOT WORD IDENTIFICATION**

Maria Wimmer, & Alan Richardson-Klavehn
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Descriptors: memory encoding, left inferior frontal gyrus, word frequency

Recognition memory for rare words is typically better than for common words. This word frequency effect has been argued to be the consequence of increased attention at encoding, due to the relatively higher novelty of low frequency words. Interestingly, activations in the left inferior frontal gyrus (LIFG) have been associated with both the processing of low frequency words and successful subsequent recognition memory. We designed an fMRI study to test whether these LIFG activations at encoding reflect attentional processes that facilitate later word identification, or if they reflect semantic processes that specifically facilitate later explicit memory. Participants studied low frequency (LF) and high frequency (HF) words in mixed lists. Encoding was followed by a word identification task in which, in a second step, required participants to judge all identified words as old or new. Word frequency effects in the LIFG overlapped with activations predicting subsequent explicit memory, but not subsequent identification. These findings support the hypothesis that the LF advantage for recognition memory is due to enhanced distinctiveness of semantic processing at encoding, as reflected by increased activation in the left inferior frontal cortex.

**Poster 111**

**EFFECTS OF LOAD AND INCENTIVES ON CONTRALATERAL DELAY ACTIVITY AND SLOW POTENTIALS IN A VISUAL WORKING MEMORY TASK**

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Descriptors: visual working memory, incentive

Visual working memory is a limited resource that holds up to four items. Neural activity as measured by ERPs during the retention interval of a change detection task has been shown to reflect this limitation. We were interested in the effects of incentives on these electrophysiological correlates because incentives should increase memory performance. In a within-subjects design, subjects performed a change detection task under standard instructions and in a condition in which they could enhance their earnings by increasing their performances. Slow waves and the contralateral delay activity (CDA) were measured over occipito-parietal brain areas. We observed clear memory load effects and we found an incentive effect in performances as well as in the slow waves, but not in the CDA. Furthermore we calculated memory indices either on slow waves or the CDA. The index based on slow waves but not the one based on CDA correlated with memory performances.

**Poster 112**

**ELECTROPHYSIOLOGICAL CORRELATES OF EXPERIMENTALLY INDUCED DECISION BIASES IN RECOGNITION MEMORY**

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Descriptors: false memories, decision bias, old-new effect

Biased memories may occur when a decision is based on vague memory information; the retrieved information can either be judged as true (liberal decision) or as false (conservative decision). We investigated when neural processes associated with (automatic vs. controlled) decision bias shifts occur relative to memory retrieval (Exp1), and whether and how enhanced memory strength interacts with decision bias processes (Exp2). Subjects read neutral words, followed by a memory test that presented these “old” words plus new words. Subjects had to apply either a liberal or a conservative decision criterion as they made old/new recognition memory judgments. In Exp1, this instruction was either varied blockwise (automated decision bias) or varied randomly from item to item (controlled bias). In Exp2, half of the study items were presented three times (high familiarity) and were compared with study items presented only once as bias shifts were induced blockwise. In both experiments a fronto-central N2 ERP was larger in the liberal condition, and a parietal late positive complex (LPC) was larger for old than for new items and modulated by memory strength. The decision bias shifts revealed similar ERP activities with an onset around 300 ms in both experiments. Exp1 showed that automatic as well as controlled processes of bias selection occur before memory retrieval. Post bias selection, on the other hand, enhanced memory strength interfered with retrieval as indicated by the parietal old-new effect showing the largest LPC for high familiar old items in Exp2.

**Poster 113**

**VISUO-SPATIAL SKETCHPAD AND DEVELOPMENTAL DYSLEXIA: ELECTROPHYSIOLOGICAL AND BEHAVIORAL INVESTIGATION**

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Descriptors: working memory, ERP, attention

Deficits in short term memory are considered to be associated with developmental dyslexia. In this study, we examined the role of short term memory in children with poor reading skills by comparing data from behavioral and event-related potential (ERP) measures of Finnish-speaking 9 year old children. Speech stimuli were presented in an oddball paradigm. The stimuli were pseudo-words, ata/atta/apu/appa. The EEG was recorded from 128 channels using a high density EEG array. The vertex served as reference. The children were divided into two groups: 11 normal readers and 10 poor readers of the same age participated in ERP and behavioral measurements. All the participants were from the Jyväskylä Longitudinal Study of Dyslexia (JLD). The ERP data were analyzed by employing spatiotemporal Principal Component Analysis (PCA), whereas behavioral data were analyzed by using t-test, analysis of variance, and correlation coefficients. We analyzed P1, N250, MMN, and LDN components of the ERP. The children with reading difficulties showed increased ERP amplitudes. The correlation between ERP and behavioral measurement revealed that there was an association between ERPs and short term memory scores. The findings showed that short term memory and specific PCA components at MMN and LDN latencies were associated with each other. Finally, behavioral measurements revealed that the visuospatial sketchpad was impaired in dyslexic children.

**Poster 114**

**BEHAVIORAL AND EEG INDICATORS OF TRUE VERSUS FALSE MEMORY**

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Descriptors: false memory, event-related potentials

In a Deese-Roediger-McDermott (DRM) paradigm, false recognition of unseen, lure items is contrasted with true recognition of items which have actually been presented before. The Fuzzy-Trace-Theory (FTT) explains the occurrence of such false memories by a different functioning of two different memory traces, gist and verbatim. In a DRM study with 42 participants, we investigated behavioral and EEG correlates of true and false recognition using pictorial scenes as stimuli. In a categorical design, one of four items prototypical of each scene was omitted randomly. Each scene was combined with one of two different textual instructions (balanced over scenes and subjects), either referring to the superficial, verbatim, or to the content-related, gist features of the scene. Eleven-channel EEG and EOG were recorded in addition to the behavioral measures,

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which included a final level-of-confidence rating. In preliminary data obtained from 25 subjects, false memories occurred in 43.2% of the unseen, lure items, with a higher rate for items combined with gist instructions. Event-related potentials (ERPs) differed between recognized and unrecognized items. They tended to differ also between true and false memories; an instructional effect was not observed in the ERPs. The outcome of the instructional manipulation gives support to the FTT, while the overall false-memory rate and the ERP correlates support further investigation of false memories using scene pictorial stimuli in a categorical design.

**Poster 115**

**CAN REPETITION LEAD TO SEMANTIC KNOWLEDGE?**

Bertram Opitz

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Descriptors: recognition memory, semantic memory, ERP

Memory enhancement after repeated presentation of to-be-learned material is a well-known phenomenon. It has been assumed that the repeated presentation of features common to a number of specific instances leads to decontextualized facts about the world, i.e., semantic knowledge. To investigate this issue, subjects studied celebrity faces along with faces of unknown individuals. Crucially, half of the unknown faces were repeated within the same study context (background and biographical information) while for the other half the contextual features changed across repetitions. Celebrity faces were chosen because they carry with them biographical information. The electrophysiological correlates of conceptual priming and explicit memory for these faces were examined. Explicit memory retrieval was associated with the early frontal old/new effect, the ERP correlate of familiarity, and the late parietal old/new effect, indexing recollection. Both ERP effects were elicited by celebrity faces and non-famous faces repeatedly studied in different contexts, whereas non-famous faces repeated in the same context elicited only the parietal old/new effect. Furthermore, conceptual priming was indexed by positive brain potentials over fronto-central regions, in addition to faster reaction times for previously presented faces. Again, a striking similarity between effects elicited by celebrity faces and non-famous faces repeated in varying contexts was observed. This indicates that repetition of features across different contexts bears some similarity to semantic knowledge.

**Poster 116**

**EEG CORRELATES OF INFORMATION PROCESSING IN SIMPLE AND COMPLEX WORKING MEMORY TASKS**

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Descriptors: working memory, theta band

In the present experiment we investigated brain activity differences between two types of cognitive tasks – a simple memory task, and simple and complex working memory tasks. The simple memory task required the subjects to memorize three pairs of unrelated elements (e.g., D S F; F C; E R), whereas in the working memory tasks the subjects had to integrate presented information and infer about relations between presented elements (e.g., after presentations of: A > B; B > C; C > D), subject was requested to answer questions concerning relationships between elements which were not previously presented, e.g., A > C). In the simple working memory task the presented pairs of elements were linked to each other one by one, whereas in the complex working memory task the relations between presented elements had to be inferred after presentation whole task (e.g., A > B; C > D; B > C). Several studies using similar tasks and neuroimaging techniques have shown that they activate bilateral PPC and posterior parietal cortex (Heckers et al., 2004; Acuna et al., 2002; Dickens et al., 2001). In our experiment we explored the pattern of EEG activity during these two kinds of tasks in comparison to the simple memory task. The biggest differences were observed in gamma and theta bands over the frontal and parietal regions.

**Poster 117**

**USING ASYMMETRIC ELECTROENCEPHALOGRAPHIC BAND ACTIVITY TO EXAMINE SEXUAL MOTIVATION**

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Descriptors: eeg asymmetry, motivation

Research has shown that variation in electroencephalographic anterior alpha asymmetry (EEG-AAA) reflects differences in motivational states that are independent of affective valence (Peterson, Shackman, & Harmon-Jones, 2008). Specifically, greater left frontal alpha EEG is thought to reflect a motivated state. The purpose of the study was to examine whether individuals who felt that they had problems controlling their erotic viewing were characterized by accentuated EEG-AAA in response to sexual stimuli. Receiver operating characteristic (ROC) curve analysis was used to determine the extent to which EEG-AAA could predict self-reported problems with erotica. The EEG-AAA was contrasted with a simple questionnaire measure of sexual desire. Participants completed questionnaires including frequency of sexual activity and erotica use, and levels of sexual desire. Fifty-eight men and women wore a 40-channel EEG cap while viewing a neutral (10 minute) and then a sexual (3 minute) film. One-second, non-overlapping blocks were visually screened for artifacts, and the 8 – 13 Hz band power for the last minute of each film was calculated. An index was calculated using the difference of the log-transformed power values from F3 and F4. Results indicated that the EEG-AAA index predicted problems with erotica viewing above chance, although it was comparable to self-report measures of sexual desire (area under the curve = .62). The study also tested whether EEG-AAA characterized motivated states regardless of emotional valance during a mixed-emotion response.

**Poster 118**

**THE INFLUENCE OF FOREKNOWLEDGE IN THE SELF-INITIATION PARADIGM**

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Descriptors: self-initiated sounds, prediction, audition

Attenuated N1 responses have been reported for self-initiated sounds compared to identical sounds initiated externally. Internal prediction mechanisms are thought to be crucial for differential processing of sounds generated by different agents. Based on a match between the effenter motor information and sensory feedback, the sensory consequences of self-generated actions can be discriminated. Accordingly, only self-initiated sounds can be accurately predicted. Attenuated ERP components are taken as evidence for the suggested internal prediction mechanism. In a typical study, self-initiated sounds are recorded online (motor-auditory task) and played back again as externally-initiated sounds in another experimental block (auditory-only task). In this paradigm, however, the observed N1 differences might be the result of different foreknowledge of left frontal alpha EEG is thought to reflect a motivated state. The purpose of the study was to examine whether individuals who felt that they had problems controlling their erotic viewing were characterized by accentuated EEG-AAA in response to sexual stimuli. Receiver operating characteristic (ROC) curve analysis was used to determine the extent to which EEG-AAA could predict self-reported problems with erotica. The EEG-AAA was contrasted with a simple questionnaire measure of sexual desire. Participants completed questionnaires including frequency of sexual activity and erotica use, and levels of sexual desire. Fifty-eight men and women wore a 40-channel EEG cap while viewing a neutral (10 minute) and then a sexual (3 minute) film. One-second, non-overlapping blocks were visually screened for artifacts, and the 8 – 13 Hz band power for the last minute of each film was calculated. An index was calculated using the difference of the log-transformed power values from F3 and F4. Results indicated that the EEG-AAA index predicted problems with erotica viewing above chance, although it was comparable to self-report measures of sexual desire (area under the curve = .62). The study also tested whether EEG-AAA characterized motivated states regardless of emotional valance during a mixed-emotion response.

**Poster 119**

**FEEDBACK RELATED GAMMA ACTIVITY MODULATION ASSOCIATED WITH THE PROBABILITY OF REWARD**

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Descriptors: reward expectation, feedback related negativity, gamma band

Reward expectation can modulate the response of the reward processing system after presentation of feedback. Despite the existing knowledge about the circuits involved in reward processing, the specific roles of the different brain electrical responses associated to reward and punishment processing are still unknown. In order to study the effect of expectations about probability and magnitude on the reward processing system through brain electrical activity, we designed a gambling task in which subjects knew in advance the probability and magnitude of an upcoming gain or loss. Electroencephalogram was recorded from 18 subjects, and event-related potentials and time frequency analysis were computed in the feedback indicating gains or losses. None of the ERP components (Feedback Related Negativity, P3) showed modulations with the probability of gains or losses. In contrast, time-frequency analysis revealed a frontocentral increase in gamma activity for low probability gain trials and not for high probability gains. In loss trials, the effect was weaker and appeared in conditions where there was high probability to win. In addition gamma activity was not modulated by the magnitude or the expected value of gains and losses. Present results show that gamma activation is not associated with gains as was previously suggested, but it is modulated by expectations of probability, specifically in better than expected consequences of actions. These results suggest a role of gamma activity in the monitoring of reward and punishment in reinforcement learning process.

**Poster 120**

**TESTOSTERONE AND WHAT PATERNAL INVESTMENT HAS TO DO WITH SENSATION SEEKING**

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Descriptors: testosterone, fatherhood, sensation seeking

Providing paternal care is associated on the one hand with decreased likelihood to engage in competitive or mating behavior and on the other hand with providing pro-
MUSIC-SUPPORTED THERAPY INDUCES PLASTICITY IN THE SENSORIMOTOR CORTEX IN CHRONIC STROKE PATIENTS

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Descriptors: chronic stroke, transcranial magnetic stimulation, 3d movement analysis

In the present project we investigated the mechanisms underlying the effectiveness of Music-supported Therapy (MST, Schneider et al., 2006) in a sample of chronic stroke patients as a neurorehabilitation technique, in order to improve the use of the affected upper extremity after stroke. Preliminary behavioral data have shown positive effects of this intervention (Schneider et al., 2006). To investigate the physiological mechanisms underlying the effects of MST, the present project evaluated possible reorganization of the sensorimotor system using Transcranial Magnetic Stimulation and 3-D movement analysis. A longitudinal trial of MST therapy in chronic stroke patients has been carried out (N = 10) with mild to moderate chronic motor deficit after stroke (mean 2.5 years after stroke). This group received intensive MST of the paretic upper extremity (30 min each day, 4-weeks), and were evaluated before and after the MST. Transcranial Magnetic Stimulation evaluation was performed before and after MST treatment. Motor function was evaluated using 3-D movement analysis before and after MST treatment, and behavioral motor tests too. Preliminary results have shown that the behavioral motor improvement (e.g., speed, quality and smoothness of movement) was accompanied by signs of neural reorganization in the sensorimotor cortex (intra-individual pre-post TMS comparisons), suggesting that the neural reorganization underlies the efficacy of MST in acute and chronic stroke patients.
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EEG COMPLEXITY IN RELATION TO WITHDRAWAL MOTIVATION LEVEL

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Lessya Ukrainka Volyn National University

Descriptors: motivation, EEG, correlation dimension

The research was conducted on 17 healthy volunteers, who were divided into two groups, according to their motivation (withdrawal level) – one group with a high motivation level (10 persons) and one group with a middle motivation level (7 persons).

EEG was recorded during both a resting state and intellectual task solving. Then EEG was analyzed, using the TISEAN package. Correlations were evaluated for 8 EEG lead positions (symmetrical frontal, temporal, parietal and occipital lobes in the left and right hemispheres) with embedding dimension = 10. Though we expected specific features, which depend on motivation level, in frontal areas, main effects were observed in parietal lobes. In both the high and middle motivation level groups, there was a statistically significant increase in correlation dimension values in both parietal lobes. But in the group with middle motivation level, the correlation dimension value, which was lower in the right parietal lobe compared to those in the group with high motivation level (7.46 and 7.39 respectively), the effect was greater for the intellectual task (6.04 and 7.95 respectively). We hypothesize that complexity of electrical processes in the parietal cortex may depend on motivation level.

Poster 128

ELECTROCORTICAL CORRELATES OF EMOTIONAL WORKING MEMORY LOAD AND STARTLE REFLEX MODULATION

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Descriptors: working memory, startle, EEG

Both working memory (WM) and emotional regulation have been considered important functions of the prefrontal cortex. This EEG study examined which PFC regions are active during the maintenance of emotional versus neutral information in WM and how this relates to the modulation of protective reflexes. Positive and negative nouns (comparable in arousal, but more arousing than neutral words) had to be memorized and maintained during a Sternberg-type WM task with high and low memory load. The modulating effects on acoustic startle were studied during maintenance, that is, the absence of any stimulus. Sixty-four-channel EEG (Synamps, Neuroscan) data were analyzed time-locked to the last stimulus. Behavioral data showed slower RTs and a greater number of errors in trials without startle.

Poster 129

NEAR-THRESHOLD STIMULUS PROCESSING IN PRIMARY AND SECONDARY SOMATOSENSORY CORTEX - AN MEG STUDY.

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Descriptors: MEG, somatosensory, near-threshold stimuli

In the current study we were interested in temporal activation patterns for conscious and subconscious processing of near-threshold tactile stimuli in somatosensory areas. Due to the weak evoked responses, we chose an indirect approach to study the processing of near-threshold stimuli by investigating the impact of near-threshold stimuli on the cortical processing of succeeding supra-threshold test stimuli in a paired-stimulus paradigm. We hypothesized that responses evoked by the test stimuli are reduced by preceding near-threshold stimuli if the underlying neuronal substrate is still refractory. In order to probe the time course of cortical activation patterns of near-threshold stimuli, stimulus pairs were presented with interstimulus intervals (ISI) of 30, 60 and 150 ms. The extent and duration of near-threshold stimulus processing and differences due to conscious perception were evaluated based on the extent of attenuation of neuro-magnetic responses to test stimuli in the different stimulation conditions. Attenuation of test stimulus responses in S1 were only observed for ISIs >60 ms, whereas in S2 the effect lasted the ISI of 150 ms. Differences due to conscious perception of the near-threshold stimuli were only observed in secondary somatosensory cortex with stronger decreases for perceived than for missed near-threshold stimuli. Our data suggest that stimulus information of near-threshold tactile stimuli is processed very briefly in S1, whereas the occupancy of SII points to its role in temporal integration and conscious perception of sensory input.

Poster 130

MEETING MORE CRITERIA OF THE METABOLIC SYNDROME ASSOCIATES WITH REDUCED GRAY MATTER VOLUME

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Descriptors: metabolic syndrome, voxel-based morphometry, gray matter volume

Comparisons of the metabolic phenotype also have not only been related to prospective risk for cardiovascular and diabetic disease endpoints, but also alterations in gross brain morphology. Here, we examined whether meeting an increasing number of MetS criteria covaried with a greater reduction in regional gray matter volume, particularly in corticobulbar areas subject to metabolic dysregulation. Participants were 96 community volunteers aged 32–54 years. Voxel-based morphometry (VBM) was used for whole-brain analysis of structural magnetic resonance images, wherein gray matter volume was quantified. Criteria of the MetS were based on the 2001 National Cholesterol Education Program Guidelines. In sum, 38 participants met no criteria; 26 met 1 criterion; 17 met 2 criteria; and 15 met 3 or more criteria. We used a 0–3 ordinal variable for our analyses of regional gray matter volume, such that 0 = meeting no criteria, 1 = meeting 1 criterion, 2 = meeting 2 criteria, and 3 = meeting 3 or more criteria. This ordinal variable was then entered as an explanatory factor in a whole-brain regression analysis of gray matter volume adjusting for age, sex, and total cerebral volume. We found individuals meeting a greater number of MetS criteria showed reduced gray matter volume in the pregenual anterior cingulate, posterior insula, and precuneus (rs > 3.2, ps < 0.001, k > 375). These findings extend epidemiological evidence on the associations between the MetS and peripheral target organ damage by suggesting that the brain may be equally vulnerable to the pathophysiological sequelae of this syndrome.

Poster 131

BRAIN VOLUME ASYMMETRIES BETWEEN HOMOLOGOUS REGIONS OF BOTH HEMISPHERES IN NORMAL SUBJECTS

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Descriptors: normal subjects, brain volume asymmetries, anatomiarni mri

Objectives: To evaluate the relation between the volumes of 54 symmetrical regions of both left and right hemispheres.

Methods: Anatomical MRIs of 237 normal subjects were obtained. Automatic classification of 54 structures in each hemisphere was obtained. Student t-tests were performed using Hotelling’s T2 test. Brain volumes between Cuban and Montreal Neurological Institute databases were compared. Structures with the highest correlation values were used to define a brain network. Results: There was a highly significant difference between left and right volumes in normal subjects. Normative Cuban volume values were similar to those reported in the Montreal Neurological Institute database. There is a relationship between handedness and correlation values between different brain structures. Sex differences in asymmetries between the two hemispheres were found. Conclusions: There is a high quantity of volume asymmetries between homologous regions of left and right brain hemispheres. It appears there is an influence of handedness on the correlation of brain structures. Relevance: Normative data can be used in order to compare subjects who could be evaluated for different suspected pathological conditions.

Poster 132

FEEDBACK PROCESSING IN A TIME-ESTIMATION TASK: AN FMRI STUDY ON TASK VALIDITY

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Descriptors: feedback processing, task validity, fmri

Performance monitoring is a prerequisite for goal-directed behavior. When a person detects an error or when he receives negative feedback, he can adjust his behavior in order to reach his goal. Using functional MRI, the current study examined the neural circuitry implicated in the processing of performance feedback in a time-estimation task. More specifically, the focus was on the task-relevance of the feedback provided to participants (N = 30; 22 female, aged between 19 and 69). The feedback consisted of a happy face following an estimate within the target time interval and an anxious face when the estimate was outside the target interval. When feedback was negative the gender of the face informed the participant whether the estimate was too short or too long, enabling the participant to adjust performance in the appropriate direction. The faces were presented
against a grid pattern informing the participant whether the feedback was task-relevant vs. task-irrelevant. The performance data showed that participants used the relevant feedback to correctly adjust their time estimations. In contrast, task-irrelevant feedback was ignored. The rostral cingularate zone, putamen and amygdala were pre-defined as regions of interest. In contrast to expectations, these brain regions were less activated after negative feedback than after positive feedback. Importantly, this difference in activation was restricted to task-relevant feedback. These findings indicate that these regions are not sensitive to stimuli carrying affective valence per se but rather to their task validity.

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GENDER SPECIFIC MODULATION OF BRAIN PROCESSES BY FOOD STIMULI

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Descriptors: fMRI, food pictures

In most cases, obesity, a major risk factor for diabetes mellitus type 2 and other associated chronic diseases, is generated by excessive eating. For a better understanding of eating behavior it is necessary to determine how this is modulated by several factors including satiety and gender. Based on recent studies, specific brain areas were found which are involved in the processing of food stimuli. However, the results are inconsistent regarding different aspects of the reward function of food, gender effects and motivational aspects. We investigated 12 healthy normal-weighted participants (6 female) in a one-back memory task. Food pictures (high and low-caloric) and non-food pictures, matched for complexity, valence and arousal were presented in a block design using functional magnetic resonance imaging (fMRI). For each subject the task was presented in a hungry and in a satiated state on two different days. High-caloric pictures compared to low-caloric pictures generated increased activation in areas involved in reward processing (ventral striatum), food processing (insula, orbitofrontal cortex) and in primary visual areas. The comparison of high-caloric pictures in the hungry vs. non-hungry state showed increased activity in the nucleus accumbens. This effect was more pronounced in women. Additional activation in women was seen in the fusiform gyrus and anterior cingulum. This study shows that the caloric content of food pictures modulates brain areas related to reward processing. In addition, satiation might influence the processing of food pictures differently in men and women.

Poster 134

A REPEATED MEASURES FMRI STUDY OF THE EFFECTS OF LEARNING ON A TOWER OF LONDON TASK.

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Descriptors: planning, tower of london, functional magnetic resonance imaging

The Tower of London task (TOL) is a common test to measure executive function impairment in patients with a number of psychiatric conditions (e.g., schizophrenia, depression). Although substantial research has been carried out to investigate cortical interconnections and functional involvements in complex planning, little is known about the effect of learning in regard to the nature of changes in behavior and cortical activation for Tower of London test performance. In contrast to commonly used single session designs, we repeatedly measured 8 healthy subjects (3 male) three times over a period of three weeks in a task load - balanced TOL design. In addition, long term effects were targeted in a 6 months follow up measurement. Functional magnetic resonance imaging was performed for the sessions during week 1, week 3 and after 6 months. In order to obtain unbiased activation maps of the targeted cognitive functions, a perceptually matched control condition (calculation task) was introduced into the established TOL protocol (Dockery et al. 2009). Marked behavioral effects and substantial changes in functional activation maps over sessions suggest the importance of learning on functional reorganization in higher cognitive functioning such as complex planning processes. Our findings are discussed in light of established theoretical concepts and possible future applications.

Poster 135

THE COMMON AND SPECIFIC NEURAL BASES FOR EMOTIONAL AND BODILY AWARENESS

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Keio University

Descriptors: emotion, interoception, fMRI

Perceiving one’s own bodily state had been proposed as an origin of emotional states. Though recent studies have revealed essential neural substrates for such interoceptive processes, it remains unclear how we shape emotions from bodily awareness. To address the question, we examined the common and specific neural substrates for evaluating one’s own bodily and emotional state. In a fMRI scanner, participants were required to answer three types of question about emotional awareness, bodily awareness and possessions. We first presented a cue (“state” or “trait”) which is followed by a statement as “I’m happy (emotional awareness)”, “I have a fast pulse (bodily awareness)” and “I have money (possessions)”. They evaluated appropriateness of the statement as for their current state or usual disposition (trait). As shared neural substrates for emotional and bodily awareness, we found significant activations in right insular and inferior frontal cortex. These regions are considered to be representative of bodily information for feeling emotions. The finding supports the hypothesis that we reference our own bodily state when we appraise emotional state. The areas were more involved in the state than the trait condition. For emotional awareness questions, the following regions were more strongly activated than for bodily awareness questions: medial and dorsolateral prefrontal cortex, posterior cingulate cortex, temporal poles and globus pallidus. In contrast, the right parahippocampal gyrus, right putamen, and left anterior cingulate cortex were more activated for bodily awareness questions.

Poster 136

COMPARISON OF SELECTIVE IMPAIRMENTS IN RESTING-STATE NETWORKS OF PATIENTS WITH EARLY ALZHEIMER’S DISEASE AND AT HIGH RISK FOR ALZHEIMER’S DISEASE

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Descriptors: alzheimer’s disease, mild cognitive impairment, resting-state networks

Alzheimer’s disease (AD) exhibits decreases in metabolism and functional connectivity in the default-mode network (DMN), which is already present in mild cognitive impairment (MCI), a syndrome that increases the risk of converting to AD. It is unclear how this loss of connectivity progresses, and whether other networks are impacted. We investigated this in a resting-state functional magnetic resonance imaging (rs-fMRI) study of patients with MCI (n = 29) and AD (n = 23) and healthy controls (n = 26). Rs-fMRI data were analyzed using independent component analysis, which has been used to dissociate functionally plausible resting-state networks (RSNs). MCI patients showed decreased connectivity of left posterior cingulate (PC) to the remainder of the posterior DMN. In AD patients, this decrease was even more pronounced, extending to PC, but not elsewhere. The anterior DMN was not impaired in either group. In MCI, medial and inferolateral parietal regions from fronto-parietal components putatively associated with attention showed decreased connectivity. Additionally, right lateral prefrontal cortex was less integrated into a right-lateralized component. AD patients exhibited the same decreases in parietal regions, which extended to parietal areas in a left-lateralized fronto-parietal network, but no additional connectivity decrease elsewhere. Our results underscore that functional disconnection of RSNs is central to AD through its progression, but that different stages show different disconnection profiles. These profiles may become useful as an early biomarker for AD.

Poster 137

VOLUMETRIC EVALUATION IN SCHIZOPHRENIA

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Descriptors: MRI volumetry, schizophrenia

Introduction: Volumetry of brain, based on magnetic resonance imaging (MRI) in schizophrenia (SZH), provides in vivo structural information. We hypothesized that there is a relation between brain volume and their volume, and MRI volumetry could help us to reveal this relation. Methods: Frontal lobe (FL) and Heschl’s gyrus (HG) were determined for volumetric evaluation because a dichotic listening paradigm showed significant changes in electrophysiological waveforms in these areas. Seventeen patients (7 women) with SCH and eight (5 women) healthy control subjects for FL volume, and four patients (2 women) with SCH and four (2 women) healthy control people for HG volume participated in study. MRI scans were obtained with a 1.5-T scanner. Results: Gray/white matter (G/W) ratio 1.23 and 1.80, gray matter/whole frontal lobe (G/F) ratio 0.54 and 0.64 were found in SCH patients and control group respectively. G/W ratio was decreased in SCH group when compared with the control group. The decrease in G/W ratio was the result of gray matter loss in SCH when G/F ratio was taken into consideration. Left HG found bigger than right HG in both group (SCH and control). HG volume decreased in SCH patients compared with control group. Conclusions: Volumetric evaluation of brain in light of changes in electrophysiological waveforms is a distinctive approach, which points to a decreased structural effect that is in line with the functional prospects. Electrophysiological data co-registered with MRI images remains another aim of this study for obtaining further functional information.
REACTION TIME AND FRACTIONAL ANISOTROPY

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Descriptors: reaction time, fractional anisotropy, white matter

We used fractional anisotropy (FA) from diffusion tensor imaging to study the relationship of white matter integrity with the speed of processing in a continuous performance test (CPT) in a sample of 49 healthy adults (20–49 years old) from the Cuban human brain mapping project. The CPT is a reliable task of sustained attention which allows computing performance using errors and reaction time (RT) in two tasks: simple RT (target letter S in a subset of 5 letters) and difficult or prepare RT (S preceded by letter A). The difference between prepare and simple RT was the neuropsychological variable to perform a functional data analysis approach using a multivariate regression of RT with all FA voxels. The results showed a significant relation between FA vs RTdiff. The structures involved (identified using white matter Mori atlas) were the right cingulate gyrus, the body of corpus callosum, right superior corona radiata, the left and right anterior limb of internal capsule, and right posterior thalamic radiation (include optic radiation) involved in the visuospatial processing of the stimuli. We believe these results are more consistent with the nature of a reaction time task that involves not only the restricted associative and projection fibers related to the visuospatial attentional network. The Internal capsule and the body of CC are explaining the motor component of the task and the right cingulate gyrus must be related with the preparation and the monitoring of the occurrence of the stimuli over time in anticipation of responding quickly to upcoming stimuli.

REGIONAL GREY MATTER VOLUME ABNORMALITIES IN EATING DISORDERS WITH BINGING SYMPTOMATOLOGY

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Descriptors: eating disorder

Functional neuroimaging studies have provided evidence for differentiation processing of food stimuli in patients suffering from binge-eating disorder (BED) and bulimia nervosa (BN). However, structural brain differences have not yet been investigated. Therefore, BED patients (n = 17), bulimic patients (n = 14), and normal-weight controls (NWC; n = 20) underwent structural MRI scanning. Grey matter volumes for specific brain regions involved in food/reinforcement processing were analyzed by means of voxel-based morphometry. Both patient groups were characterized by greater volumes of the medial orbitofrontal cortex (OFC) and the nucleus accumbens compared to healthy controls. BN patients showed greater lateral OFC volumes than BED patients. In BED patients, symptom severity was negatively correlated with insula volume. In BN patients, symptom severity showed a positive association with insula and lateral OFC volume. Altogether, our data implicate a general role of the brain reward system (medial orbitofrontal cortex (OFC) and the nucleus accumbens) as well as specific regional networks (medial OFC and lateral OFC) involved in the pathophysiology of eating disorders.

IMPULSIVITY-RELATED PREFRONTAL ACTIVATION DURING REWARD DISCOUNTING IS MODERATED BY COMT VAL158MET POLYMORPHISM

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Descriptors: delay discounting, impulsivity, dopamine

Delay discounting (DD) represents an important factor of impulsivity which is inherently connected with reward processing. Prefrontal structures that are reward delay (RD) sensitive, in particular the orbitofrontal cortex (OFC), are highly innervated by dopaminergic neurons. However, studies explicitly testing the trialic interplay of dopaminergic neurotransmission, impulsivity and brain activation during intertemporal choice are missing. Using functional near-infrared spectroscopy (fNIRS) we assessed prefrontal cortical activation upon immediate and delayed monetary rewards in 49 healthy volunteers with known differences in DD (behavioral assessment), and DA-bioavailability indicated by the genotype of the catechol-O-methyltransferase Val158Met polymorphism. We examined the interaction of individual DA bioavailability levels, impulsivity (DD) and neural RD sensitivity within the OFC. Our results demonstrated that DA-bioavailability moderates the association between impulsivity (DD) and neural RD sensitivity within the OFC. While neural RD sensitivity was reduced at low DA-levels (Val/Val) and entirely unrelated to impulsivity (DD), RD sensitivity increased at intermediate DA-bioavailability level (Val/Met) but was restricted to high impulsive subjects only. At high DA-level (Met/Met), neural RD sensitivity was existent across subjects, and decoupled from impulsivity (DD). These results suggest that increasing DA bioavailability enhances OFC functioning by incorporating coding ability for RD information.

CORRELATIONS BETWEEN WORRY TENDENCIES AND BRAIN ACTIVATION DURING AVERSIVE IMAGERY

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Descriptors: worrying, imagery, fMRI

Worrying, because of its abstract nature, might function as an avoidance response in order to cognitively disengage from fearful imagery. The present functional magnetic resonance imaging study investigated neural correlates of aversive imagery and their association with worry tendencies. Nineteen healthy females first watched and subsequently imagined pictures from two categories with positive and negative (worry related) content. Relative to the watch condition, both imagery conditions were associated with activation of the parietal cortex and the insula. Participants’ tendency to worry was negatively correlated with activity in these two brain areas. These areas are seen as crucial for the experience of vivid imagery. Furthermore, worrying was negatively correlated with anterior cingulate, dorsolateral, dorsomedial and ventrolateral prefrontal cortex recruitment. As these brain regions are involved in emotion regulation and memory retrieval, a lowered activity might be associated with cognitive disengagement from aversive imagery as well as an insufficient refreshment of mental pictures. The results encourage future imagery studies with extreme worriers suffering from generalized anxiety disorder.

NEURAL MEDIATORS OF WORKING MEMORY DEFICITS IN AUTISM SPECTRUM DISORDER

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Descriptors: autism spectrum disorder, fMRI, working memory

Relatively little research has been done to investigate differences in working memory (WM) in individuals with autism spectrum disorder (ASD) compared to non-ASD individuals, including the cognitive components that comprise WM. During event-related fMRI-scanning functional images were recorded while participants performed a delayed-response WM task wherein they encoded, retained, and retrieved either 2 or 6 letters (set size) from trial to trial. Participants completed full trials involving encoding 2 or 6 letters, maintaining them over a delay, and then deciding if a probe was included in the original letter-set (retention); and they completed partial-trials of encoding only, encoding and maintenance, and encoding, maintenance, and retrieval. Event-related fMRI methodology permits observation of neural activity during these separate WM-task components. Three-way ANOVA techniques were used to assess interactions between set size, task component, and group. The results indicated that in non-ASD individuals the lateral and medial prefrontal cortex (PFC) regions differentially responded to the 2- and 6-letter memory-sets over trial periods, showing greater responses to 6- than to 2-letter sets during encoding and maintenance. In individuals with ASD greater responses to 2- than 6-letter sets was observed. This result suggests that the PFC-based WM executive functions that mediate supracaudacy encoding and maintenance are less available to individuals with ASD.

DEFICIENT FRONTAL-STRIATAL-THALAMIC ACTIVITY DURING ATTENTION-TO-PREPULSE AND VISUAL-FLANKER TASKS IN SCHIZOPHRENIA

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Descriptors: schizophrenia, fMRI, startle eyeblink

Compared with healthy controls, schizophrenia patients show lower functional magnetic resonance imaging (fMRI) blood-oxygen-level-dependent response activation in frontal-striatal-thalamic (FST) circuitry during an attention-to-prepulse startle eyeblink modification (SEM) paradigm. This SEM paradigm involves hearing a series of attended, ignored, and novel tones that served as prepuces for an acoustic startle stimulus on some trials. Participants were instructed to count the number of longer-than-usual (8-s sec vs. standard 5-sec duration) tones of a particular pitch and simply ignore the other tones. Here, we compared FST glucose metabolism with FDG-PET in two separate cohorts of schizophrenia patients and healthy controls. One cohort performed the attention-to-prepulse SEM task (25 unmedicated schizophrenia patients and...
25 healthy controls) while the other cohort performed a visual attention flanker task, requiring attention to stimuli embedded in a background (19 unmedicated patients and 38 healthy controls). Patients had lower glucose metabolism in dorsolateral prefrontal cortex (DLPFC) which was most marked in Brodmann area 44, ventral caudate and mediofrontal nucleus (MDN), particularly during the SEM paradigm (Diagnostic Group x Task x FST area (DLPFC, caudate, MDN) × Region (DLPFC: BA44; 45; 46; Caudate and MDN: ventral, middle, dorsal) interaction, F(4,100) = 3.21, p = .02, Wilks). These results underscore the importance of FST integrity during both auditory and visual attention tasks and are consistent with our prior SEM fMRI work.

**Poster 144**

REWARD ANTICIPATION FOLLOWING MONETARY GAIN AND LOSS IN DEPRESSED AND HEALTHY YOUTH

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Descriptors: reward, depression, imaging

Reward anticipation appears to be altered in youth with depressive disorders. Decreased reward-related behavior is found following disappointment in depressed youth, which could indicate a difficulty with enhancing motivation following disappointment. In the present study, we examine the possibility that reward-anticipation-related brain function in the striatum is lower in depressed than in comparison youth following loss relative to following winning. Seven youth with diagnosed major depressive disorder and 7 comparison youth with no history of psychiatric disorder participated in a functional magnetic resonance imaging study on a 3T Siemens Allegra scanner that implemented a modified Tower of London cognitive planning paradigm. Group differences in BOLD response to anticipation of reward following winning and losing trials were examined within a striatal region of interest using SPM5. Preliminary analyses found less caudate activation in reward anticipation in depressed than in healthy youth in post-win (26 voxels; MNI coordinates -2,18,8; t = 2.94, p < .01) and post-loss (32 voxels; MNI coordinates -8,6,10; t = 3.05, p < .01) trials. Future analyses will examine additional differences based on task and diagnostic status. Depressed youth demonstrated reductions in striatal activation following both win and loss experiences. This suggests that reward anticipation deficits are found following loss and win in depression. Results also suggest that interventions for youth depressive disorders may benefit from including maintaining focus on rewards despite past outcomes.

**Poster 145**

THE INFLUENCE OF HEART RATE VARIATION ON TASK AND GROUP EFFECTS OF THE FMRI BOLD SIGNAL

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Descriptors: fmri, electrocardiogram, OCS

It has recently been demonstrated that fMRI signals during rest are strongly correlated with changes in heart rate. Such correlations may be expected because fMRI blood oxygenation level dependent (BOLD) signals from the brain reflect local variations in blood oxygenation as well as blood flow and blood volume. Since these heart rate/fMRI correlations are present in all parts of the brain they may form an important confound in activation studies where heart rate is modulated by the task, and in group studies where groups systematically differ in heart rate. To assess the impact of heart rate on task and group effects, we co-registered the electrocardiogram with event-related fMRI in 12 subjects with low and 12 subjects with high levels of obsessive compulsive symptoms (OCS) while performing a Tower of London cognitive planning paradigm. We confirmed significant effects of heart rate regressors on fMRI BOLD, as well as an influence of heart rate variation on simple task fMRI main effects as derived from the individual stimulus regressors. However, heart rate variability did not strongly influence higher level fMRI contrasts that test for increased fMRI signal during planning vs. no planning conditions and fMRI baseline vs. pupil diameter. However, pupil diameter was also not affected, despite higher heart rates in the subjects with high levels of OCS. Our findings indicate significant hemodynamic effects associated with heart beat variations during active task performance, which impact only mildly on task and group effects in the fMRI BOLD signal.

**Poster 146**

ALTERED FEEDBACK PROCESSING AND DECISION-MAKING IN PATIENTS WITH BORDERLINE PERSONALITY DISORDER

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Descriptors: feedback processing, decision-making, borderline personality disorder

Marked impulsivity is considered to be a core characteristic of borderline personality disorder (BPD) and has been shown to play a significant role in decision-making and planning. Despite the clinical relevance of decision-making in BPD, the number of studies investigating its neurophysiological correlates is still small. In the present study, decision-making was examined in BPD patients and matched healthy controls while performing a modified version of the Iowa Gambling Task (IGT) and electroencephalogram (EEG) was recorded. Although clinical impressions indicate that BPD patients show alterations in negative feedback perception, there are no event-related potential (ERP) studies investigating feedback processing in BPD patients. Hence, another concern was to examine performance monitoring in BPD by measuring the feedback-negativity (fERN) and the P300. The behavioral results suggest that BPD patients showed less advantageous and more impulsive choices on the IGT than did the healthy controls. ERP data revealed that patients with BPD showed diminished fERN amplitudes after negative feedback and fERN reduction was correlated with enhanced impulsivity. Attenuated fERN amplitudes might indicate that BPD patients show impaired performance monitoring and thus impaired adjustment to negative consequences. In contrast, patients with BPD showed increased P300-amplitudes after negative feedback which might indicate that patients pay special attention to negative events as negative events are associated with higher motivational significance and salience.

**Poster 147**

P50, N100, AND P200 SENSORY GATING DIFFERENCE SCORES MAP ONTO SPECIFIC FACETS OF THE PHENOMENOLOGY OF SENSORY GATING AS INDICATED BY SELF-REPORT QUESTIONNAIRE

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Descriptors: schizophrenia, senory gating

Sensory gating is a phenomenon whereby the second of two identical auditory stimuli occurring close together in time is associated with less neural activation than the first. In healthy participants, it is postulated that this significantly diminished ERP response to the second click (S2) relative to the first click (S1) indicates an ability to “gate out” redundant information. In the ERP literature, this observation is often quantified by subtracting the amplitude of the P50 at S2 from the P50 at S1 (S1-S2), with smaller values indicating poorer suppression of redundant information. It is widely reported that schizophrenia patients have low difference scores compared to healthy controls, and recently a significant relationship was demonstrated between these ERP indices of gating and scores on the Sensory Gating Inventory (SGI), a self-report questionnaire that assesses perceptual anomalies. In the present study, four factors that contribute to the total SGI score (Perceptual Modulation, Distractability, Over-Inclusion, and Fatigue & Stress Vulnerability) were independently correlated with ERP indices of sensory gating for 51 schizophrenia patients and 50 non-psychiatric controls. Perceptual Modulation and Fatigue & Stress Vulnerability correlated significantly with P50, N100, and P200 difference scores, whereas no such relationship existed with Distractability or Over-Inclusion. The results indicate that specific aspects of sensory gating, and not sensory gating in general, map onto the observed electrophysiological components commonly associated with this phenomenon.

**Poster 148**

PREADOLESCENTS’ SOMATIC AND COGNITIVE-AFFECTIVE DEPRESSIVE SYMPTOMS ARE DIFERENTIALLY RELATED WITH CARDIAC AUTONOMIC STATUS AND CORTISOL: THE TRAILS STUDY

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Descriptors: preadolescents’ depressive symptoms, cortisol, autonomic nervous system

Depression is a well-known risk factor for cardiovascular disease and mortality. Dysregulation of the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal (HPA-) axis have been proposed as underlying mechanisms. Several studies suggest that only a subset of the depression symptoms account for associations with cardiovascular prognosis. This study examined the possibility that somatic and cognitive-affective depressive symptoms are differentially related with the ANS and the HPA-axis in a large non-clinical sample of preadolescents. Self-reported somatic and cognitive-affective depressive symptoms were examined in relation to heart rate variability (HRV), spontaneous baroreflex sensitivity (BRS), and the cortisol awakening response (CAR) in 2049 preadolescents (mean age 11.1 years, 50.7 percent girls) from the general population cohort TRAILS. Physiological measurements were not associated with the overall measure of depressive symptoms. Somatic depressive symptoms were negatively related to HRV and BRS, and positively to the CAR; whereas cognitive-affective depressive symptoms were positively related to HRV and BRS, and negatively to the CAR. Associations with the CAR pertained to boys only. To conclude, somatic and cognitive-affective depressive symptoms differ in their association with both the
ANS and HPA-axis functioning in preadolescents. Particularly somatic depression symptoms may mark cardiac risk.

**Poster 149**

ELECTROPHYSIOLOGICAL ABNORMALITIES IN TRAUMATIZED CHILDREN WITH PTSD

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Descriptors: PTSD, trauma, children

Knowledge of electrophysiology and PTSD largely centers on studies of adult males with combat-related PTSD, as few studies have published data on this topic in youth. A recent review of adult data describes persistent hyperarousal, and exaggerated responses to startling sounds and trauma reminders (Pole, 2007). These include increased SCR, HRR and eyeblink reflexes to startling sounds and increased SCR, HRR, facial EMG responses to trauma-related cues (Pole, 2007). Though findings are mixed, studies of youth suggest similar patterns (e.g., Klonerman, Cichetti, Thatcher, & Ison, 2003; Ornitz & Pynoos, 1989). In addition, a recent review highlighted irregularities in information processing in individuals with PTSD (Karl, Malta, & Maercker, 2006). For example, data suggests that compared to controls, individuals with PTSD show greater P3 responses to threat-related distractors (Karl et al., 2006). Thus, individuals with PTSD appear to allocate more attentional resources toward processing trauma-related stimuli.

To examine potential electrophysiological abnormalities in traumatized youth with PTSD, we are currently measuring HRR, SCR, EMG, and ERP responses to threat-related stimuli and startling sounds in a sample of traumatized youth with PTSD and comparison control children aged 10 to 16 years. Currently, seven traumatized children and 10 matched controls have participated. Twenty-four in each group are expected. Though there is not adequate statistical power to conduct tests at this time, preliminary data suggest heightened physiological reactivity in the PTSD group.

**Poster 150**

ATTENTION BIASES IN SOCIAL ANXIETY AND DEPRESSION AS REVEALED BY EVENT-RELATED BRAIN POTENTIALS

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Descriptors: anxiety, EEG/ERP, depression

The study of common and distinct information processing biases in anxiety and depression is of great import to understanding the development, maintenance, and treatment of negative affective psychopathology. Research shows, for example, that social anxiety and depression are associated with different abnormalities in the allocation of attention to emotional information. Specifically, social anxiety seems to be associated with an early attention to and later avoidance of emotional faces while depression is associated with later elaboration on such stimuli. To further elucidate these processing distinctions between social anxiety and depression, patients and community recruited control subjects performed a modified version of the Eriksen Flanker task using emotional face stimuli (face flanker task) while event related brain potentials (ERPs) were measured. In support of hypotheses, results showed that distinct emotion face biases characterized social anxiety versus depression. Social anxiety was associated with early attention to and later avoidance of emotional faces as reflected in the stimulus-locked N1 and N2, and P3, respectively. Depression, on the other hand, was associated with an exaggeration of later emotional face processing as reflected in the response-locked error-related negativity. Implications of these findings for research and theory of information processing biases in social anxiety, depression and negative affective psychopathology more generally will be considered.

**Poster 151**

ANXIETY AND DEPRESSION DURING PREGNANCY: IMPACT OF STRESS ON MOTHER AND FETUS

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Descriptors: pregnancy, stress, fetus

Prenatal maternal stress is associated with severe effects on pregnancy outcomes and infant development. However, it is not well understood how mental disorders affect mother and fetus during pregnancy. The aim of the present study is to investigate psychophysiological stress reactivity in pregnant women with an anxiety disorder (AD) and/or major depression (MD) and the reaction of their fetuses. A sample of 62 pregnant women participated in a prospective study in which reactivity to a standardized stress paradigm (Trier Social Stress Test, TSST) was measured between 32nd–34th gestational weeks (self-reported stress, cardiovascular and fetal reactivity with computerized CTG were recorded). Using a standardized interview to diagnose psychological disorders (CIDI), three groups (clinical, subclinical and healthy control) were created. All groups felt significantly more stressed after the TSST.

**Poster 152**

EFFECTS OF THE TEMPORAL STAGE OF CUES AND THE FOCUS OF ATTENTION ON CUE REACTIVITY OF SMOKERS INVESTIGATED BY MEANS OF FMRI

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Descriptors: cue reactivity, nicotine addiction, attention

Stimuli associated with the beginning of the smoking ritual cause craving in smokers and activate neuronal structures related to emotion and motivation, learning and memory, attention, and cognitive control. Stimuli related to the end, however, lead to lesser craving and inhibit brain activation in the ventral striatum and the anterior cingulate cortex. Here we tried to replicate these findings and further elucidate the role of attention in cue reactivity by means of FMRI. Three groups of subjects, deprived smokers, non-deprived smokers and non-smokers, saw stimuli related to the beginning of the smoking ritual, stimuli related to the end of the smoking ritual and equivalent neutral control pictures. On all stimuli a geometric figure was superimposed that consisted of a circle with two small lines in it. Those lines were oriented either vertical or parallel to each other. The stimuli were presented for 300 ms. All subjects had to perform two tasks: they either had to state whether they saw a smoking picture or a neutral control picture (explicit attention) or they had to state whether the small lines of the geometric figure were oriented vertical or horizontal to each other (implicit attention). First results indicate a greater allocation of attention resources by stimuli related to the beginning of smoking, as indicated by reaction times and brain data. Stimuli related to the end of smoking, however, seem to have their inhibitory impact only in the explicit attention condition.

**Poster 153**

TRICK OR THREAT? DECISION-MAKING AND IMPULSIVITY IN PARKINSON’S DISEASE

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Descriptors: dopamine dysregulation, decision-making, SCR

It has been considered that dopaminergic drugs used in Parkinson’s disease (PD) reduce patients’ tendency to avoid bad choices that had harmed them in the past. This may manifest as addiction to L-dopa and behavioral disturbances associated with the impulse control system (Dopamine Dysregulation syndrome, DDS). Our aim was to investigate whether there was a relationship between the Iowa Gambling Task (IGT), skin conductance responses (SCRs) and psychometric evaluation (Barratt Impulsiveness scale, BIS 11) in non-demented DDS and non-DDS PD patients and in an age-matched social gambler control group (CG). In particular we expected that DDS PD patients would show a worse performance at the IGT associated with a lack of discriminatory anticipatory SCRs during the task. Methods: We investigated the performance at the IGT in DDS (n = 8) and non-DDS patients (n = 15) with PD and CG (n = 9) while SCR was recorded continuously. Results: 1) DDS PD patients demonstrated impaired decision-making on the IGT, compared to non impulsive PD and CG, F(2, 30) = 5,34; p = .010; 2) no differences emerged in SCRs; advantageous decks: F(2, 30) = 1,977; p = .156; disadvantageous decks: F(2, 30) = 208; p = .814 between groups, nor in BIS 11 between PD patients, F(1,18) = .79; p = .438. Conclusions: Dopamine medication may have a detrimental effect on decision-making ability. However, more research is necessary to find out remarkable decision-making difficulties in DDS-PD patients compared non DDS-PD patients and to the control group, but in these patients it does not appear related to autonomic activity.

**Poster 154**

DUAL DEFICIT IN PSYCHOPATHY: NEURAL CORRELATES OF PSYCHOPATHIC TRAITS WITHIN SOCIAL EXCHANGE

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Descriptors: psychopathy, emotion, social exchange

In the present study, we investigated neural correlates of psychopathic traits within the ultimatum game, where two players (a proposer and a responder) have to divide a sum of money in a single trial. If the responder accepts the offer made by the proposer, the deal goes ahead, but if the responder rejects the offer, neither player gets anything. Participants played the ultimatum game as a responder in two conditions to distinguish between emotional and behavioral responses to conflict. In the decision condition, they decided acceptance or rejection for offers. In the no-decision condition, they had no decision at all and simply watched what was going to happen. Results demonstrated negative correlations of primary psychopathy with...
activations of the right insula and the dorsal anterior cingulate for the contrast of the decision condition minus the control condition. It was also shown that secondary psychopathy was related to reduced activation of the ventromedial prefrontal cortex for the contrast of the decision condition minus the no-decision condition. These results suggest psychopathy is based on two separate dysfunctions. That is, primary psychopathy may be related to reduced experience of negative emotions in response to social norm violations. On the other hand, secondary psychopathy may be a dysfunction of behavioral control in conflicts.

**Poster 155**

NEURAL CORRELATES OF DECISION MAKING IN A SUBCLINICAL OBSESSIVE-COMPULSIVE SAMPLE

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Descriptors: decision making, obsessive-compulsive disorder

Cognitive models of OCD suggest that patients are characterized by uncertainty concerning their actions and decisions. Excessive monitoring of behavior and increased error detection contributes to obsessive behavior. Abnormal activation of prefrontal areas and basal ganglia have been proposed to be associated with abnormal performance monitoring in OCD. Here, we used functional magnetic resonance imaging to investigate neural correlates of decision making.

We used a parametric design with increasing levels of difficulty in healthy subjects with high versus low scores in an obsessive-compulsive symptoms questionnaire. The design allowed us to separate the decision making stage from the motor response. Results show increased activation of BA 8 with increased task difficulty in high vs. low obsessive-compulsive subjects during the decision making stage. During the motor response, high vs. low obsessive-compulsive subjects showed increased activation in the orbitofrontal cortex and basal ganglia. These findings indicate that, depending on the information processing stage, distinct neural circuits are associated with task difficulty and severity of obsessive-compulsive symptoms. Results are discussed within the context of current neural models of decision making and action monitoring in patients with OCD.

**Poster 156**

PRO- AND ANTI-SACCADES ELICITED BY VISUAL AND ACOUSTIC CUES – A COMPARISON BETWEEN CHILDREN WITH AND WITHOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

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Descriptors: ADHD, cross-modal, response inhibition

Children with ADHD have difficulties inhibiting reflexive reactions. One way to investigate inhibitory processes are anti-saccade tasks, during which participants are requested to suppress reflexive eye movements towards a stimulus (pro-saccade), and to direct the saccade in the opposite direction of the stimulus (anti-saccade) in relation to a fixation cross. The present study was a first step to determine the effect of stimulus modality (visual or acoustic cue) on saccades in children with and without ADHD. Sixteen children with ADHD and sixteen age- and gender-matched control children between 5 and 13 years participated in the experiment. Pro- and Anti-saccades were elicited by either (i) visual or (ii) acoustic cues. Conditions were randomly presented. Saccades were recorded during an electroencephalographic (EEG) measurement using a high-density 257-channel cap. Saccade onset and direction were analyzed. Group and condition differences were analyzed in repeated measures analyses of variance using Statistica version 6. Within both groups of children, (i) more errors were made and (ii) latencies were slower when saccade cues were auditory. Importantly, children with ADHD made more errors than control children when anti-saccades were triggered by an acoustic cue. This was not the case for visual cues. Saccadic control in children is dependent on the modality a stimulus is presented in. Response inhibition difficulties in children with ADHD are particularly prominent when saccade cues are auditory.

**Poster 157**

IMPAIRED RESPONSE INHIBITION IN OBSESSIVE-COMPULSIVE DISORDER: EVIDENCE FROM AN ANTISACCADE TASK

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Descriptors: obsessive-compulsive disorder, antisaccade, response inhibition

Clinical and empirical evidence suggests altered executive functions in patients with obsessive-compulsive disorder. The antisaccade task may be used to identify deficits in specific components, such as inhibition or initiation of an action, but recent studies yielded diverging results: either increased latencies of correct antisaccades or enhanced error rates were found. As the latter could either be due to an inhibition deficit or to a deficient volitional initiation of a saccade, the present study investigates antisaccades and simple volitional saccades (without inhibitory demands) under different stimulus conditions. Preliminary results suggest unaffected volitional saccade latencies, but increased error rates in the condition that increased the difficulty to inhibit an erroneous response. The results are discussed in terms of a response inhibition deficit. As the performance distribution of the patient group appears to be bimodal further analyses to characterize the impaired subgroup will be conducted.

**Poster 158**

DIFFERENTIAL CONDITIONING IN SPIDER PHOBIA: SUBJECTIVE, ELECTRODERMAL AND BOLD RESPONSES

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Descriptors: specific phobia, conditioning, fmri

Conditioning processes are believed to play an important role in the etiology and maintenance of anxiety disorders. Although the neural network underlying fear conditioning is understood in considerable detail, little is known about the neural processes mediating pathologic fear. This study was designed to examine the neural basis of aversive conditioning and related extinction processes in spider phobic subjects and healthy controls. Furthermore, we were interested in potential differences in conditionability in phobic subjects with disorder specific versus non-specific aversive unconditioned stimuli. Using a differential picture-picture conditioning approach we recorded conditioned subjective, electrodeural and BOLD responses. The conditioned stimuli (geometric shapes) were either paired with pictures of spiders, generally aversive scenes (e.g., of mutilations), or neutral objects (e.g., household items). Preliminary results show successful conditioning as indexed by subjective and electrophysiological responses. Regarding brain activity, the spider phobic subjects revealed overall stronger activations in response to the CS that was paired with the disorder-specific UCS as compared to the other reinforced CS in the anterior cingulate and the thalamus, among other regions. In sum, the results point to enhanced conditionability with disorder-relevant UCS in patients. Results will be discussed with a focus on therapeutic relevance.

**Poster 159**

EFFECTS OF COGNITIVE-BEHAVIOR THERAPY ON PERSEVERATIVE RESPONDING IN ALCOHOL DEPENDENT MEN AND WOMEN

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Descriptors: alcohol, therapy, impulsivity

Alcohol use disorders (AUDs) represent a major societal concern in terms of both physical and psychological well-being. Research to date has indicated that impulse control may be a critical factor in the development, maintenance, and treatment of AUDs. Recent data suggest that specific aspects of impulsivity may serve as important underlying mechanisms accounting for the behavioral changes associated with treatment. In the current study, men and women, ages 25 to 55, were recruited via advertisements for individuals seeking help for an alcohol problem. Each participant completed two lab assessments (pre- and post-treatment) and a 12 week cognitive-behavior therapy (CBT) program for AUDs. An auditory task designed to assess perseverative responding, a component of impulse control, was used to elicit the P300 pre- and post-treatment. Preliminary analyses indicate improved performance on the auditory perseveration task as well as an increase in P300 amplitude from pre- to post-treatment. Regression analyses indicated that fewer perseverative responses at pre-treatment were significantly associated with a greater number of completed treatment sessions. These initial findings provide support for the importance of impulsivity in treatment for AUDs as well as changes in impulse control as a product of cognitive-behavior therapy. It is anticipated that results from this study will better define the role of impulse control as a potential mechanism of behavioral change and inform the development of subsequent avenues of investigation on this mechanism in the treatment of AUDs.

**Poster 160**

THE ROLE OF THE STRESS RESPONSE IN PREDICTING THE COURSE OF SCHIZOPHRENIA

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Descriptors: schizophrenia, stress, cortisol

Despite the prominent role attributed to stress, its actual contribution to the expression and course of schizophrenia has yet to be clearly specified. This study sought to determine the relationship between the stress response and the course of
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VISUALLY-GUIDED AND VOLITIONAL SACCADE INITIATION IN SCHIZOPHRENIA

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Descriptors: schizophrenia, saccades, action control

Clinical evidence and neuropsychological tests suggest action control deficits in schizophrenia. Experimental eye movement tasks have proven particularly useful to investigate the underlying neuropsychological mechanisms. Recent studies showed increased latencies in various types of volitional saccades and normal latencies in visually-guided saccades, suggesting a fundamental deficit in the volitional initiation of action. The present study sought to further elucidate the underlying neuropsychological mechanisms by comparing saccades toward the onset of a visual target, saccades toward the offset of a visual target, and a task in that the volitional saccade (without a peripheral target) was instructed by the offset of a central fixation point. Contrary to expectations, saccade latencies of 30 schizophrenia patients and 30 matched healthy control subjects did not differ in any task. The failure to find increased latencies of schizophrenia patients in the volitional saccade task might relate to extinguishing the central fixation point, which was not done in previous studies showing increased latencies. We suggest that the proposed impairment in the volitional initiation of action might actually rely on a deficit in disengaging from a preceding activity.

Poster 162

MINDFULNESS INTERVENTION FOR FEMALE FIBROMYALGIA (FM) PATIENTS: DOES AN EIGHT-WEEK PROGRAM ALTER REAL-WORLD CARDIORESPIRATORY FUNCTION OR DAILY ACTIVITY?

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Descriptors: fibromyalgia, ambulatory monitoring, cardiorespiratory

FM is a disorder characterized by severe pain, fatigue and sleep disturbance, often associated with depression and emotional trauma. Causes and mechanisms remain unclear, and treatment difficult. In an earlier study, a mindfulness-based intervention (MBI) appeared to enhance self-reported well-being of female FM patients for up to 3 years post-treatment. Therefore, we performed an expanded, randomized controlled, 3-armed replication, in which an 8-week MBI was compared to wait-list and to another active intervention aimed to control for nonspecific effects of MBI. In addition to questionnaire data, ambulatory accelerometer and cardiorespiratory function were monitored among 139 female FM patients over 24-hour periods at 3 time-points; pre- and post-intervention, and 8 weeks later. Based on previous evidence of impaired cardiorespiratory dysfunction and daily activity among FM patients, we hypothesized that MBI would improve cardiorespiratory function and increase activity in comparison to controls. Three-axis activity, heart period (HP), respiratory sinus arrhythmia (RSA) and ventilation were measured. Although there were clear effects of time of day and time-point on many measures, effects of treatment were few. MBI, but no other arm, was associated with a small HP increase across time-points.

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THE RELATION BETWEEN ELECTROPHYSIOLOGICAL AROUSAL AND COGNITIVE-EMOTIONAL PROCESSING IN CHILDREN RECEIVING TRAUMA-FOCUSED COGNITIVE BEHAVIORAL THERAPY

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University of Delaware

Descriptors: PTSD, emotion, psychotherapy

Kazdin highlights that after years of research on psychotherapy efficacy, it is not yet clear how or why some of the most empirically supported treatments produce symptom change. Process research is vital to treatment development, as such information can “guide the next generation of research and inform clinical applications” (p. 878). The goal of process research is to understand what happens between the beginning and end of treatment. The current study applies process research techniques to examine change over the course of Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), a treatment for traumatized youth with PTSD. It is comprised of three phases: coping skills development, trauma narrative (exposure), and future goals and growth. Treatment session recordings are coded using an observational coding system (CHANGE) designed to capture theoretically important processes of therapeutic change. Factors of change include facilitating (e.g., processing) and inhibiting (e.g., avoidance) factors. Heart rate and non-specific skin conductance responses are measured during treatment sessions so as to examine the patterns of change in physiological reactivity across sessions and the relation between these patterns, change factors derived from coding, and treatment outcome. Seven children are currently enrolled. A total of 24 are expected. Preliminary data suggest a quadratic pattern, with greater reactivity occurring during the narrative phase and greater reactivity associated with more trauma processing and greater symptom reduction.

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DECREASED BRAIN ACTIVATION PRECEDING REMEDIAL ACTION AFTER NEGATIVE FEEDBACK STIMULI IN RECENT-ONSET SCHIZOPHRENIA

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Descriptors: schizophrenia, performance monitoring, remedial action

The brain response to feedback stimuli was studied in 20 healthy controls and 17 schizophrenia patients using fMRI. Only recent-onset patients were included, of whom 9 were medication-free, 7 received haloperidol and 1 received clozapine. Participants performed a time estimation task, in which they pushed a button whenever they thought that a cue was presented for 1 second. Feedback about their performance was given in the form of words (correct/incorrect) or emotional face expressions (happy/fearful). The percentage positive and negative feedback was kept at 50% by manipulating the interval in which the estimation was counted as correct. This interval was lengthened after an incorrect estimation and shortened after a correct estimation. Average interval length, a measure of estimation quality, was longer for patients than for controls. Percentage correct adjustments after negative feedback, a measure of cognitive flexibility, did not differ between groups and type of feedback. Negative feedback followed by a correct adjustment was accompanied by additional activation in the right middle frontal gyrus, the right inferior parietal lobe and the pre-supplementary motor area as compared to negative feedback followed by incorrect adjustments. The first two areas were significantly less activated in schizophrenic patients. We concluded that patients reacted adequately to feedback and tried to improve performance after negative feedback. However, the quality of adjustments was decreased which is possibly related to reduced activation in areas involved in cognitive control.

Poster 165

RESPIRATORY SINUS ARRHYTHMIA AS A PROXY MEASURE OF EMOTIONAL SENSITIVITY IN EATING DISORDERS: A PILOT STUDY

Eunice Y. Chen, Tanja Gazibara, Karla Fettich, Johnny Berona, James Roehrig, Hakeemah Cummings, & Michael S. McCloskey
The University of Chicago

Descriptors: eating disorders, RESPIRATORY SINUS ARRHYTHMIA

The study aim is to gather pilot baseline respiratory sinus arrhythmia (RSA) or vagal tone data in individuals with and without eating disorders (EDs) to see if there are differences between these two groups. RSA, which assesses the parasympathetic influence on heart rate, has emerged as a psychophysiological marker of emotional sensitivity. In adults, reduced baseline RSA has been associated with generalized anxiety disorder, panic, post traumatic stress disorder, depression, alcohol abuse, and schizophrenia compared with normal controls. The minimal work on RSA comparing ED samples to controls has yielded conflicting results. For this pilot study, 5 minutes of resting baseline cardiac data were gathered from 6 women with ED and 4 women without ED. Eating disorders were assessed by the ED Examination with 3/6 met full/partial bulimia nervosa criteria and 3/6 met full/partial binge-eating disorder criteria (DSM-IV). Spectral analysis was utilized to assess the vagal influences on cardiac activity. RSA values, expressed in units of log (beats/minutes squared/Hertz) for each individual in the ED group, were: 6.14, 5.92, 5.62, 6.04, 6.93, 5.96. Significantly lower high-frequency spectral power (i.e., attenuated RSA) was found in the individuals with ED (M = 6.04, SD = 0.72) compared to those without ED (M = 6.93, SD = 0.24), t(8) = 2.83, p = .03. This preliminary data suggests further examination of RSA in ED samples may be warranted.

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FRONTAL ALPHA ASYMMETRY AS A MODERATOR OF DEPRESSED MOOD INFLUENCE ON COGNITIVE TASK PERFORMANCE

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Descriptors: frontal alpha, depression, cognition

Frontal alpha asymmetry is often treated as an indicator of approach-withdrawal reactions, with an assumption that the left frontal regions are more active during the
experience of approach-related (i.e., positive) emotions and the right frontal regions are more active during the experience of withdrawal-related (i.e., negative) emotions. Davidson and his co-workers also noted that this asymmetry is also a stable trait, which could be treated as a marker of vulnerability to depression. In our experiment, we measured the EEG activity (64 channels) as well as a linear syllogism task in 14 depressed and 15 nondepressed participants. During solving syllogisms subjects had to infer about relations between presented elements; e.g., after presentations of three pairs of related objects: G > H; H > K; F > F; the subject was requested to answer questions concerning relationship between presented elements (so-called adjacent relations; e.g., H > K ? – and it was a measure of memory processes) as well as about relations between elements which were not presented (so-called two-steps relations, e.g., G > K ? and end point relations, e.g., G > F? – and it was a measure of ability to integrate information). We found significant differences between depressed and non-depressed participants in queries about two-steps and end-point relations but not in the adjacent relations. Then, we used a frontal alpha asymmetry indicator as an additional variable in analysis. Our results indicate that this factor could explain observable differences in cognitive functioning between depressed and nondepressed persons.

**Poster 167**

**COMORBID Autism Spectrum DISORDER AND ADHD: DIFFERENCES IN N2 AND P3 RESPONSES**

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1University of Miami, 2Yale Child Study Center, Yale University School of Medicine

Descriptors: autism, children, social and emotional competence

ADHD symptoms are considered core deficits in autism spectrum disorders (ASD); however, those with comorbid diagnoses are often excluded from studies with a desire to isolate ASD-specific characteristics. Given the overlap, this study compared ERP components of cognitive control (N2) and attention (P3) in higher functioning children with autism (HFA) with comorbid ADHD, specifically externalizing behaviors. Further analyses observe relations between N2 and P3 and individual differences in social and behavioral symptoms. A preliminary sample of 30 male HFA children between 8 to 16 years of age: twelve with clinically significant externalizing symptoms (HFA+) and eighteen without (HFA-). EEG was collected continuously as children completed a modified version of the Eriksen Flanker Task. N2 amplitude was analyzed at 200–450 ms and P3 was analyzed at 300–600 ms after stimulus onset at midline sites on correct trials. Dependent variables included parent report of ASD symptom severity (SCQ and SRS) and self- and parent-report measures of behavior (BASC-2). HFA+ children tended to have attenuated N2 responses on incompatible trials, F(1,28) = 3.18, p = .09. N2 and P3 latency and P3 amplitude did not differ between HFA and HFA+ groups. In the HFA+ group, larger N2 and smaller P3 amplitude responses predicted more perseverative behaviors. In contrast, larger N2 and smaller P3 amplitude responses predicted more social deficits and lower levels of personal adjustment in the HFA group. Results indicate different attention profiles and imply a need to further understand comorbidity in ASD.

**Poster 168**

**SENSORIMOTOR GATING DEFICIT IN CHILDREN EXPOSED TO A SINGLE TRAUMA**

Edward M. Ornitz, & Robert Pynoos

University of California, Los Angeles

Descriptors: PTSD, ppi of startled, children

In PTSD, symptom cluster D suggests deficient capacity to inhibit excessive cognitive, perceptual, affective and motor responses. This may reflect deficiency of sensorimotor gating, the capacity of nervous systems to protect stimulus processing from interference by motor excitation. Sensorimotor gating, measured as prepulse inhibition (PPi) of startle, is deficient in veterans exposed to combat who develop PTSD, but not in adult civilians exposed to single traumas. This study evaluates PPi in traumatized children in a way that can be contrasted with studies of adults. We compare PPi of startle in 25 children, 17 with DSM-IV criteria for PTSD, who had experienced a single traumatic event and 16 children, matched for age, without trauma history. PPi of startle is reduced in traumatized children; those who meet diagnostic criteria for PTSD have the greatest deficit. Hence, there is a significant linear contrast when children with PTSD (the least PPi), traumatized children without PTSD (greater PPi), and non-traumatized children (the greatest PPi) are compared (p = .024). Trauma per se induces disruption of sensorimotor gating; if PTSD develops, then this disruption is more severe. Children appear to be more vulnerable to the effects of trauma in that a single episode may induce lasting change; in contrast, in post-puberty individuals, chronic trauma may be necessary to produce the same effects.

**Poster 169**

**PSYCHOPHYSIOLOGICAL INDICATORS OF RESPONSE TO DRUG ADDICTION REHABILITATION TREATMENT**

Nuno F. Costa, Isabel B. Fonseca, Samuel Pombo, Ana Monteiro, Aleksandra Dziuba, & Teresa Costa

University of Lisbon

Descriptors: drug addiction, response to treatment, motivation

The relationship between craving, actual drug use, compliance to treatment programs and ERP indicators of attention and categorization were studied to identify objective correlates of clinical improvement. One control sample and two samples of opiate addicts in treatment (one group abstinent for more than six months, and the other group with present opiate use) were studied, examining subjective evaluation of craving, well being, and ERP indicators of motivation and emotion. Participants responded to stimuli a related or unrelated to drugs, and/or related to a particular valence (positive, neutral, negative). Stimuli were presented in an oddball paradigm, in pseudo-random sequences with equal category probabilities while EEG was recorded. Averaging and baseline correction were performed for each stimulus category. ANOVA repeated measures (with response to treatment as the between subjects factor and stimuli category as the within subjects factor) demonstrated significant results for LPP amplitude at Pz in response to the five stimuli categories, with distinct modulations in each of the patient samples. The pattern of results for the abstinent group was similar to that observed in the control sample of healthy participants. These results were also correlated with subjective intensity of craving and clinical response to treatment.

**Poster 170**

**EFFECT OF TIANEPTINE ON HIPPOCAMPAL GR EXPRESSION AND ANXIETY IN AN ANIMAL MODEL OF DEPRESSION**

Verónica Trujillo, & Marta M. Suárez

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Descriptors: depression, psychophysiology

Impaired glucocorticoid (GR) receptor function plays a key role in the pathophysiology of stress-related disorders such as anxiety and depression. Hippocampus is vulnerable to the effects of stress hormones, often increased in depressed patients; furthermore in this pathology there is less hippocampal GR expression than in healthy subjects. Tianeptine is a modified tricyclic antidepressant, which enhances serotonin uptake. Several animal models have been developed based on the relation between stress and depressive episodes. These models have been useful in studying the effects of antidepressant drugs. The aim of this work was to determine the effect of chronic treatment with 10 mg/Kg of tianeptine on anxiety and GR in the hippocampus, in an animal model of depression, Male Wistar rats were daily separated from their mother for 4.5 hours during the first 3 weeks of life, and were, as adults, submitted to variable chronic stress for 24 days (depression model). The Plus Maze test was performed in order to evaluate the anxiety index, and GR levels were determined by immunohistochemistry in the layers CA1, CA2, CA3 and Dentate Gyrus of dorsal hippocampus. Our results show that while the depressive state tends to increase anxiety, tianeptine shows an anxiolytic tendency. Besides, tianeptine tend to increase GR immunoreactivity in all layers. In conclusion, tianeptine shows an interesting tendency to revert stress-related alteration in the hypothalamic-pituitary-adrenal axis regulation and anxiety, although with a higher sample size, we would find statistically significant results.

**Poster 171**

**NEUROPHYSIOLOGICAL EFFECTS OF QIGONG EXERCISE PROGRAM ON DEPRESSED ELDERLY WITH CHRONIC MEDICAL ILLNESS**

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Descriptors: qigong, neurophysiologic pathways, depression

Regular qigong exercise could alleviate depression in elders. Preliminary results of a RCT to explore plausible neurophysiologic pathways underlying the anti-depressive effect of qigong are reported. Participants are randomly assigned to either an intervention or a comparison group. Intervention group participants practice Eight Section Brocades while comparison group participants participate in a therapist-led newspaper reading group for 12 weeks. Both groups receive psychological and physiological assessments at intake, on completion of the intervention, and follow-up after 1 month. Psychological assessments are conducted 6 weeks after the beginning of the intervention and follow-up after two months. Result: Twelve participants (eight experimental and four comparison) had completed the intervention and assessments. Scores of the depression scales suggested a trend that the experimental group subjects were less depressed compared with the comparison group subjects although statistical significance was not achieved. Similarly, the serum serotonin level of subjects in the experimental group had increased while the comparison subjects did not. The results on salivary cortisol and serum BDNG have yet to be reported. Conclusion: The results suggest that...
the anti-depressive effect of qigong exercise may be due to an increase of the brain serotonin similar to the action of anti-depressants such as SSRIs. Further directions along this line of research will be suggested.

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SERUM BUTYRYLCHOLINESTERASE EVALUATION IN WOMEN AND MEN WITH POSTPARTUM DEPRESSION

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Descriptors: butyrylcholinesterase, postpartum depression

The psychiatry literature shows that postpartum depression (PPD) is a psychopathology which can happen to 10–19 per cent of mothers, and 4 per cent of fathers during the PPD period (Morales et al., 2006; Pinheiro et al., 2006). The most frequent symptoms in this psychopathology are sleep and/or appetite disturbance, energy loss, guilty feelings, and carelessness with the newborn. Besides those factors there is impairment of attention, memory, and concentration. The information is not stored because attention is reduced, so the depressed patient complains about memory loss. Recent data show that cholinesterase has an important role in cognition and is involved in glial working, brain blood flux, and tau protein phosphorylation (Ballard et al., 2005). This study’s aim was to evaluate serum butyrylcholinesterase (BChE) activity in women and men with PPD. The research focused specifically on data from patients who make use of Brazilian Health Public System (BHPS). The data were from a transversal cohort study, composed of women and men who had prenatal attendance at BHPS, and who were registered in the Pelotas City Health Program. During the period of 30 to 90 days after the childbirth, data about social-demographic and health conditions were collected, as well as the depression evaluation (Edinburgh Postnatal Depression Scale). A second domiciliary visit happened one week later to collect blood samples; thereafter, the blood was centrifuged and the derived serum was stored to −20 degrees centigrade to dose the BChE according to Elmann’s method (Elmann, 1961).

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METHYLPHENIDATE AND SELF-REGULATION ARE COMPARABLE IN MODULATING THE P300 IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

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Descriptors: ADHD, ERP, response inhibition

ADHD is often treated with methylphenidate (MPH), but the long-term effects are unclear. This motivates investigating the efficacy of alternative treatment options. The present study compared the effect of MPH with the self-regulation strategy implementation interventions. In the MPH condition, 11 medicated children with ADHD and 16 controls were tested with and without medication. In the instruction condition, 13 unmedicated children with ADHD and 16 controls were tested with a neutral instruction and a self-instruction. The Go/NoGo task consisted of Go-stimuli requiring a button press. NoGo-stimuli started with a stop-sign indicating no response on the following trial. A 257-channel EEG material. Minimum norm source localizations were carried out to estimate the distribution of the sources of the evoked neuromagnetic activity in the first 300 ms of picture processing. Statistical analyses revealed an enhanced activation towards high arousing slides in parieto-occipital areas across all groups. However, compared to the other two groups, only PTSD patients showed an increased cortical reactivity to aversive pictures over right frontal areas already at 70 ms after stimulus onset. This very early hyperactivation suggests a rapid discrimination mechanism towards aversive cues which seems to be specifically related to PTSD symptoms rather than to depression. Results will be discussed within the framework of an assumed hyperresponsive fear network associated with PTSD which apparently can be activated not only by trauma related, but generally highly arousing aversive cues.

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FLASHING A SMILE: IS STARTLE SENSITIVE TO UNCONSCIOUS FACE PROCESSING?

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University of Missouri, Kansas City

Descriptors: startle reflex, unconscious processing

The unconscious induction of affect by emotional faces is typically studied using self-report and functional neuroimaging in conjunction with a visual backward masking paradigm. These studies find that self-report ratings and amygdala activation are modulated by the valence of the subliminally presented face. The purpose of this study was to determine whether the startle response is also sensitive to the valence of subliminally presented faces. Participants were randomly assigned to one of two groups: (1) a masked faces group where participants viewed emotional faces for 17 ms that were masked by neutral faces for 4983 ms or (2) a non-masked faces group where participants viewed the same emotional faces for 5000 ms without a neutral mask. Acoustic startle probes (50 ms, 105 dB SPL(A) white noise burst) were presented at lead intervals of 300 ms, 800 ms, or 3500 ms following the onset of the neutral face mask (masked faces group) or the emotional face (non-masked faces group). Analyses performed on data from 35 healthy undergraduate participants revealed that across the three different lead intervals, the startle response was modulated by both the conscious processing (non-masked faces group) and unconscious processing (masked faces group) of emotional faces. Overall, these preliminary results suggest that startle is sensitive to the unconscious processing of emotional faces and could be used in future studies to further investigate the unconscious processing of emotional stimuli.

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EARLY CORTICAL ACTIVATION TOWARDS AVERSIVE STIMULI IN PATIENTS WITH PTSD AND COMORBID DEPRESSION COMPARED TO PATIENTS WITH MAJOR DEPRESSION ONLY

Claudia Catani1, Hannah Adenauer1, Sonja Haas2, Steivan Pinoesch3, Julian Keil1, Hannah Aichinger1, Johanna Kessler1, & Frank Neuner1
1University of Bielefeld, 2University of Konstanz

Descriptors: MEG, affective stimulus processing, PTSD and depression

Posttraumatic stress disorder (PTSD) has been associated with an altered processing of trauma-related or threatening stimuli. However, the high comorbidity between PTSD and depression leads to the question whether these abnormal responses are specific for PTSD patients or whether they are also associated with affective disorders. In the present study, 25 patients with severe and chronic PTSD and comorbid depression, 13 patients with a diagnosis of major depression, and 16 healthy subjects participated in a visual evoked magnetic field study using flickering pictures of varying affective valence as stimulus material. Minimum norm source localizations were carried out to estimate the distribution of the sources of the evoked neuromagnetic activity in the first 300 ms of picture processing. Statistical analyses revealed an enhanced activation towards high arousing slides in parieto-occipital areas across all groups. However, compared to the other two groups, only PTSD patients showed an increased cortical reactivity to aversive pictures over right frontal areas already at 70 ms after stimulus onset. This very early hyperactivation suggests a rapid discrimination mechanism towards aversive cues which seems to be specifically related to PTSD symptoms rather than to depression. Results will be discussed within the framework of an assumed hyperresponsive fear network associated with PTSD which apparently can be activated not only by trauma related, but generally highly arousing aversive cues.

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ANXIOUS RESPONSE TO PREDICTABLE AND UNPREDICTABLE AVERSIVE EVENTS IN CHILDREN

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National Institute of Mental Health

Descriptors: startle, anxiety, predictability

Previous research highlights the importance of discrimination between predictable and unpredictable aversive events in studies of both clinical anxiety and anxiety as a trait in general population samples (Grillon, 2008). While signaled (predictable) threat leads to phasic fear, unsignaled (unpredictable) threat evokes sustained levels of anxiety. However, since the stimulus needs to be sufficiently aversive to elicit anxiety to unpredictable events, studies in children are especially challenging. We investigated the startle reflex in children in three conditions, predictable (P) and unpredictable (U) aversive events, and no aversive events (N). In each condition, an 8 second duration cue was presented several times. The aversive events, an air-blast to the neck and a scream accompanied by a picture of a frightened woman, were delivered signaled by the cue in the P condition and randomly in the U condition. Startle reflex was measured within the N, P, and U conditions during the cues and in their absence. Preliminary data (N = 8, Mean Age = 14.5 SD = 1.64) show robust fear-potentiated startle to the threat cue in the P condition, t(7) = 4.28, p = .004. More important, startle increased linearly from the N to the P to the U condition, F(1, 7) = 5.89, p = .046, suggesting that unpredictable aversive events can evoke a sustained state of anxiety in children. This paper will present a description of the experimental paradigm and the results of this experiment by age, gender and state/trait anxiety.

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OPTIMISM MODULATES HABITUATION OF THE STARTLE REFLEX IN PTSD REMITTED INDIVIDUALS

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Descriptors: startle, PTSD, optimism

Subjects with post-traumatic stress disorder (PTSD) show increased physiological reactivity and attenuated habituation to startle tones. Resilience is defined as a personality characteristic that moderates the negative effects of stress and promotes adaptation. Previous studies suggest that positive emotion related traits such as optimism are associated with resilience to stress. We investigated whether subjects who develop PTSD after accident related serious injury show lower optimism values, stronger physiological reactivity and less habituation to startle tones compared to resilient subjects. We compared
10 subjects who fulfilled DSM-IV criteria for PTSD or 6 months after injury but were remitted at the time of the study (PTSD-remitted) with 10 subjects who did not develop PTSD after injury and had no other psychiatric condition (PTSD- resilient). Fifteen 95-dB, 50 ms white noise startle probes were presented binaurally with variable intervals ranging from 27 s to 52 s. Startle response magnitude was assessed as peak EMG activity of the left musculus orbicularis oculi. Preliminary analyses indicate a significant effect of time and time X optimism, and a trend for time X group. PTSD-remitted subjects showed lower optimism values, and their reaction and habituation to startle tones was negatively modulated by optimism. Results indicate that remitted PTSD patients still show physiological responses similar to PTSD patients and suggest an indirect role of optimism in resilience.

**FILTERS FOR OPTIMAL SMOOTHING OF THE STARTLE EYEBLINK EMG RESPONSE**

Anton van Boxtel
Tilburg University

Descriptors: startle reflex, eyeblink

Based on studies in other muscles, it may be assumed that the mechanical effects (force and velocity) of the orbicularis oculi startle reflex are determined by the size of the integrated EMG response (area-under-the-curve). In many eyeblink studies, however, an alternative method for quantifying the EMG response is used, that is, measuring the peak value of the smoothed (low-pass filtered) rectified EMG signal. I compared the performance of different smoothing filters, correlating peak value with area-under-the-curve. In 15 healthy subjects, 50 acoustic blink reflexes were elicited at irregular intervals (15–20 s) while they were looking at an animation coupled with their eyes fixated on the center of the screen. Trials with artifacts were removed and no more than 5 zero responses were tolerated. The output of 34 different filters was compared. The results can be summarized as follows: (1) When using a first-order resistor-capacitor filter, the mean intra-individual correlation increased from .86 to .97 when the time constant was increased from 5 to 100 ms. (2) When using a finite impulse response (FIR) filter with a rectangular (boxcar) window, the mean correlation increased from .79 to .99 when the number of filter coefficients was increased from 5 to 101, but it dropped to .59 when using a filter with 201 coefficients. (3) When using a FIR filter with a Hamming window, the mean correlation increased from .84 to .99 when the low-pass cutoff frequency was lowered from 60 Hz to 5 Hz, irrespective of the number of filter coefficients (being 101, 201, or 501).

**MATURATION OF PPI IN CHILDHOOD COMPARED TO PPI IN ENURETIC CHILDREN: NEW ASPECTS ON THE CLASSIFICATION OF ENURESIS**

Julia Meir1, & Paul Eggert2
1University of Leipzig, 2University Clinics of Schleswig-Holstein

Descriptors: central reflex control

Background: It is known that the central reflex control measured by the prepulse inhibition of the startle reflex (PPI) in children differs from that in adults. It matures during childhood. And children who suffer from enuresis have a lower level of central reflex control. Objective: To examine the maturation of PPI in children and compare it with the PPI of enuretic children. Methods: 142 healthy children (67 girls, 64 boys), aged from 3 - 10, and 30 children with enuresis divided into the two major types (11 with monosymptomatic, 19 with non-monosymptomatic enuresis) were examined. The initiation of the startle-reflex (PPI) was initiated by a 60 ms earlier applied tone (prepulse) and was measured by the EMG of M. orbicularis oculi. Results: The PPI matures until the age of 10. There is a significant difference in the PPI-level between both enuretic groups (p = .0002). Only those children who report daytime-incontinence and bedwetting (non-monosymptomatic type) differ from normal controls. Discussion: These findings confirm that central reflex control mechanisms mature during childhood. They also acknowledge a central genesis of enuresis, but only in those children who suffer from non-monosymptomatic enuresis (nnmE). Wetting day and night was supposed to be two different diseases. This findings indicate that it is caused by one pathophysiologic mechanism: lower central control over the bladder-reflex.

**INHIBITORY PROCESSING DEFICITS REFLECTED BY EVENT RELATED POTENTIALS DURING THE EVENING ARE RELATED TO GREATER AROUSABILITY DURING THE NIGHT IN INSOMNIA PATIENTS**

Aisha Corroos, Elke De Valck, & Raymond Cluydts
Vrije University of Brussels

Descriptors: insomnia, hyperarousal

The neurocognitive perspective posits that hyperarousal and impaired information processing are characteristics of insomnia. In the present study auditory event-related potentials (ERPs) were evaluated in the evening and analysis of the cyclic alternating pattern (CAP) during sleep, a measure of operational activity of the brain while producing consolidated sleep, was performed to assess hyperarousal in insomniacs and good sleepers. Thirteen insomnia patients diagnosed according to DSM-IV criteria with polysomnographically confirmed sleep disruptions and eleven good sleepers were included. An auditory oddball paradigm was administered the evening of the polysomnography and N100 and P200 mean amplitudes and peak latencies at Fz and Cz were analyzed. After standard sleep scoring, CAP analysis was performed. CAP time and CAP rate were the primary outcome variables. Insomnia patients were characterized by decreased P200 amplitudes, especially at Fz, and increased CAP time and CAP rate compared to the control group of good sleepers. Within the insomnia group, P200 amplitudes correlated negatively with CAP time and CAP rate. The insomnia patients of this study were characterized by impairment of inhibitory information processing, reflected by decreased P200 amplitudes, which in turn was related to the increased effort of the brain to produce consolidated sleep, namely heightened CAP time and rate. This result suggests that a deficit in de-arousal during the evening is related to the higher arousability of the brain during the night in order to preserve sleep architecture in insomnia.

**LOW-INTENSITY LIGHT AND THE RESTORATIVE EFFECT OF SLEEP**

Elke De Valck1, Johan Wyts1, Nathalie Pattyn1, Marie Vandekerckhove1, Daniël Berckmans2, Bart Haex3, Johan Verbraecken1, & Raymond Cluydts1
1Vrije University of Brussels, 2Catholic University of Leuven, 3Antwerp University Hospital

Descriptors: low-intensity light, sleep microstructure

In relation to sleep, light has mostly been studied with regard to its impact on the circadian pacemaker. However, the impact of light at low intensity levels, widely present in everyday life, is not covered in these studies, as it does not influence the suprachiasmatic nucleus. Here, we focus on the influence of light with an intensity of 40 lux or less during the night on the restorative potential of sleep. Twenty-eight healthy sleepers, aged 23 ± 4.4 y, spent three nights of 8 hours time in bed in the sleep laboratory: adaptation, reference and light induction. For the light induction, light with an intensity ranging from 0.1 L to 40 L was administered during sleep for 5 minutes at 30 minute intervals. Questionnaires on mood (Profile of Mood States (POMS)) and sleep (Stanford Sleepiness Scale (SSS)) were administered in the evening and morning. During the night, polysomnography was performed. Friedman ANOVA's indicated a significant difference between conditions for SSS scores.

**EFFECTS OF VIEWING AFFECTIVE PICTURES ON NIGHTTIME SLEEP: LATENCY TO NON-REM SLEEP STAGES**

Toshihiko Sato
Tohoku Bunka Gakuen University

Descriptors: non-REM sleep, affective pictures, EEG

This study aims to determine the effects of emotion elicitation on the latency of non-REM sleep stages in healthy participants by using polysomnographic recordings. The participants were five women and four men. Sixty different pictures drawn from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005) were
used to elicit emotions. There were 20 pleasant, 20 neutral, and 20 unpleasant pictures. All the participants underwent four full-night polysomnographic measurements in a sleep laboratory. After the measurement on the first night, the adaptation night, one of the three picture-viewing tasks—viewing pleasant, neutral, or unpleasant pictures and rating them after viewing each one—was randomly assigned for the second, third, or fourth night. The participants engaged in one of the three tasks before bedtime on these three nights. Polysomnographic recordings for 8 hours commenced at 2400, at which time all the lights, except an emergency fluorescent light bulb, were turned off. The polysomnographic measurements obtained after the picture-viewing tasks revealed that latencies from the time when the lights were turned off to sleep stages 2 and 3 were significantly longer after the pleasant picture-viewing task than after the neutral picture-viewing one, and the latency to sleep stage 3 was also significantly longer after the unpleasant picture-viewing task than after the neutral picture-viewing one. The results indicate that the application of pleasant or unpleasant stimuli prior to bedtime extends the latency to deep sleep stages.

**CLUSTERED POSTER SESSION #4**

**EMOTIONS ON OUR MIND: THE ROLE OF EMOTION REGULATION AND SELF-REFERENCE FOR EMOTIONAL REACTIVITY AND EMOTION PROCESSING**

Chair(s): Beate M. Herbert1, & Olga Pollatos2
1Eberhard-Karls-University Tübingen and University Hospital Tübingen, 2Ludwig-Maximilians-University Munich

Descriptors: emotion regulation, self-reference, alexithymia

One of life’s great challenges is successfully regulating emotions. Although definitions of emotion regulation can vary substantially across studies, broadly defined, this construct refers to the processes by which one influences how, when, to what degree, and which emotions he or she experiences and expresses. Alexithymia comprises a deficit in one’s ability to identify and describe one’s feelings. It is associated with externally oriented thinking, and seems to be closely related to altered recognition and regulation of emotions. This construct constitutes a potential model for understanding how emotion regulation may mediate emotional processing and reactivity. Furthermore recent studies demonstrate that self-reference, that is whether stimuli are experienced as related to “our self”, modulates emotional reactivity and reactivity. The contributions to the posters work on this topic by applying different methodological approaches.

**EMOTIONAL HYPER- OR HYPOREACTIVITY IN ALEXITHYMIA? CLUES FOR ALTERED EMOTION REGULATION STRATEGIES DURING EMOTIONAL PICTURE VIEWING**

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It has been suggested that conscious awareness of emotions is integral to the ability to successfully regulate emotions and that deficits in this area may manifest as altered automatic arousal and poor health outcomes. Regarding alexithymia there have been different approaches favoring either hypo- or hyperarousal towards stress and/or emotional stimuli in persons with high degrees of alexithymia (HDA). Recent evidence suggests that alexithymia is associated with deficient emotion recognition and poor emotional reactivity. The aim of this study was to examine whether alexithymia is associated with altered strategies of emotion regulation, possibly going along with hyper- or hyporeactivity of automatic reactivity toward emotional stimuli. To test this, heart rate, heart rate variability (FFT) and pre-ejection period (PEP) were measured while participants with HDA and persons with low degrees of alexithymia (LDA) viewed emotionally aversive, positive and neutral pictures. Additionally, subjective emotional experience, subjective tendencies of approach and avoidance and voluntary viewing time were analyzed. Participants with HDA demonstrated less heart rate deceleration and vagal reactivity as well as shorter voluntary viewing times, especially toward aversive slides. The results support a deficit in emotion processing in persons with HDA, which is associated with tendencies of avoidance.

**SELF-REFERENCE MODULATES THE PROCESSING OF VERBAL EMOTIONAL STIMULI**

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At present, a growing body of literature demonstrates that explicit self-referential evaluation of emotional stimuli influences and modifies the way emotional stimuli are processed. The current study investigated whether self-reference is capable to alter emotional processing when subjects are not explicitly instructed to evaluate emotional stimuli for their self-reference. To test this, we measured event-related potentials (ERPs) while subjects viewed a series of emotional and neutral nouns paired either with the possessive pronoun “my” indicating “self-reference” (the “my”) devoid of meaning. ERPs showed facilitated processing of emotional, particularly unpleasant nouns at early as well as later processing stages, especially in conditions where nouns were preceded or presented together with the possessive pronouns. The results suggest that self-reference triggered by possessive pronouns facilitates spontaneous cortical processing of emotional, particularly unpleasant stimuli. This supports theoretical views according to which self-reference acts as a first selective filter emotional content has to pass through to merit further processing.
class and on the dynamics of lexical access. The second poster will demonstrate distinct influences of emotional valence (positive, negative, neutral) and emotional arousal (high, low) on ERP components and peripheral indicators. How EPN and LPC effects to angry and neutral faces can be modulated by different task demands and, further, by different static or dynamic presentation modes, will be the topic of the third and fourth posters.

**Poster 188**

EMOTIONS IN WORD AND FACE PROCESSING: RECENT EVIDENCE FROM ERPS AND PERIPHERAL INDICATORS

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The presentation will provide a short review about recent evidence of emotion effects in ERP components (early posterior negativity, EPN, and late positive complex, LPC) and peripheral parameters as skin conductance responses (SCRs) and facial muscle activity from different studies in the word and face domain. Against this background, we will summarize previous and recent findings of our group that explicitly motivated the studies in the following presentations. Here, we will focus on the question under which boundary conditions emotional processing depends on the availability of central resources and specific factors such as word frequency. Importantly, EPN effects are more pronounced in emotional than faces, but show similar scalp distributions and are independent of the level of processing. Moreover, the EPN to angry faces appears to benefit from the withdrawal of central resources by an additional task. In contrast, LPC effects are modulated by a variety of different factors and depend on specific task demands. Furthermore, these late emotion effects to words and faces show similar latencies but different scalp distributions, indicating contributions of domain-specific brain systems. Our results indicate both ERP components to reflect different mechanisms of emotional processing.

**Poster 189**

EFFECTS OF EMOTION IN WORDS ARE LOCALIZED IN POST-LEXICAL PROCESSING STAGES

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Recent studies have shown that emotional valence influences visual word processing. However, it still remains mostly unclear, during which processing stage the emotional valence of written words is activated. The aim of the present study was to localize emotion effects in different word classes and their dependency on word frequency. Twenty subjects performed a lexical decision task on single German adjectives, nouns, and verbs of high or low word frequency and of positive, negative, or neutral valence. Event-related potentials (ERPs) were recorded at 57 electrodes. An early emotion effect appeared after 270 ms of stimulus onset and showed a scalp distribution resembling the early posterior negativity (EPN), a component which is usually associated with attention allocation to emotional stimuli. Interestingly, this EPN was more pronounced for positive and negative nouns than for emotional verbs. Positive adjectives, on the other hand, elicited enhanced EPN amplitudes as compared to negative adjectives. Most importantly, EPN effects started only after the differentiation between ERPs to words and pseudo-words (indicating lexical access), and were not modulated by word frequency. Together the results indicate the effect of emotional valence of single words to be distinguishable for words of different classes, and to be localized in post-lexical processing stages.

**Poster 190**

EMOTION IN WORD PROCESSING: VALENCE AND AROUSAL IN EVENT-RELATED BRAIN POTENTIALS AND PERIPHERAL INDICATORS

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There is evidence from both central and peripheral psychophysiological parameters that emotional stimuli involuntarily draw (attentional) resources in the service of preferential processing. Most of these studies employ a two-dimensional model that describes emotions as a U-shaped function of emotional valence and arousal. In event-related potentials (ERPs), emotional, high-arousing words typically elicit both an enhanced early posterior negativity (EPN) and late positive complex (LPC). However, as yet, there is little direct evidence about the specific contributions of the two emotional dimensions to these ERP effects. The present study assessed unconfounded comparisons of stimuli varying in just one of the two dimensions of valence and arousal and therefore aimed to disentangle the effects of both dimensions. Participants performed a lexical decision task on emotional and neutral single words while ERPs, activity of facial corrugator and zygomaticus muscles, electrodermal activity, and pupil responses were recorded, allowing for a multilayered picture of emotional responses. Results show differential effects of both valence and arousal, for the latter even in case of neutral words, that is, in the absence of emotional valence.

**Poster 191**

BETWEEN PASSIVE VIEWING AND EMOTION DECISIONS: HOW AUTOMATIC IS EMOTIONAL FACE PROCESSING?

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Faces provide a direct source of emotional information, caused by their high biological and social relevance. Thus, their processing is suggested to be automatic, that is, independent of specific (cognitive) tasks demands. In the present study, we realized a direct within-subject comparison of emotion effects in event-related potentials (ERPs) and corrugator muscle activity in varying tasks on angry, happy, and neutral faces. In general, emotional ERP effects to angry faces were enhanced as compared to happy faces in all tasks. The early posterior negativity (EPN) appeared earlier (after 150 ms) and the late positive complex (LPC) was elicited only for explicit emotional expression decisions as compared to all other tasks. Interestingly, EPN amplitudes to angry faces were most pronounced when participants viewed the faces without any instruction as compared to both superficial word-face-discriminations and if attribution should be paid to the emotional expressions. Weakest EPN effects were elicited in gender decisions, possibly reflecting enhanced task demands which might reduce emotion effects. Further evidence for this impression was provided by an enhanced corrugator activity also to neutral and happy faces in this task. Together, these finding indicate a direct impact of cognition on the processing of emotional aspects in faces.

**Poster 192**

EFFECT OF FACE MOTION ON EMOTIONAL EXPRESSIN Recognition: An ERP Study

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Most studies on emotional facial expression recognition have used static pictures as stimuli. However, movements of the face might be especially relevant for communicative and emotional aspects of social interaction. Here, we investigated how emotional expression interacts with facial motion, and how these variables affect the typical ERP components elicited by emotional face stimuli: N170, early posterior negativity (EPN), and late positive complex (LPC). ERPs were recorded from 57 electrodes in 21 healthy students. Stimuli consisted in pictures of faces that differed in emotional expression (neutral, angry, or happy) and in presentation mode (static or dynamic). Reaction times (RTs) were significantly shorter for dynamic than for static faces; error rates were significantly diminished for dynamic positive faces, as compared with static ones, confirming previous research showing that dynamic presentation improves emotional expression recognition. Neither amplitude nor the latency of the N170 was affected by emotional expression or by facial movement. The EPN and the LPC components were strongly increased and prolonged for dynamic trials. Moreover, emotion and movement interacted within both EPN and LPC time windows. Therefore, dynamic faces seem to increase reflexive attention, represented by the EPN, and enhance the analysis of the emotional expression. This enhanced attention will lead to a more elaborative processing and conscious recognition of the emotional expression, as reflected in the augmented LPC effect.