

PSYCHOPHYSIOLOGY

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Society for Psychophysiological Research
Abstracts for the Fifty-Fifth Annual Meeting
Westin Hotel, Seattle, Washington, USA
September 30-October 4, 2015

Introduction and Speakers	S1
Panel Discussion Abstracts	
<u>Wednesday, September 30, 2015</u>	
Panel Discussion 1: Altered States: Undergraduate-Driven EEG/ERP Research on Attention, Cognition, and Emotion	S2
<u>Friday, October 2, 2015</u>	
Panel Discussion 2: Psychophysiology Measures in Women's Health Research: Challenges and Creative Solutions	S3
Flash Talks	
<u>Friday, October 2, 2015</u>	
A Focus on Early-to Mid-Career Psychophysiolgists	S4
Invited Symposia Abstracts	
<u>Friday, October 2, 2015</u>	
Invited Symposium 1: Toward A Mechanistic Approach to Mindfulness Meditation Training	S6
Invited Symposium 2: A Multi-Faceted Electrophysiological Lens on the Dynamics of Language Comprehension	S6
Symposia Abstracts	
<u>Thursday, October 1, 2015</u>	
Symposium 1.1: Brain Stimulation to Enhance Processing of Pleasant Stimuli: Evidence Across Two Methods and Three Measures	S8
Symposium 1.2: The Cognitive Neuroscience of Working Memory: Dynamics of Attention, Distraction, and Interference	S8
Symposium 1.3: Mobile Brain/Body Imaging (MOBI), A New Field of Psychophysiological Research	S9
Past Presidents Symposium 2.1: The Present as the Past's Future: Past Presidents Panel	S10
Symposium 2.2: Transdiagnostic and Disorder-Specific Processes in Anxiety and Depression: Evidence from Psychophysiology	S11
Symposium 2.3: Affective Neurolinguistics: How Emotion Modulates Basic Language Processing	S12
Symposium 3.1: Adaptive Control: Neurocomputational Substrates and Implications for Neuropsychiatric Disease	S13
Symposium 3.2: Auditory Predictions Induced by Extracted Sensorial Rules and by Intentional Actions	S14
Symposium 3.3: Equal, But Not the Same: Why Participant Diversity Matters in the Study of Physiology-Behavior Associations	S15
<u>Friday, October 2, 2015</u>	
Symposium 4.1: Using Biobehavioral Profiles to Decrease Heterogeneity, Improve Specificity and Prediction of Risk	S16
Symposium 4.2: Brain Systems for Action Perception in Understanding Co-Speech Gesture and Signed Languages	S17
Symposium 4.3: Midline Frontal ERPS and Theta Phase Alignment	S18
<u>Saturday, October 3, 2015</u>	S19
Symposium 5.1: Potential Mechanisms for the Development and Maintenance of Threat Sensitivity in Anxiety	S19
Symposium 5.2: Psychophysiological Research in China and Japan	S20
Symposium 5.3: Emotion and Language in Interaction – Why and How Context Matters	S21
Poster Session Abstracts	S23
Index to Abstract Authors	S127
Index to Abstract Descriptors	S133

PSYCHOPHYSIOLOGY

THE INTERNATIONAL JOURNAL OF THE SOCIETY FOR PSYCHOPHYSIOLOGICAL RESEARCH

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Fifty-Fifth Annual Meeting of the Society for Psychophysiological Research

Westin Hotel, Seattle, Washington, USA

September 30–October 4, 2015

Website: www.sprweb.org

The 2015 Annual Meeting Program includes three Pre-Conference Workshops, three Invited Addresses, two Invited Symposia, the SPR Presidential Address, two Panel Discussions, eight Flash Talks, and one Early Career Award Address. Specific research topics will be covered in the Symposia. The majority of the research reports will be discussed at four Poster Sessions.

This Supplement contains the abstracts from each presentation in the Symposia, Panel Discussions, Flash Talks, and Poster Sessions. The abstracts are listed in the order in which they will occur at the Annual Meeting.

All authors are listed in the Index to Abstract Authors. In addition, abstract topics are listed in the Index to Abstract Descriptors.

We would like to thank all contributors for sharing their research and making this meeting a rich and stimulating event!

Christine L. Larson
2015 Program Committee Chair

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Pre-Conference Workshops

Wednesday, September 30, 2015

9:00 A.M.–5:00 P.M.

Pre-Conference Workshop #1
Brainstorm EEG/MEG Analysis Toolbox
Stephan Moratti & Javier Gonzaless-Rosa

9:00 A.M.–4:00 P.M.

Pre-Conference Workshop #2
Multilevel Modeling
Elizabeth Page-Gould

9:00 A.M.–5:00 P.M.

Pre-Conference Workshop #3
Consumer Grade Psychophysiology
Greg Siegle & Julian Thayer

Invited Addresses

Thursday, October 1, 2015

1:15 P.M.–2:15 P.M.

Invited Address
Remembering the Past and Imagining the Future: Functions of Episodic Simulation
Daniel L. Schacter, PhD
William R. Kenan, Jr., Professor of Psychology, Department of Psychology, Harvard University, Cambridge, MA

Friday, October 2, 2015

9:15 A.M.–10:15 A.M.

Invited Address
The Restless Brain: How Intrinsic Activity Organizes Brain Function
Marcus E. Raichle, Sr., MD
Professor of Radiology, Neurology, Neurobiology, Biomedical Engineering and Psychology, Washington University School of Medicine, St. Louis, MO

5:30 P.M.–6:30 P.M.

Invited Address
Relationships and Stress Buffering in Human Development
Megan R. Gunnar, PhD
Regents Professor and Distinguished McKnight University Professor of Child Development at the Institute of Child Development, University of Minnesota, Minneapolis, MN

Early Career Award

Saturday, October 3, 2015

10:30 A.M.–11:00 A.M.

Context counts: Context-Dependency of Face Processing as Reflected by Large-Scale Electrophysiology
Matthias Wieser, PhD
University of Würzburg

Presidential Address

11:00 A.M.–12:00 noon

Individual Differences in Affective Reactivity
Karen S. Quigley, PhD
Research Associate Professor, Department of Psychology, Northeastern University, Boston, MA

PANEL DISCUSSION ABSTRACTS

WEDNESDAY, SEPTEMBER 30, 2015

5:30 P.M.–7:00 P.M.

Panel Discussion 1

**ALTERED STATES: UNDERGRADUATE-DRIVEN
EEG/ERP RESEARCH ON ATTENTION, COGNITION,
AND EMOTION**

Chair: Jeffrey J Sable, Christian Brothers University
Discussant: Victoria A Kazmerski, Pennsylvania State University Erie

This structured panel discussion will highlight research by students and faculty at primarily undergraduate institutions. Undergraduates from four psychophysiology laboratories will present research findings that emphasize the use of electroencephalography (EEG) and event-related brain potentials (ERPs) to study factors that affect attentional, cognitive, and emotional states. The panel will conclude with an open discussion about how best to engage students—primarily undergraduates—in EEG and ERP research.

ALTERED ATTENTION IN CHRONIC MIGRAINE?

Toni A Patrick, Patrick L Woody, Katelyn R Baker, Stephanie Allen-
Winters, April Collins, & Jeffrey J Sable
Christian Brothers University

Automatic attention in adults with chronic migraine was examined using event-related brain potentials (ERPs) to ignored sounds. The N1, in particular, is affected by attention—even to ignored stimuli. Participants watched a silent video while hearing tone pairs with inter-tone intervals of 500-ms. Pairs were separated by 1 or 5 seconds (in randomized order). Although the N1 peak amplitudes decreased between the first and second tones in both groups and to all pairs (especially after the 5-second interval), the N1 was consistently larger in migraineurs than in controls. The N1s were especially large in migraineurs following the 5-second inter-pair intervals. These results are consistent with a general increase in cortical excitability in chronic migraine. In spite of the increased N1 amplitudes, automatic attention may not be adversely affected (at least between migraines) because the relative amplitudes of the N1s (i.e., larger responses to more salient stimuli and smaller responses to others) remain intact.

LONG-TERM CONSEQUENCES OF REPETITIVE SPORTS- RELATED HEAD IMPACTS AND CONCUSSION

Jessika Tollefson, Paige Mullen, Connor Hanson, Kevin Duvall, & Desiree
Budd
University of Wisconsin-Stout

There is growing evidence that athletes who receive multiple concussions experience diminished long-term cognitive functioning. Much less attention has been focused on the possible consequences of repetitive “sub-concussive” head for individuals whose sports participation was limited to high school. This study compares the cognitive function of freshman male college students, who played a minimum of 3 consecutive years of American football during high school (concussed and non-concussed), to those who participated in 3-4 consecutive years of non-impact high school sports, such as baseball or basketball (concussed and non-concussed). Subjects answered questions about the length and intensity of their sport experiences and concussion symptoms. They then performed a three-tone auditory oddball task while their brainwave activity was measured using electroencephalography (EEG). Preliminary pilot data indicates a decrease in P300 amplitude and an increase in P300 latency for both football groups compared to the non-concussed, non-football comparison group.

BULLFISH: AN EEG STUDY OF STRATEGIC RESPONDING

James Vance, Nathan Fashingbauer, Caleb Nelson, Paige Mullen, Desiree
Budd, & Michael PW Donnelly
University of Wisconsin-Stout

Lying—specifically the brain mechanisms that are involved with lying—remains unexplained. This study compares brain activity when people commit lies of denial, lies of false affirmation, true denial, and true affirmation. To create a situation which requires both types of lies, we have created a card game called

“Bullfish” which is similar to “Go Fish” but with bluffing. Playing in pairs, the subject and another player take turns asking each other if they do or do not have certain cards. The respondent is allowed to say ‘yes’ or ‘no’ and may lie or tell the truth in their response. The questioner then tries to determine if they think the respondent has lied or not, and their ability to distinguish truthful from false responses determines the outcome of each turn. Preliminary data show that both types of lying, when contrasted with each other and also with truthful responses, reveal distinct spatiotemporal scalp voltage distributions.

BRIEF MEDITATION INCREASES RESOURCE ALLOCATION AND IMPROVES PERFORMANCE ON THE ANT

Daniel R Creem, Les Sikos, & Catherine J Norris
Swarthmore College

We used event-related brain potentials (ERPs) to study the effects of a short meditation session on attention in healthy young adults. Participants were randomly assigned to either listen to a 10-min audio-guided meditation or a matched control, then completed the attention network task (ANT), which tests three attentional networks including alerting, orienting, and executive control. Following meditation participants were on average faster on the ANT than were control participants, regardless of cue type (i.e., center, double, no cue, spatial) or trial type (i.e., incongruent, congruent, neutral); importantly, there were no differences in accuracy between the meditation and control groups. Within the meditation group, larger P3b components were associated with reduced response times on incongruent trials, suggesting that greater resource allocation on trials that require behavioral inhibition results in faster RTs following meditation. There was no relationship between P3bs and RTs in the control group.

EEG AND EDA MEASURES OF STRESS REDUCTION IN RESPONSE TO MUSIC INTERVENTION

Veronica Fallon, & Echo Leaver
Salisbury University

Research suggests that listening to music can affect mood (McGregor et al. 2011) and physiological states (Thoma et al. 2013). Much of this research has focused on self-report and on music listening (as opposed to music playing). The purpose of this study was to expand the previous work in two major ways. Firstly, we wanted to compare the stress-reducing effects of music listening versus music playing. Secondly, we utilized psychophysiological measures (EEG and EDA) in addition to self-report measures of stress. Participants were assigned to one of three “recovery” conditions; Control, Music Listening, or Music Playing. All participants we exposed to a stressor task (a modified version of the Trier Social Stress Test; Kirschbaum et al. 1993). After the stressor task was complete, participants in the Control condition rested quietly for several minutes while participants in the Music Listening condition listened to music and participants in the Music Playing group were encouraged to interact with a xylophone. Baseline measures of EEG and EDA were obtained before the stressor task and recordings were collected during the stressor task and during the “recovery” period. The Music Listening group exhibited a significant reduction in the Skin Conductance response while the Music Playing group did not. Further, EEG exhibited decreased activity at frontal and parietal sites for both Music conditions. These results replicate previous findings regarding the stress reduction effects of music listening and provide mixed support for the stress-reduction effects of music playing.

FRIDAY, OCTOBER 2, 2015

1:45 P.M.–3:15 P.M.

Panel Discussion 2

**PSYCHOPHYSIOLOGY MEASURES IN WOMEN'S
HEALTH RESEARCH: CHALLENGES AND CREATIVE
SOLUTIONS**

Chairs: M. Kathleen B Lustyk

Seattle Pacific University & University of Washington & Haley A Carroll,
University of Washington

While health promotion for women includes attention to the entire spectrum of a woman's life, the adult years in particular present challenges to the study of psychophysiological and neurobiological underpinnings of wellness in women. Cyclical hormonal alterations associated with reproductive functioning in women have broad system effects as does the dramatic increases in hormone levels associated with pregnancy, the sudden reduction observed postpartum, and the age-induced decline resulting in the loss of reproductive functioning. Thus, studies of health and system functioning in women have the added challenges of addressing hormone-related effects in women on both long-term and short-term scales. This panel will discuss such challenges within the context of reproductively aged, freely cycling women, pregnant and postpartum women, peri- and postmenopausal women, as well as women with physical and mental health pathologies. Experts from the combined fields of Behavioral Neuroscience, Biology, Clinical Psychology and Nursing will share specific research problems, challenges to laboratory and clinical protocols, and offer potential solutions and troubleshooting tips within the field of women's health research.

**ENERGETICS EFFECTS IN WOMEN: ASSESSING BI-
DIRECTIONAL INTERACTIONS WITH MENSTRUAL CYCLE
PHASE**

Cara Wall-Scheffler
Seattle Pacific University

Collecting data from freely cycling women in their early 20s provides a set of difficulties and the data suggest that there are not many generalizable patterns for this age group. From a data collection perspective, residual shyness about menstruation and female reproduction generally creates a barrier to effective testing and long-term monitoring. Once data collection begins, it is clear that there is extreme variability across and between cycles for the length of luteal phases despite the textbook adage that luteal phase should be fixed based on the timing of apoptosis of the corpus luteum. Additionally, young women regularly miss cycles, have anovulatory cycles, and show extensive shifts in all phases due to psychological stressors. Moving constantly between living conditions, fluctuating sleep cycles, and adding on intense exercise regimes also seem to lend themselves to shifting menstrual cycles. Even well-nourished females show complete cessation of cycling during term time exercise regimes. Moreover, cycle cessation is a function of pregnancy and remains altered postpartum creating additional energetics effects specific to the female condition. A set of suggestions will be made about long-term tracking and recruiting with reference to specific stages of reproduction.

**PSYCHOPHYSIOLOGICAL STUDIES OF WOMEN WITH
IRRITABLE BOWEL SYNDROME**

Margaret Heitkemper
University of Washington

Irritable bowel syndrome (IBS) is a common health care problem affecting 10-17% of American women. Many of these women report that daily stress is associated with the onset of symptoms. Thus, a number of studies have examined the role of stress in symptom generation in IBS. These studies have primarily focused on women of reproductive age. Using a biopsychosocial model of IBS our laboratory has used a variety of measures to elucidate relationships between the hypothalamic-pituitary-adrenal axis and abdominal symptoms of IBS (i.e., abdominal pain, constipation, diarrhea). Results demonstrate that women with moderate/severe IBS symptoms report greater psychological distress and reduced quality of life. Menstrual cycle phase influences the report of symptoms, in that premenstrual is a time of increased gastrointestinal symptom reporting. In addition poor sleep the night before is associated with increased gastrointestinal symptoms the next day. Physiological studies conducted with polysomnography revealed that women with IBS (age 18-45) exhibit greater reductions in sleep efficiency and greater time to REM sleep on the first night in a sleep lab as compared to an age-matched healthy controls. The introduction of a social stressor (anticipation of public speaking) on the third night resulted in significantly higher serum cortisol but not ACTH levels collected during the night in IBS as compared to control women. Challenges in

conducting psychophysiological studies in women with IBS will be discussed as well as future studies with a focus on metabolomics and proteomic approaches.

**STUDYING REPRODUCTIVE AGING: LESSONS FROM THE
SEATTLE MIDLIFE WOMEN'S HEALTH STUDY**

Nancy Fugate Woods, Ellen Sullivan Mitchell, & Annette Thomas
University of Washington

With the aging of the US population, understanding of reproductive aging and its relationship to older women's health has become imperative. The aims of this panel discussion are to: 1) review research on reproductive aging, including approaches to staging reproductive aging; and 2) discuss stages of reproductive aging in relationship to hypothalamic-pituitary-ovarian (HPO) and hypothalamic-pituitary-adrenal (HPA) and autonomic nervous system (ANS) functioning. Of particular relevance to the methods employed in this line of research, the literature about staging reproductive aging will be reviewed using examples from the Seattle Midlife Women's Health Study. Methods of endocrine data collection to assess the interrelationships between HPO and HPA/ANS functioning within the context of staging reproductive aging will be discussed. Measurement implications for studying reproductive aging will be reviewed with respect to study design type and approaches to staging, including use of menstrual calendars, interviews, and hormonal measurement. Relationships of reproductive aging measures and HPA/ANS functioning will be illustrated with data from the Seattle Midlife Women's Health Study, including the relationships seen with cortisol elevation during the menopausal transition. Future research to more fully understand the implications of reproductive aging for HPA/ANS functioning will be proposed, including relationship of study question to the types and timing of measurements, assessment of endocrine levels versus responses or patterns over time.

**PSYCHOPHYSIOLOGICAL AND NEUROENDOCRINE
MEASURES OF STRESS IN WOMEN: ASSESSING
MENSTRUAL CYCLE PHASE EFFECTS**

M. Kathleen B Lustyk^{1,2}, & Haley A Carroll²
¹Seattle Pacific University, ²University of Washington

Reproductive Hormones affect stress processes in women, as do the interventions used to suppress or alter the cyclical hormonal pattern. Resultantly, results from the typical battery of psychophysiological and neuroendocrine measures of stress used in the laboratory depend upon phase of the menstrual cycle or hormone status. As an example, our lab has consistently shown greater hemodynamic and neuroendocrine reactivity in response to laboratory stressors during the late luteal phase compared to the follicular phase of the menstrual cycle in freely cycling women of reproductive age. Moreover, hemodynamic recovery post-stressor shows greater delay during the luteal phase compared to the follicular phase. These cycle phase effects on stress have implications for interpreting results from stress moderating interventions. As such, practical methods for monitoring cycle phase in order to test phase effects in laboratory research will be discussed. In addition, methods to control for cycle phase effects will also be discussed in the context of both psychophysiological laboratory and fMRI research.

**LINKING DISCRIMINATIVE CONDITIONING AND
EXTINCTION IN WOMEN WITH PTSD TO EXTINCTION
DURING EXPOSURE THERAPY**

Lori A Zoellner, & Natalia Garcia
University of Washington

Although men report more traumatic experiences, women are at particular risk for the development of PTSD, with nearly two to four times as many women developing PTSD (e.g., Breslau et al., 1991, 1998; Helzer et al., 1987; Kessler et al., 1995). Dysregulated fear responding and failure of fear extinction are hallmark features in the pathogenesis of PTSD (e.g., Jovanovic et al., 2009, 2010; Norrholm et al., 2010). Further, both research and theory strongly suggest that inhibitory extinction learning is a primary mechanism by which exposure therapy, a key psychotherapy used in the treatment of PTSD, works (e.g., Craske et al., 2008). Emerging research implicates the role of estrogen in fear conditioning and extinction learning. Low estradiol is associated with impairments in fear inhibition in both healthy and clinical samples (Glover et al., 2013), impairments in fear extinction recall in healthy samples (e.g., Milad et al., 2010; Zeidan et al., 2011), and impairments in extinction learning in PTSD (Glover et al., 2012). We will discuss discriminative conditioning and extinction psychophysiological paradigms in women with PTSD and discuss their linkage with extinction learning occurring during exposure therapy for PTSD. We will also discuss the role of varying estrogen levels across the follicular phase, ovulation, and luteal phase, common sampling issues, and methodological concerns across these conditioning and extinction paradigms in women with PTSD.

FLASH TALKS

FRIDAY, OCTOBER 2, 2015

8:00 A.M.–9:00 A.M.

**Flash Talks: A Focus on Early- to Mid-Career
Psychophysicists**

PREDICTIVE CODING SUPPORTS SOUND SOURCE
SEGREGATION

Alexandra Bendixen

Chemnitz University of Technology, Chemnitz, Germany

Many sound sources emit signals in a predictable manner over time, such as a train passing by whose acoustic signature carries temporal and spatial predictability. The brain easily extracts such predictability from sound sequences. Following a predictive-coding framework, one major benefit of auditory predictive processing is usually seen in the possibility to prepare for upcoming events by the appropriate allocation of attention. In this talk, I propose that another beneficial aspect of predictive processing lies in its contribution to basic auditory scene analysis processes. The auditory system is typically confronted with a mixture of different sounds from which it has to disentangle the various sources before relevant information can be retrieved. Tracking an auditory source over time may help to segregate this source's activity from signals emitted by concurrently active sources. In line with this hypothesis, I will present psychophysical and psychophysiological evidence for the contribution of auditory predictability to sound source segregation. Empirical results further show how the involved processes change with age. I will briefly discuss implications for the ability to decompose the complex acoustic mixture arriving at the ears.

NEURAL MEASURES OF TRACKING OBJECTS THROUGH
OCCLUSION

Trafton Drew

University of Utah

As we track moving objects they are often occluded by other surfaces, presenting a challenge for the visual system. Human observers are surprisingly good at this task: in laboratory conditions object occlusion during multiple object tracking frequently yields no behavioral cost. In order to understand the neural underpinnings of this finding, we recorded ERPs while observers covertly tracked moving objects. On some trials, the objects were briefly occluded behind an invisible occluder. We time-locked the ERPs to the onset of the moving objects and recorded throughout the trial. We observed a sustained negative wave at electrode sites that were contralateral with respect to the hemifield the subject was tracking. This wave persisted throughout the entire trial. Previous evidence has shown that this component is sensitive to whether or not object information is being actively updated. In the current study, the objects stopped moving for 500ms on some trials. During this pause, amplitude of the tracking component reliably decreased. When a tracked object was passed behind an invisible occluder for 500 ms, we observed a statistically equivalent decrease in amplitude. This suggests that in our paradigm, object updating ceased while the object was occluded. Perhaps as a result, we observed a small, but reliable behavioral performance decrement when target objects were occluded.

QUANTIFYING INDIVIDUAL VARIABILITY AND INDIVIDUAL
UNIQUENESS IN THE ERP RECORD: THREE STUDIES

Sarah Laszlo

Binghamton University

Especially in the developmental literature, but also in the language comprehension literature more broadly, there is a strong tradition in electrophysiological research of taking a “many trials, few subjects” approach. This is likely in part motivated by real practical concerns, such as the time necessary and expense required to collect high quality ERP data, especially from children. However, this approach also has an important limitation: it obscures potentially fascinating individual differences, which are lost when group averaging takes place. Here, we will (very briefly!) discuss three studies which begin with well-understood cognitive ERP paradigms but extend the results of those paradigms through analysis of individual differences. In a word/face/object viewing study designed to replicate differences in lateralization on the N170, we will demonstrate that N170 differentiation and lateralization of these well-studied item types are strongly impacted by individual reading experience. In a much-replicated N400 repetition effect design presented to elementary aged-children, we will demonstrate that N400 am-

plitude and effect magnitude are predictive of a variety of behavioral measures in these children, including scores on reading-related report card subjects. Finally, we will extend ourselves beyond the idea of individual *differences*, into quantification of individual *uniqueness*, by performing a formal biometric analysis of N400 repetition effect data collected from a large sample of adults. This biometric analysis will demonstrate that individuals are uniquely identifiable on the basis of ERPs elicited in an N400 repetition effect paradigm > 95% of the time.

EXPECTATION OF THREAT ENHANCES PERCEPTION

Aprajita Mohanty Jingwen Jin, Tamara Sussman, and Akos Szekely
Stony Brook University

While it is well accepted that threatening stimuli are perceptually prioritized, most research has attributed faster and more accurate detection of these stimuli to bottom-up stimulus-related factors. However, top-down factors like anticipatory attention and expectations play a key role in perception. In the present talk I will present evidence from hierarchical drift diffusion modeling (HDDM), evoked response potentials (ERPs), as well as univariate and multivariate functional magnetic resonance imaging (fMRI) to show how predictive representations of threatening stimuli confer them with a distinct processing advantage. The talk will demonstrate that perceptual prioritization of threatening stimuli can be attributed to pre-stimulus biases measured by higher baseline evidence and higher rate of evidence accumulation in favor of a threat-related decision. Neurally, the perceptual advantage can be attributed to more precise template representations measured by population coding of threat-cues as well as greater activation in brain regions higher in visual processing hierarchy. Overall, the talk will elucidate the behavioral and neural mechanisms of perceptual decision-making regarding threatening stimuli and has implications for understanding perceptual biases seen in clinical conditions such as anxiety and paranoia.

STRESS AND MORAL BEHAVIOR

Elizabeth Page-Gould¹, Serena Goel¹, and Rimma Teper²
¹University of Toronto, ²Yale University

What is the relationship between physiological stress and moral behavior? Much of the research examining moral behavior has relied on people's responses to hypothetical moral situations, which is not an immersive enough paradigm to evoke peripheral physiological stress responses. This talk will describe two studies where participants were placed in situations that demanded real moral decisions while acute stress was measured or manipulated. In the first study, we found that participants who had greater sympathetic stress responses when faced with the opportunity to cheat ultimately cheated less than participants whose sympathetic nervous systems remained relatively unaroused. In the second study, we manipulated acute stress with a Trier Social Stress Test prior to giving participants the opportunity to steal money and candy, finding that stress actively reduced immoral behavior. We further examined the regulation of the hypothalamic pituitary adrenal stress axis the day after the laboratory session to examine the regulation of the HPA as a function of moral behavior the preceding day. We take these findings to suggest that acting morally — or at least normatively — may serve as a form of coping in response to stress.

THE INTEGRATION OF EMOTION AND COGNITION IN THE BRAIN

Alexander J Shackman
University of Maryland

We tend to experience cognition and emotion as fundamentally different. Emotion is saturated with feelings of pleasure or pain and manifests in readily discerned somatic changes, whereas cognition feels devoid of hedonic, motivational, or somatic features. These differences in experience and physiology have led many to treat emotion and cognition as distinct. But newly available neurobiological data compel a fundamentally different view. Imaging studies show that negative affect and cognitive control recruit overlapping regions of the mid-cingulate cortex (MCC). Anatomical studies reveal that the MCC constitutes a hub where information about pain, threat, and more abstract kinds of negative feedback can be synthesized and used to regulate regions involved in expressing emotion, executing behavior, and biasing attention. Electrophysiological studies indicate that emotion and cognition are functionally integrated in the MCC: errors, punishments, and other calls for enhanced control are associated with exaggerated MCC control signals in anxiety-prone individuals. The magnitude of these signals strongly predicts inhibition and avoidance in future encounters. Collectively, these observations suggest that a circuit centered on the MCC adaptively controls thoughts, feelings, and behavior when there is uncertainty about actions and their potentially aversive outcomes. These findings indicate that emotion and cognition are deeply interwoven in the fabric of the brain and provide a novel framework for understanding the nature of temperament and the origins of psychopathology.

EMOTIONAL CONTEXT DURING ENCODING MODULATES BRAIN POTENTIALS OF SUBSEQUENT RECOGNITION MEMORY

Mathias Weymar
University of Greifswald

Much evidence indicates that memory performance is enhanced for emotional, compared to neutral, items, but effects of an emotionally charged context on memory for associated elements is also important in trauma and stress-related disorders. Memory for items initially encoded in either emotionally charged or neutral contexts was investigated, assessing the neural correlates of recollection. In one study, recognition memory was tested for objects that had been actively associated with emotionally arousing or neutral scenes during encoding. Results showed that objects associated with emotional scenes were better recognized than objects encoded in the context of neutral scenes, and that objects associated with emotional contexts prompted enhanced ERP amplitudes for old, compared to new, objects (ERP old/new effect), suggesting better recollection. In another study, we investigated whether a different emotional context - mere anticipation of an unpleasant event (e.g. threat of shock) - affects recognition of items whose color signaled possible threat of shock or safety during encoding. Again, a larger ERP old/new difference and better recognition was found for words that had been encoded in a threatening context, compared to words encoded in safety. Taken together, both behavioral and neurophysiological measures of memory indicated that information originally encoded in an emotional context, regardless of whether actually experienced or merely anticipated, shows better recollection, which could assist in understanding binding mechanisms in anxiety and stress.

COMPARATIVE PSYCHOPHYSIOLOGY: MACAQUE EVENT-RELATED POTENTIALS PARALLEL THOSE OBSERVED IN HUMANS

Geoffrey F. Woodman
Vanderbilt University

Event-related potentials (ERPs) recorded from humans provide psychophysiolgists with a large toolbox for studying normally unobservable aspects of information processing. A half-century's worth of research has established the existence of a large number of ERP components that measure a host of different cognitive operations. Surprisingly, little is known about whether monkeys exhibit ERP components similar to those that have been used to study human cognition. This talk reviews our recent work recording ERPs from macaque monkeys. This work demonstrates that monkeys exhibit ERP components that have the same relative timing, scalp distribution, and functional properties as those described in previous studies with humans. This program of research seeks to solve the inverse problem, and localize the generators of these components in the primate brain.

Supported by a Vanderbilt University Discovery Grant, RO1-EY019882, T32-EY08126, R01-EY025275, P30-EY08126.

INVITED SYMPOSIA ABSTRACTS

FRIDAY, OCTOBER 2, 2015

10:45 A.M.–12:15 P.M.

Invited Symposium 1

**TOWARD A MECHANISTIC APPROACH TO
MINDFULNESS MEDITATION TRAINING**

Chair: G. R. Mangun
University of California, Davis

Mindfulness meditation practices can be conceptualized as a set of attention-based, regulatory and self-inquiry training regimes cultivated for various ends, including the training of well-being and psychological health. These panelists will discuss a theoretical model which they have jointly created (Lutz, Jha, Dunne, and Saron, under review). This model conceptualizes mindfulness-related states and traits as a well-defined multidimensional phenomenal matrix that can readily be expressed into a neurocognitive framework. This phenomenal and neurocognitive matrix of mindfulness is presented as a heuristic to guide formulation of next-generation research hypotheses from both cognitive/behavioral and neuroscientific perspectives. In addition to presentation of this model, individual presentations by the panelists will discuss recent behavioral, physiologic, and neural results related to mindfulness training from their own laboratories. The influence of mindfulness training will be discussed as a function of short-form vs. intensive demands, in meditation naïve participants as well as long-term expert mindfulness practitioners to probe the hypotheses formulated in their model.

**DIFFERENTIAL EFFECT OF TWO ATTENTION-BASED
MEDITATIONS ON CONSCIOUS AUDITORY PROCESSING IN
EXPERTS AND NOVICES**

Antoine Lutz
Lyon Neuroscience Research Center and University of Wisconsin-Madison

Meditative practices are a useful tool to investigate how mental states, which incorporate the participant's attention, subjective presence, emotions, expectations and goals, may shape information processing in the brain and perceptual experience. In the present study, we investigated the effects of different meditative styles on auditory stimulus processing as a function of meditation expertise. Two groups of expert and novices practitioners performed an auditory oddball task during two meditative states (Focused Attention, FA, and Open Presence, OP) and a control condition (Reading a newspaper). Using electroencephalography, we investigated the differential effect of these three states and level of meditation expertise on event-related potentials reflecting pre-attentive stimulus processing (the Mismatch Negativity or MMN) and attention mechanisms. There is current debate as to whether the MMN, which is sensitive to break in sensory regularity, can also be modulated by selective attention. As FA is thought to enhance top-down prediction toward the attended object of meditation, we specifically predicted that the practice of FA, here sustained on a static visual object, would increase the bottom-up prediction error signal in response to the auditory deviant. As predicted, we found an increased MMN during FA in the expert practitioners only and no differences between OP and Reading. This presentation will also discuss modulatory effects of these states on later EEG markers of attention.

**STRENGTHENING ATTENTION WITH SHORT-FORM
MINDFULNESS TRAINING IN HIGH PERFORMANCE
COHORTS**

Amishi P. Jha
University of Miami

Elite athletes strive for peak performance. Yet the stress and anxiety of high stakes, high demand athletic training may impede performance. We investigated the impact of offering mental conditioning programs to a Division I NCAA football team (N=105). Performance on the sustained attention response task (SART), self-reported stress (PSS) and anxiety (STAI) were examined before (T1) and after (T2) the mental conditioning programs. Over 4 weeks, the team attended a mindfulness training course (MT) or a relaxation and visualization course (RV). Both courses involved 4, 45 minute group sessions with a trainer, 4 weekly proctored practice sessions, and 12 minutes of assigned daily homework listening to guided recordings. Assignment to MT vs. RV was determined via a matched randomization procedure. Because homework compliance was highly variable, each training group was median split by self-reported minutes of homework practice.

A repeated measures ANOVA examining time (T1 vs. T2) x training type (MT vs. RV) x homework compliance (high vs. low) on SART performance (A') demonstrated a significant 3-way interaction. At T2, A' was greater for high vs. low MT, while high and low RV did not differ from each other. High MT also outperformed RV at T2. When practice time was considered as a continuous variable, greater time spent engaging in homework corresponded with greater improvements in A', as well as greater reductions in self-reported stress and anxiety for MT but not RV. Thus, MT course participation and better homework compliance enhanced attention and psychological health.

**LONGITUDINAL EFFECTS OF INTENSIVE MEDITATION
TRAINING ON SUSTAINED ATTENTION, RESPONSE
INHIBITION, AND EMOTIONAL PROVOCATION**

Clifford Saron
University of California, Davis

This talk will summarize our ongoing investigation regarding how attentional, emotional and physiological processes are modified over the course of three months of intensive full-time training in meditative quiescence (Shamatha, ~6h/d) and beneficial aspirations (loving kindness, compassion, empathetic joy, and equanimity, ~45 m/d) taught by Buddhist scholar and teacher Alan Wallace, in a longitudinal randomized wait-list controlled study known as "The Shamatha Project." A large collaborative team employed repeated measures that examine: behavioral and electrophysiological correlates of vigilance and response inhibition in continuous performance tasks (CPTs); heart rate, skin conductance, and startle magnitude in response to affective images; facial expression of emotion in response to graphic film clips; EEG obtained during focused attention and compassion meditation as well as rest; as well as a battery of validated self-report instruments, daily mood state, thematic analysis of structured interviews, and biomarkers related to stress, affiliation and cellular aging. Our findings demonstrate improvements in visual perceptual thresholds, vigilance and response inhibition as well as training-related shifts in the amplitude and latency of visual ERPs obtained during the CPTs. Autonomic and facial expression measures suggest increased attention to, and engagement with, perceptions of human suffering, a strong theme of this contemplative training. Individual differences and the need for a phenomenological perspective will be emphasized regarding interpretation of our findings.

3:45 P.M.–5:15 P.M.

Invited Symposium 2

**A MULTI-FACETED ELECTROPHYSIOLOGICAL LENS
ON THE DYNAMICS OF LANGUAGE COMPREHENSION**

Chair: Marta Kutas
University of California, San Diego

An overview of some recent work using electrophysiological (EEG, ERP, and/or ECoG) and complementary measures to examine written and spoken language processing at a variety of levels (lexical, grammatical, sentential) in monolinguals and bilinguals.

USING THE SENSES TO MAKE SENSE

Marta Kutas, Ben Amsel, Katherine DeLong, & Thomas P. Urbach
University of California, San Diego

What we know about people, places and things is deployed in real time to make sense of sensory inputs such as language. Using the related anomaly paradigm in combination with event related brain potentials (ERPs), we find that perceptuo-motor knowledge is incrementally activated during written sentence comprehension. This inference is based on finding reduced N400 amplitudes to written words which though inconsistent with the global context share perceptual attribute(s) with the contextually expected word. While such perceptual knowledge could, in principle, be amodal in nature, we will argue that at least in the case of color processing it is perceptually-grounded, relying on the very visual systems that are involved in perceiving color. This inference is based on our finding that reducing the visual contrast of a monochromatic word pair has a much larger effect on the neural timing of semantic access to color (e.g., green-lime) versus location (e.g., kitchen-lime) knowledge in a Go/NoGo task (as reflected in the NoGo N200 effect).

I THINK I SEE WHAT IT MEANS: MULTI-METHOD APPROACHES TO UNDERSTANDING THE COMPLEX DYNAMICS OF LANGUAGE COMPREHENSION

Kara D. Federmeier
University of Illinois at Urbana-Champaign

Language comprehension involves the incremental accrual of information from the world and from long-term knowledge stores, allowing the development of a message-level representation, which, in turn, shapes the processing of incoming words. The dynamics of language comprehension have been extensively studied with recordings of electrophysiological (especially event-related brain potential: ERP) activity, as well as through eye-tracking during natural reading, and these measures have provided complementary, if not always concurring, views. In ongoing research, we have been examining the multifaceted effects of context in these measures concurrently, by (1) correlating eye-tracking, ERP, and EEG (time-frequency) measures obtained from the same materials, (2) measuring ERPs during self-paced reading, and (3) examining ERPs in the context of parafoveal preview. Our results reveal the role of attentional allocation and control processes in comprehenders' ability to apprehend and integrate language stimuli, make predictions, and deal with ambiguous or unexpected information. We find that comprehension strategies vary with task affordances and demands, as well as with age and individual differences in cognitive and neural functioning. Moreover, similarities between our findings and those observed in nonverbal tasks suggest that the neural dynamics observed during language processing may not be unique to the cognitive domain of language.

ERPS AS METRICS OF SECOND-LANGUAGE ACQUISITION AND LOSS

Lee Osterhout
University of Washington

Second language (L2) learning is a dynamic process, in which the learner gets better over time at processing L2 sounds, words, and sentences. In our lab, we track changes in electrical brain activity (measured from the scalp) that occur as novice learners progress through the early years of classroom-based L2 instruction. The goal is to determine how much L2 experience is needed before learners incorporate L2 knowledge into their on-line comprehension systems. We describe the trajectory of lexical and grammatical learning, and show that (at least in some respects) the process of language attrition is just like the process of language learning - but in reverse. Furthermore, language learners are known to be highly variable with respect to their rate of learning and ultimate attainment. I will describe work showing how these individual differences are systematically manifested in event-related potentials. I will then attempt to place our research findings in a broader cognitive and neurobiological context.

ELECTROCORTICOGRAPHY AND LANGUAGE

Robert T. Knight
University of California, Berkeley

Language, attention, perception, memory, motor control and executive control generates focal high frequency oscillatory activity in the range of 70-250 Hz (high gamma, HG). The HG response in the human electrocorticogram (ECoG) precisely tracks auditory processing in the neocortex and can be used to study the spatio-temporal dynamics of linguistic processing. We will review ECoG data addressing the neural mechanisms of speech suppression, categorical representation and the timing of speech perception and production in peri-sylvian language regions. The high gamma response provides a powerful tool for development of neural prosthesis for disabling language deficits and progress in speech and music reconstruction from ECoG recordings will also be reviewed.

SYMPOSIA ABSTRACTS

THURSDAY, OCTOBER 1, 2015

8:00 A.M.–9:30 A.M.

Symposium 1.1

BRAIN STIMULATION TO ENHANCE PROCESSING OF PLEASANT STIMULI: EVIDENCE ACROSS TWO METHODS AND THREE MEASURES

Chair: Nicole Prause
University of California, Los Angeles

Brain stimulation methods are increasingly used to ameliorate negative affect associated with a variety of disorders. The dorsolateral prefrontal cortex is commonly stimulated. Yet, the effects at DLPFC do not remain local. Activity is propagated from DLPFC to brain areas active during reward, such as through the cingulo-opercular network. The mechanism of some therapeutic effects may be uniquely attributable to changes in reward sensitivity. In three separate studies, the effects of two different stimulation methods (direct current stimulation, transcranial magnetic stimulation) on emotional processing are monitored using three different psychophysiological methods (fMRI, MEG, and EEG). Each study contrasted inhibitory and excitatory methods of brain stimulation. Results demonstrate enhanced processing of pleasant images relative to unpleasant images and increased positive engagement with genital sexual stimulation with DLPFC stimulation. Next steps to enhance these mechanisms for novel therapeutic effects are discussed.

A ROLE FOR TRANSCRANIAL MAGNETIC STIMULATION IN ENHANCING/INHIBITING RESPONSIVENESS TO SEXUAL REWARDS

Nicole R Prause¹, Greg J Siegle², Choi Deblieck¹, Allan Wu¹, & Marco Iacoboni¹

¹University of California, Los Angeles, ²University of Pittsburgh

Theta burst stimulation (TBS) is thought to affect reward processing mechanisms, which may increase and decrease reward sensitivity. To test the ability of TBS to modulate response to strong primary rewards, participants hypersensitive to primary rewards were recruited. Twenty men and women with at least two opposite-sex, sexual partners in the last year received two forms of TBS. Stimulations were counterbalanced to avoid order effects and separated by 2 hours to reduce carry-over. The two TBS forms have been demonstrated to inhibit (continuous) or excite (intermittent) the left dorsolateral prefrontal cortex using different pulse patterns, which links to brain areas associated with reward conditioning. After each TBS, participants completed tasks assessing their reward responsiveness to monetary and sexual rewards. Electroencephalography (EEG) was recorded. They also reported their number of orgasms in the weekend following stimulation. This EEG signal was malleable by TBS, where excitatory TBS resulted in lower EEG alpha relative to inhibitory TBS to primary rewards. EEG responses to sexual rewards in the lab predicted up to 76% of the number of orgasms experienced over the weekend. TBS may be useful in modifying hypersensitivity or hyposensitivity to primary rewards that predict sexual behaviors. TBS may offer a first effective treatment for sexual desire problems.

TRANSCRANIAL DIRECT CURRENT STIMULATION ENHANCES BOLD SIGNAL REACTIVITY TO PLEASANT RELATIVE TO UNPLEASANT SCENES

Dean Sabatinelli¹, & Markus Junghöfer²
¹University of Georgia, ²University of Münster

Transcranial direct current stimulation (tDCS) of the brain modulates evoked motor potential amplitude and has reported utility in the treatment of severe depression. Functional imaging studies have linked activation of the human nucleus accumbens and medial prefrontal cortex (mPFC) to the perception of pleasant emotional stimuli. Here we tested whether stimulation of the mPFC via tDCS might alter BOLD signal in this region and across the brain during emotional and neutral scene perception. Twenty-four participants viewed three mixed series of pleasant, neutral, and unpleasant pictures, the first prior to tDCS (baseline), followed by 10 minutes of 1.5 mA anodal (excitatory) and 1.5 mA cathodal (inhibitory) stimulation conditions, the order of which was counterbalanced across subjects. A 90-minute rest period separated tDCS sessions. Stimulation electrode placement at middle forehead and chin sites targeted mPFC as estimated by ani-

sotropic finite element head modeling. Analyses of whole-brain BOLD signal change measured by a 3T Siemens Prisma MR scanner revealed of an interaction of scene pleasantness and transcranial current flow. Bilateral orbitofrontal and right prefrontal regions show enhanced activity specifically during pleasant scene perception and anodal tDCS stimulation. Other regional stimulation effects and the potential clinical implications of this technique will be discussed.

This work was supported by the German Research Association (DFG; SFB-TRR58-C1).

TRANSCRANIAL DIRECT CURRENT STIMULATION OF THE MEDIAL PREFRONTAL CORTEX MODULATES APPETITIVE-AVERSIVE PICTURE PROCESSING BIAS: MAGNETOENCEPHALOGRAPHIC EVIDENCE

Markus Junghöfer¹, Constantin Winker¹, Maimu Rehbein¹, & Dean Sabatinelli²

¹University of Münster, ²University of Georgia

Functional imaging studies have linked activation of human reward structures, including nucleus accumbens and medial prefrontal cortex (mPFC), to the perception of pleasant emotional stimuli. Here we tested the hypothesis that a stimulation of the mPFC via transcranial current stimulation (tDCS) alters the proportions of appetitive versus aversive stimulus reactivity. TDCS electrode placement optimally targeting mPFC areas was calculated via computer simulations based on anisotropic finite element head modeling. Thirty-three participants viewed a random series of pleasant and aversive pictures before (baseline) after cathodal (inhibitory) and after anodal (excitatory) tDCS-mPFC stimulation while event related magnetic fields were measured by whole head magnetoencephalography (MEG). TDCS sessions were separated by 2 hours and stimulation order was balanced across subjects. Inverse modeling of event related neural activity revealed an enhanced pleasant-to-unpleasant picture processing ratio after anodal and a reduced ratio after cathodal stimulation especially at right occipito-temporal visual regions within the time intervals of the Early Posterior Negativity (EPN; 120-300 ms) and the Late Positive Potential (LPP, 300 – 600 ms). Ongoing research now tests whether a series of anodal mPFC stimulations reduces the ‘negativity bias’ and ‘positive attenuation’ effects in major depressive disorder (MDD) potentially providing an add-on therapy to common MDD treatments.

This work was supported by the German Research Association (DFG; SFB-TRR58-C1) and the Interdisciplinary Center for Clinical Research of the University of Münster (Ju2/024/15).

8:00 A.M.–9:30 A.M.

Symposium 1.2

THE COGNITIVE NEUROSCIENCE OF WORKING MEMORY: DYNAMICS OF ATTENTION, DISTRACTION, AND INTERFERENCE

Chairs: Pierre Jolicoeur¹, & Andreas Keil²
¹Université de Montréal, ²University of Florida

A substantial literature has characterized the processes associated with short-term retention and manipulation of items, often referred to as short-term memory (retention) or working memory (manipulation). Recent research suggests that these functions are linked to encoding processes studied in research on perception, attention, and distraction. Leveraging the temporal and spatial information provided by cognitive neuroscience methods, this symposium explores how encoding-related processes interact with working memory function. Across different paradigms and sensory modalities, we examine the effects of interference among task items and between task items and distractors, at different stages of encoding and retrieval. Results illustrate that interactions between encoding and working memory processes reflect the neurophysiological properties of the sensory system examined, and the demands imposed by the experimental paradigm: Alho will, for example, show that processing of task-irrelevant speech needs to be suppressed during phonological processing of written letters. Klaver will relate capacity limitations in processing task items and distractors to hippocampo-parietal and prefrontal brain activity. Jolicoeur and Fortier-Gauthier will examine the interplay between attention to visual targets and distractors using ERPs as well as oscillatory alpha-gamma phase-amplitude coupling during spatial attention. Finally, Keil and colleagues will examine the relation between selective processing of task items in retinotopic visual cortex and working memory performance.

INTERMODAL INTERFERENCE DURING AUDITORY AND VISUAL SELECTIVE AND DIVIDED ATTENTION

Kimmo Alho
University of Helsinki and Aalto University

It is often quite easy to ignore task-irrelevant auditory stimuli during visual attention, and vice versa. However, our functional magnetic resonance imaging (fMRI) and event-related brain potential (ERP) studies suggest that active suppression of auditory-cortex responses to task-irrelevant speech is needed during a phonological task involving written letters. Moreover, our recent fMRI study showed that enhanced left dorsolateral prefrontal activity observed during successful auditory-visual dual tasking is non-existent or at least attenuated in dual tasks where the auditory component task demands spatial processing or the visual component task demands complex phonological processing, that is, when one of the two tasks, according to Baddeley's working-memory model, demands mental processing also in the other modality. Our other recent fMRI study indicated that fronto-parietal areas where activity enhances during divided attention to speech and written text show enhanced activity even during selective attention to speech or text at the presence of task-irrelevant text or speech, respectively. This suggests that the fronto-parietal network controlling dual-tasking and intermodal division of attention is also involved in dealing with interfering inputs from the other modality during intermodal selective attention.

Supported by the Academy of Finland grants #260054 and #265528

VISUAL WORKING MEMORY LOAD AND CAPACITY DEPENDENT PROCESSING OF TASK AND DISTRACTOR ITEMS IN A FRONTAL-PARIETAL-HIPPOCAMPAL NETWORK

Peter Klaver
University of Zürich and University Children's Hospital Zürich

Limited working memory capacity is typically reflected by brain activity in the posterior parietal cortex that increases with set size and levels off after capacity limits have been reached. This presentation aims at showing that other brain regions in the working memory network, such as the prefrontal cortex and hippocampus, are also capacity dependent and respond differently to task and distractor items. The first study used a classic working memory paradigm with four set size levels (1, 2, 4 and 6 objects). Functional MRI showed a set size dependent increase in activity in the right anterior hippocampus that dropped to baseline beyond individual capacity. This finding was replicated in a developmental sample aged between 8 and 27 years. In this group a developmental increase in visual working memory capacity was accompanied by a shift from posterior hippocampal to anterior hippocampal brain activity. A third study used a contingent capture variation of a Sternberg paradigm. Target items were one or four colored letters. Frontal ERPs showed that capture of attention contingent on a relevant color was higher when distractor letters were presented in high than in low memory load conditions. Thus, memory load may reduce resources that inhibit distractor items from capturing attention. In conclusion, we suggest that the hippocampus can process a limited number of objects, while parietal and prefrontal areas support limited resources that can be allocated to stored items in working memory and distractors, respectively.

IMPACT OF SPATIAL PATTERN DISTRACTORS ON VISUAL SPATIAL ATTENTION TO POP-OUT TARGETS REVEALED BY ERP AND ALPHA-GAMMA PHASE-AMPLITUDE COUPLING

Ulysse Fortier-Gauthier, & Pierre Jolicoeur
Université de Montréal

We examined the impact of the number and spatial layout of low-salience shape distractors on the deployment of visual spatial attention to a pair of salient visual targets selected on the basis of a pop-out color difference from distractors. Distractors could be between, outside, or both between and outside the targets and the salience of the targets was also varied although all remained clearly within pop-out range. The impact of the distractors was greater for lower salience targets and for inside distractors. Interactions between target salience and distractor layouts were reflected in the amplitude and temporal dynamics of lateralized ERPs (N2pc, Ppc, SPCN), as well as in the amplitude of alpha-gamma phase-amplitude coupling, corroborated by variations in the onset latency of the P3 response to the presence of targets that were to be counted for overt report after short sequences of search displays. These electrophysiological results suggest that spatially-proximal distractors perturb neuronal mechanisms of target selection and engagement to a greater extent for spatial locations between salient potential targets and particularly so for lower levels of target salience.

DIFFERENTIAL VISUAL CORTICAL ENGAGEMENT DURING RETENTION OF OBJECT FEATURES IN WORKING MEMORY: AMPLIFICATION VERSUS COMPETITION

Andreas Keil¹, Nina N Thigpen¹, Jessica Oswald², & Klaus Oberauer²
¹University of Florida, ²University of Zürich

Many current models of visual working memory emphasize aspects of selecting and amplifying sensory representations of task items. The empirical testing of these notions has however been prevented by methodological issues with separately quantifying sensory responses to the multiple items contained in a memory set. Three experiments addressed this challenge by means of steady-state potential frequency tagging: EEG data were collected while participants performed a delayed orientation-matching task. Two oriented gratings (the memory set) were initially presented. After a retention interval (2000 ms), two probe gratings were shown, with each grating phase-reversing at a different rapid rate. Three conditions resulted: No probe grating matched the memory set; one matched; both matched. Observers then made either a match/no-match decision (Experiments 1 and 2) or they manually set one probe grating at the remembered orientation (Experiment 3). Results show enhanced visual steady-state signals for stimuli being held in working memory, compared to non-matching stimuli. In conditions where both probes matched the memory set, visuo-cortical responses were heightened above the level of the no-match condition, but did not reach the level of single-match conditions. The differences were mirrored in measures of occipito-temporal and occipito-frontal connectivity indexed by oscillatory phase-locking. Results suggest that visual neurons low in the traditional hierarchy are actively involved in the widespread neural networks mediating working memory function.

Supported by the National Institutes of Health (R01MH097320)

8:00 A.M.–9:30 A.M.

Symposium 1.3

MOBILE BRAIN/BODY IMAGING (MOBI), A NEW FIELD OF PSYCHOPHYSIOLOGICAL RESEARCH

Chair: Scott Makeig
Swartz Center, University of California, San Diego

Recent advances in source-resolved EEG imaging have alleviated concerns about separating potentials from brain, head, and eye movements, making it possible to record, measure, and model cortical source-resolved dynamics supporting natural cognition that involves both spontaneous and goal-directed body and eye movements. In 2009, Makeig et al. (Int J Psychophysiol) proposed that this essentially allows a new wide field of psychophysiological investigation that might be called Mobile Brain/Body Imaging (MoBI). Now, low-cost hardware and open source software are making both tabletop and ambulatory experiments incorporating MoBI elements ever more feasible. This symposium aims to increase awareness and stimulate discussion of the entailed research possibilities and challenges. After a topic introduction by Scott Makeig, Klaus Gramann will present studies exploring source-resolved EEG dynamics during studies aimed toward imaging brain activity during active navigation. Tzyy-Ping Jung will discuss low-cost tabletop MoBI hardware and paradigms for studying computerized learning. Stefan Debener will present miniaturized EEG technology enabling the concealed and comfortable acquisition of EEG in daily life, and John Foxe will compare ERPs and performance during treadmill walking in younger and older adults. These reports show the promise of an important paradigm shift for psychophysiology – from static-pose functional brain imaging to active imaging and modeling of the wide range of normal and abnormal human brain/body dynamics that our brains have evolved to support.

REALLOCATING COGNITIVE RESOURCES DURING DUAL-TASK WALKING IN AGING: A MOBILE BRAIN/BODY IMAGING (MOBI) STUDY

John J Foxe, Brenda R Malcolm, John S Butler, & Pierfilippo De Sanctis
Albert Einstein College of Medicine

Aging is associated with reduced abilities to selectively allocate attention across multiple domains. This may be particularly problematic during everyday multi-tasking situations when cognitively demanding tasks are performed while walking. Due to previous limitations in neuroimaging technology, much remains unknown about the cortical mechanisms underlying resource allocation during locomotion. Here, we utilized an EEG-based Mobile Brain/Body Imaging (MoBI) technique that integrates high-density event-related potential (ERP) recordings with simultaneously acquired foot-force sensor data to monitor gait patterns and brain activity concurrently. To assess effects of motor load on cognition we evaluated young (N=17; mean age=27.2) and older adults (N=16; mean age=63.9) and compared behavioral and ERP measures associated with performing a Go/No-Go response inhibition task as participants sat stationary or walked on a treadmill. Stride time and variability were also measured during task performance and compared to stride parameters obtained without task performance, thereby assessing effects of cognitive load on gait. Results showed that older, but not young adults' accuracy dropped significantly when performing the inhibitory task while walking. Young adults revealed ERP modulations at relatively early (N2 amplitude reduction) and later (earlier P3 latency) stages within the processing stream as motor load increased while walking. In contrast, older adults' ERP modulations were limited to later processing stages (increased P3 amplitude) of the inhibitory network.

MOBILE BRAIN/BODY IMAGING (MOBI) OF NATURAL SPATIAL COGNITION

Klaus Gramann
Berlin Institute of Technology

Experimental paradigms to study the brain dynamics accompanying spatial cognition force participants to sit still or lie prone to avoid movement-related artifacts from obscuring the signal of interest. Spatial cognitive processes, however, make use of a wide range of idiothetic information generated through movement of the agent in space (Gramann, 2013, *Spatial Cog Comp*, 13, 1-25). This information is not only central to a wide range of spatial navigation strategies (e.g., path integration in the dark) but is used to efficiently update spatial representations (i.e., without the need for expending cognitive resources). Current brain imaging modalities do not allow for imaging of brain dynamics during natural spatial behavior (Gramann et al., 2014, *Int J Psychophysiol* 91, 22-29) and thus little knowledge exists about brain dynamics underlying vestibular and kinesthetic information processing during natural orienting behavior. Using mobile brain/body imaging (MoBI) that combines high-density electrical brain and neck-muscle activity recording with three-dimensional body motion recording, and then performing joint data-driven analysis, we gain new insights into cortical brain activity patterns supporting more natural spatial orienting tasks including whole body translations and rotations in real and virtual space.

NINE TO FIVE CEEGRIDS: NEAR INVISIBLE, UNOBTUSIVE EVENT-RELATED EEG USING A SMARTPHONE AND FLEXIBLE PRINTED CIRCUITS AROUND THE EAR

Stefan Debener, Reiner Emkes, Maarten De Vos, & Martin Bleichner
University of Oldenburg

Traditional EEG technology has clear drawbacks, such as the requirement of a cap or net to place electrodes on the scalp, unstable electrode impedances over longer periods of time, use of bulky hardware, and poor motion tolerance. We have previously shown that wireless, head-mounted amplifiers enable the acquisition of good quality EEG signals in real-life settings, such as walking outdoors (Debener et al., 2012, *Psychophysiology*, 49, 1449-53). Aiming towards concealed EEG acquisition, we developed a behind-the-ear multi-channel electrode array, which is comfortable to wear over many hours. Ten silver electrodes were integrated into a c-shaped flexible plastic film designed to fit around the ear (cEEGrid). In the morning, ten participants were fitted with a cEEGrid at each ear and were recorded in the morning (8-10 am) and in the afternoon (4-6 pm). Resting EEG, eye artifacts and auditory oddball data were collected using a wireless, head-mounted EEG amplifier. Stimulus presentation as well as signal acquisition was performed with an off-the-shelf smartphone. Electrode impedances were stable for > 6 hours. A significant increase in resting EEG alpha power for eyes closed versus eyes open conditions confirmed the validity of oscillatory EEG signals recorded near the ear. Moreover, a linear classifier trained on the morning session single-trial

oddball data and evaluated on the afternoon session data revealed stable and significantly above-chance level P300 classification for all participants. Unobtrusive, near invisible and highly portable single-trial EEG is within reach.

LOW-COST PERVASIVE 'MOBI-IN-A-BOX'

Tzyy-Ping Jung¹, Ying Wu¹, Tu-Te Wang¹, Guang-Yu Zheng², Gary Gan²,
& John Zao²
¹University of California, San Diego, ²National Chaio Tung University,
Taiwan

Human cognition has been studied from many physiological perspectives, ranging from minute physiological changes in neural tissue to patterns of observable behavior in meaningful contexts. Makeig et al. (2009) recently proposed a multimodal approach, Mobile Brain-Body Imaging (MoBI), to simultaneously record and synchronize individuals' real-time brain activity with their three-dimensional body and eye movements. This new paradigm offers exciting prospects for studying distributed cortical brain dynamics supporting engagement in complex, real-world activities. However, first full MoBI systems have been costly to implement and required extensive laboratory facilities. This study proposes and demonstrates an inexpensive, portable, easy to use desktop system ('MoBI in a Box') that integrates inexpensive wireless EEG, eye tracking, body motion capture, and touchscreen input with auditory and visual stimuli presented to one or more participants. Low-cost 'MoBI in a Box' type systems can open new frontiers for multimodal imaging experiments that can be conducted in homes, classrooms, clinics, and research labs with only modest funding.

IMAGING BRAIN AND BEHAVIOR

Scott Makeig
University of California, San Diego

Human functional brain imaging studies, which began with single-channel EEG recordings in the 1920s, have flowered during the last 40 years. Unfortunately, most brain imaging modalities (PET, fMRI, MEG) require the participant to hold their head still against a heavy sensor apparatus. New lightweight, high-density, wireless EEG recording systems now allow highly mobile applications – it is now not difficult to record a million bits of information per second about brain activity. Yet for the most part EEG studies collect participant behavior only as occasional finger button presses yielding at best a few bits of behavioral information per second. This severe information bandwidth mismatch between the recorded brain and behavioral data streams is not an efficient way to proceed toward the primary goal of psychophysiology and cognitive neuroscience, to discover links between human brain dynamics, behavior, and experience. The Mobile Brain/Body Imaging paradigm can be seen as a new, emerging functional brain imaging modality that combines simultaneous body and eye movement capture and physiological signals with EEG, audiovisual, and task performance recording. MoBI studies aim to simultaneously record and model brain, behavioral, and physiological dynamics during natural cognition involving physical actions and/or (social) interactions. Major challenges remain in joint modeling of the diverse, high-bandwidth data streams.

10:00 A.M.–11:30 A.M.

Past Presidents Symposium 2.1

THE PRESENT AS THE PAST'S FUTURE: PAST PRESIDENTS PANEL

Chair: Emanuel Donchin
University of South Florida

This "Past Presidents Symposium" continues a tradition launched at the 2008 Annual Meeting. We are again presenting a panel in which 3 Past Presidents are invited to reflect on their Presidential Address from the perspective of the present. The specific topics discussed will be presented by the individual abstracts. The participants this year will be Kees Brunia, Steven Hackley and Christopher Patrick. Emanuel Donchin will also present.

SPN AND THE PREPARATION FOR THE NEAR FUTURE

Kees Brunia
Tillburg University

Slow potentials preceding the making of a movement or the arrival of a stimulus are the reflection of large numbers of EPSPs in equally large numbers of neurons involved in the anticipatory process. Although BP and SPN have a different function and emerge from various cortical areas, the way the potentials are built up suggests basically comparable processes. Both show a systematic increase in negativity up to the moment the crucial event will take place. Here I restrict myself to the SPN. The crucial stimulus arrives at the cortical level via specific thalamic nuclei from where – under control of the reticular nucleus of the thalamus - excitatory fibers run to specific projection areas, reflecting the modality effects found during the recording of the SPN. Yet the feedback itself seems to be of utmost importance. The right hemisphere preponderance we found from the beginning has been confirmed several times in various laboratories, but not always, leaving us with the question why this is the case. There seems to be no doubt any longer about the importance of the insula Reili and the right hemisphere preponderance might be based upon processes in this cortical area. Also the contrast between the anterior and posterior insula is a factor not to be missed now, but earlier on this did not get much emphasis. The involvement of the reticular nucleus remains intriguing, but is perhaps more involved in selection processes than in the very control of the emergence of the SPN. Cortico-cortical connections presumably play a role besides the fronto-thalamo-cortical pathways.

FOR BETTER OR FOR WORSE: PATHS TO A SUCCESSFUL MARRIAGE OF ACTION AND OUTCOME

Steven A Hackley
University of Missouri-Columbia

A number of anticipatory processes can be distinguished during Grey Walter's CNV (contingent negative variation) and Brian Knutson's MID (monetary incentive delay) paradigms. My presidential address described attempts to isolate temporal expectancy and phasic arousal effects that come into play as the signal to respond draws near. Since that 2006 address, research at my lab has focused on the period in which the outcome of that response (feedback or reward) is awaited. Post-auricular reflexes are used to assess positive hedonic state, stimulus-preceding negativity (SPN) to assess motivation-specific attentional processes, and comparisons of participants with and without Parkinson's disease to evaluate the role of the dopamine system. Findings will be discussed with respect to Holroyd and Coles' (2002) influential theory, including paths that can lead to a felicitous match between an eligible trace and unattached reinforcer.

PSYCHOPHYSIOLOGY AND INDIVIDUAL DIFFERENCES: FUTURUM NUNC EST

Christopher J Patrick
Florida State University

Psychophysiology is an experimental discipline but its applications—in areas including mental and physical health, adaptive performance, developmental trajectories, and aging outcomes—focus predominantly on individual differences. Traditional conceptions of individual differences are based largely on self- or informant-report data (e.g., personality dispositions), or in some instances task-behavioral measures (e.g., intellect or other cognitive capacities). Psychophysiological studies of individual differences have sought to 'map' brain or peripheral response measures onto person-factors operationalized in these ways, with less-than-satisfying results—i.e., small effects with inconsistent replicability. In this talk, I describe an alternative approach, entailing reformulation of individual difference concepts themselves through incorporation of physiological data. The approach is grounded in basic principles of measurement theory—which conceive of person-factors as constructs with nomological networks extending into differing domains of observation. Illustrations are provided with reference to mental health related constructs of inhibitory control and threat sensitivity, and innovative approaches to variable quantification and analysis are discussed. I argue that the future of efficacious biologically-oriented research on individual differences is close at hand, and that psychophysiologicalists are uniquely situated to carry the field forward into this future.

10:00 A.M.–11:30 A.M.

Symposium 2.2

TRANSDIAGNOSTIC AND DISORDER-SPECIFIC PROCESSES IN ANXIETY AND DEPRESSION: EVIDENCE FROM PSYCHOPHYSIOLOGY

Chair: Danielle Mathersul, University of Pennsylvania
Discussant: Greg Hajcak, Stony Brook University

Abnormal responsiveness to threat and reward are proposed as distinguishing features of anxiety and depression, respectively. However, high comorbidity and shared genetic liability also suggest there may be common mechanisms for these conditions. Taking a transdiagnostic view, the current symposium utilizes a range of psychophysiological measures to explore specific and shared processes in anxiety and depression. First, Danielle Mathersul will present functional magnetic resonance imaging (fMRI) evidence that anxiety and depressive disorders diverge in their neural reactivity during threat anticipation but not reward consumption. Next, Annmarie MacNamara will present fMRI data highlighting core abnormalities in neural responding to threatening faces in emotional disorders, with divergent patterns emerging for anxious and depressive symptoms. Brady Nelson will then present evidence that separate symptoms of anxiety and depression demonstrate unique associations with startle reflex during anticipation of unpredictable threat. Finally, Stewart Shankman will present data from a family study design highlighting unique vulnerability markers for anxiety and depression (startle and electroencephalography (EEG) asymmetry, event-related potentials (ERPs)) to threat and reward). Greg Hajcak will discuss. These data underscore the value of a transdiagnostic framework for conceptualizing, studying, and classifying emotional disturbance.

NEURAL REACTIVITY TO MONETARY GAIN AND LOSS IN DEPRESSION AND ANXIETY

Danielle Mathersul¹, Ayelet M Ruscio¹, John D Medaglia¹, Haijing Wu¹,
Matthew J Weber¹, & Diego A Pizzagalli²

¹University of Pennsylvania, ²MacLean Hospital/Harvard Medical School

Converging evidence from electrophysiological and neuroimaging research supports the notion of reduced reward responsiveness as a biological marker of pathology and risk for depression. At the same time, there is evidence in support of heightened threat sensitivity as a core mechanism of anxiety. It is known that depression and anxiety co-occur far beyond chance and have a strong shared genetic liability, particularly major depressive disorder (MDD) and generalized anxiety disorder (GAD). Direct comparison of these two disorders provides a particularly conservative test of processes that are common to, and that distinguish, anxiety and depression. The Monetary Incentive Delay (MID) task assesses anticipation and consumption of monetary gain (reward) and loss (conceptualized as threat). The present study utilized functional magnetic resonance imaging (fMRI) to explore neural reactivity during the MID task in adults diagnosed with MDD (without GAD; N=16), GAD (without MDD; N=13), and healthy controls (with no history of psychopathology; N=13). Preliminary results revealed little difference between groups in their neural responses to consumption of reward. In contrast, the GAD-only group displayed reduced bilateral putamen activity during anticipation of threat, compared to the MDD-only group. These results suggest that the possibility of future threat may be more salient to individuals with GAD than MDD, providing further support for the specificity of heightened threat sensitivity to anxiety.

NEURAL REACTIVITY TO SOCIAL SIGNALS OF THREAT IN ANXIETY AND DEPRESSION

Annamarie MacNamara, Julia Roberts, Heide Klumpp, Scott A Langenecker,
& K L Phan
University of Illinois at Chicago

Anxiety and depressive diagnoses (ADs) are demarcated based on specific sets of symptoms, yet evidence points to shared pathology across these disorders, such as overlapping behavioral, cognitive and genetic features. Therefore, psychopathology may be better understood as and represented by brain-based dimensional constructs, which cut across current categorical diagnostic boundaries. In an ongoing study, to elucidate concordance and differences in neural activation across several categories of ADs, 135 psychiatrically healthy individuals and 220 AD participants performed an emotional face-matching task during functional magnetic resonance imaging (fMRI). Compared to their healthy counterparts, AD participants showed greater insula activation and less lateral prefrontal activation in response to threatening faces. Major depression and social anxiety disorder were characterized by heightened insula reactivity, and post-traumatic stress disorder was characterized by increased amygdala reactivity to threatening faces. Across the entire AD sample, greater self-reported anxiety (Hamilton Anxiety) was associated with increased insula reactivity and reduced amygdala reactivity to threatening faces; greater self-reported depression (Hamilton Depression) was associated with heightened amygdala reactivity. The results provide evidence of both shared and unique neural underpinnings of anxiety and depression, and illustrate the importance of considering transdiagnostic, neural dimensions in the development of more refined classification schemes for internalizing psychopathology.

ANXIETY AND DEPRESSION SYMPTOMS DEMONSTRATE UNIQUE RELATIONSHIPS WITH THE STARTLE REFLEX IN ANTICIPATION OF UNPREDICTABLE THREAT IN ADOLESCENT FEMALES

Brady D Nelson, & Greg Hajcak
Stony Brook University

There is growing evidence that sensitivity to unpredictable threat is a core mechanism of anxiety disorders. In multiple studies using a no, predictable, and unpredictable threat (NPU-threat) task, anxiety disorders have been associated with a heightened startle reflex in anticipation of unpredictable threat. There is also evidence that depression, which is highly comorbid with anxiety, is also associated with a heightened sensitivity to unpredictable threat. However, no study has simultaneously examined continuous symptoms of both conditions. Furthermore, these associations have never been examined in adolescent females, a group at increased risk for anxiety and depression. The present study examined the association between anxiety and depression symptoms and the startle reflex during the NPU-threat task in a sample of 75 8-14 year-old adolescent females. Participants completed a developmentally-appropriate version of the NPU-threat task and the Children's Depression Inventory (CDI) and Screen for Childhood Anxiety Related Emotional Disorders (SCARED). CDI negative self-esteem and SCARED social anxiety were associated with a heightened startle reflex during the unpredictable threat condition. Conversely, CDI negative mood and SCARED generalized anxiety were associated with an attenuated startle reflex during the unpredictable threat condition. All results were independent of each other. This study provides novel evidence suggesting multiple anxiety and depression symptoms are associated with unique variance in sensitivity to unpredictable threat in adolescent females.

REWARD AND THREAT SENSITIVITY AS VULNERABILITY MARKERS FOR DEPRESSION AND ANXIETY

Stewart A Shankman
University of Illinois at Chicago

Blunted reward sensitivity and heightened threat sensitivity have long been viewed as key features of depression and anxiety, respectively. There is a growing view, however, that these emotional deficits are not just concomitants of these psychopathologies, but are vulnerability markers for them as well. One way to identify vulnerability markers is with a family study design given that a family history of psychopathology is one of the most robust indicators of vulnerability of psychopathology. This talk will present data from several family studies using psychophysiological indicators of reward (EEG asymmetry and ERP [reward positivity]) and threat (startle). Specifically, an abnormal EEG asymmetry during reward anticipation and blunted reward positivity to receipt of reward are shown to be vulnerability markers for depression but not anxiety. A heightened startle re-

sponse to threat (specifically unpredictable threat) is shown to be vulnerability marker for anxiety, but not depression. Preliminary results from an ongoing RDoC funded R01 will also be presented on other indicators of reward (e.g., reward learning) and threat (e.g., error-related negativity). This line of research has the potential to help identify important underlying mechanisms that play a role in the etiopathogenesis of internalizing psychopathology.

10:00 A.M.–11:30 A.M.

Symposium 2.3

AFFECTIVE NEUROLINGUISTICS: HOW EMOTION MODULATES BASIC LANGUAGE PROCESSING

Chair: Johanna M Kissler
Bielefeld University

Traditionally, language is viewed as an 'encapsulated' symbol processing system whose operations are not affected by specific contents or psychological states. However, recent evidence indicates that both emotional contents and emotional states modulate lexical, semantic and morpho-syntactic language processing. In this symposium, electrophysiological results on the mechanisms of this emotion-language interface will be presented. Firstly, results from single word processing demonstrate amplified early (EPN) and late (LPP) ERPs, reflecting accelerated lexical access, enhanced attention and more pronounced evaluative processing of emotional words. Secondly, emotionally arousing words will be shown to resist the N400 word-frequency effect, revealing fluent processing even of rare emotional words. Thirdly, emotional contents will be demonstrated to modulate morpho-syntactic processing at the sentence level. Finally, experimentally induced mood-states are revealed to affect both semantic and syntactic sentence processing. Positive mood induces a long-range, integrative processing style and negative mood induced a local, detail-focused processing style, which affect N400 and P600 amplitudes, respectively. Together, these data specify how various linguistic processes and their concomitant electrophysiological signatures are affected by emotional contents and emotional states both at the word and at the sentence level. Basic language processing, just like other types of cognition, is modulated by emotion. Theoretical implications will be discussed jointly with the audience.

LOVE IS (NOT JUST) A WORD - MECHANISMS OF EMOTION PRIORITIZATION IN VISUAL WORD PROCESSING

Johanna M Kissler
Bielefeld University

Humans can associate emotions with abstract symbols. Words therefore differ in their emotional quality. This talk will give an overview of recent studies investigating the impact of emotional content on visual word processing. Electroencephalographic (EEG) studies show that our brain differentiates spontaneously and reliably between emotional (positively and negatively arousing) and neutral words. This is reflected in a larger early posterior negativity (EPN) and a larger late positive potential (LPP) for emotional words. An attentional interpretation of the EPN and LPP effects suggests that emotional words are spontaneously attended to more than are neutral ones, both during early perceptual tagging (EPN) and during late evaluative processing (LPP). Indeed, both task-driven attention and emotional content amplify the EPN in parallel and act synergistically on the LPP, causing larger task effects for emotional words. Conversely, emotion EPN and emotion LPP persist when experimental participants are given a primary syntactic task. Within the EPN time-window the brain also responds faster to emotional than to neutral words, faster differentiating emotionally arousing words from pseudowords than neutral words from pseudowords. This earlier lexical access may be one basis for the faster lexical decisions to emotional words found in behavioral studies. Specifically for positive words, these are further sub-served by response facilitation, evident in the readiness potential. Thus, emotional words are prioritized across several cortical processing stages.

German Research Foundation.

THE AVALANCHE EFFECT: EMOTIONALLY SALIENT WORDS ARE NEVER RARE TO YOUR BRAIN.

Nathaniel Delaney-Busch, & Gina Kuperberg
Tufts University

A longstanding idea is that emotional information can be “privileged” over other information during stimulus processing — so-called affective primacy. There is some behavioral evidence for affective primacy even when processing single emotional words, presented in isolation of any preceding context: where frequent words are typically read and responded to faster than infrequent words, emotional words can be processed with disproportionate speed even when they are infrequent (consider hearing the word “avalanche!” shouted in your direction). We used ERPs to ask when and at which level of processing this emotion advantage is incurred, and whether it is driven primarily by the valence or by the arousal properties of emotional words. Previous ERP studies have established that the lexical frequency effect for words presented in isolation typically manifests between 300-400ms (the early N400), with more frequent words evoking a smaller N400, reflecting facilitated lexico-semantic processing. We conducted a mixed-effects regression on trial-by-trial ERP amplitudes for 468 English words that varied widely by Valence, Arousal, and Frequency. We found that more emotional words showed significantly diminished frequency effects on the N400 (between 300-400ms over posterior electrode sites), and that this was driven primarily by arousal. These data suggest that highly arousing words are facilitated during lexico-semantic processing, regardless of their frequency, and provide strong evidence for affective primacy on words appearing even in the absence of sentence or discourse contexts.

YOUR STOMACH HURTS: EFFECTS OF EMOTION ON THE PROCESSING OF PERSON AGREEMENT

Natalia Martínez-García, Uxia Fernández-Folgueiras, Teresa Diéguez-Risco, Miguel A Pozo, & José Antonio Hinojosa
Universidad Complutense de Madrid

Most of the research on emotion and language interactions investigated how emotional content modulates several aspects of lexico-semantic analyses in single words. However, there is some evidence, which suggests that affective information may also influence morphosyntactic processing. In this sense, the results of recent studies showed that emotional content affects the processing of agreement relations between sentence constituents based on either gender or number information. In the current study we focused on the modulatory effects of emotion in the processing of person agreement relations. For this purpose, event-related potentials (ERPs) were recorded while participants read sentences and performed a syntactic judgment task. In these sentences, negative, positive and neutral verbs could agree or disagree in person with the preceding pronoun. The results indicated that person agreement errors were associated with a negative component around 300 ms, which was modulated by the emotional content of words. In particular, reduced amplitudes in this component were found when person agreement relationships were violated in emotional compared to neutral words. This result suggests that the processing of this type of morphosyntactic error is facilitated in emotional words.

INTERACTIONS BETWEEN EMOTION AND LANGUAGE: AN INVESTIGATION OF THE ROLE OF EMOTIONAL STATE AND ATTENTION ON THE PROCESSING OF NEUTRAL LANGUAGE

Dorothee J Chwilla
Donders Institute for Brain, Cognition and Behaviour

The classic account is that language processing occurs in isolation from other cognitive systems, like perception, motor action and emotion. The central theme of this talk is the relationship between a participant’s background emotional state and language comprehension. Does emotional context – like being in a happy or sad mood – affect how we process neutral words? I will present an overview of ERP results from our lab in which we investigated the effects of emotional state on the processing of: (1) word meaning (e.g., highly expected: “In that library the pupils borrow books ...” vs. unexpected: “The pillows are stuffed with books ...”), (2) semantic reversal anomalies relative to plausible sentences (e.g., “The cat that fled from the mice” vs. “The mice that fled from the cat”), and (3) syntactic agreement errors relative to correct sentences (e.g., “The daughter who about their parents talked [plural]” vs. “The parents who about their daughter talked [plural]”). Interactions between emotional state and language (semantic or syntactic processing) were obtained in all three studies. What are the mechanisms behind the emotion by language interactions? Could more general factors like

attention underlie the interaction of emotional state with semantics or syntax? This question was addressed in two more ERP studies by manipulating attention (directed at semantic/syntactic features or at purely physical features) next to emotional state. The results of these studies will be presented and the implications for theories of language comprehension will be discussed.

2:45 P.M.–4:45 P.M.

Symposium 3.1

ADAPTIVE CONTROL: NEUROCOMPUTATIONAL SUBSTRATES AND IMPLICATIONS FOR NEUROPSYCHIATRIC DISEASE

Chair: Alexander J Shackman, University of Maryland
Discussant: Alexander J Shackman, University of Maryland

The mid-cingulate cortex (MCC) plays a central role in contemporary models of emotion and cognition. While it is clear that the MCC biases attention, learning, and behavior in the face of uncertainties about actions and motivationally-significant outcomes, the neurocomputational mechanisms underlying adaptive control have remained unclear. Here, we describe recent advances in our understanding of the nature and origins of adaptive control and their implications for neuropsychiatric disease. We begin by describing compelling electrophysiological evidence ($n > 500$) that MCC control signals are sensitive to individual differences in temperament and predict adaptive adjustments in motivated behavior. Next, we highlight efforts to establish computationally-grounded, translational models of adaptive control. This work demonstrates that electrophysiological markers of control can be used to integrate computational and animal models, providing unique insights into the mechanisms underlying adaptive and maladaptive control. Next, we describe computational and imaging evidence that the paucity of control functions that have been ascribed to MCC reflect the optimal allocation of control based on its expected value. Finally, we will describe new evidence that MCC plays a key role in regulating temporally-extended bouts of motivated behavior. These findings provide a novel framework for understanding the role of adaptive control in health and disease, suggest the most important future challenges, and set the stage for developing more effective intervention strategies.

University of Maryland.

THE ERN, COGNITIVE CONTROL, AND ANXIETY: FROM BETWEEN- TO WITHIN-SUBJECTS RELATIONSHIPS

Greg Hajcak, Alexandria Meyer, Jennifer N Bress, Daniel Mackin, Emily Hale-Rude, Greg Perlman, & Roman Kotov
Stony Brook University

The error-related negativity (ERN) is observed following errors and is generated in the anterior cingulate cortex (ACC)—a region of the brain that is thought to integrate information about punishment to guide behavioral adaption (Shackman et al., 2011). Theories of brain function are mainly based on within-subjects comparisons. Our group has been most interested in between-subjects variability (i.e., individual differences) in the ERN; an increased ERN has consistently been related to anxiety disorders and risk for anxiety. However, these effects are unaccompanied by post-error behavioral differences. Very few studies have examined trial-by-trial associations between the ERN and behavioral measures (i.e., reaction time, accuracy) of cognitive control, and none have done so in the context of development and individual differences in anxiety. In the current talk, I will present ERN and behavioral data from over 500 female adolescents. I will discuss both between- and within-subjects associations between ERN and post-error behavioral measures, as well as how these associations vary by development and individual differences in anxiety.

E-PHYS IS THE BASIS: A TRANSLATIONAL MODEL OF ADAPTIVE CONTROL

James F Cavanagh¹, Krystal Parker², Kuan-Hen Chen², & Kumar Narayanan²

¹University of New Mexico, ²University of Iowa

Electrophysiology affords us a window into canonical neural operations. This makes it well-suited for identifying potential biomarkers of aberrant operations in psychiatric and neurological disease. However, the limitations of non-invasive human recordings require a translational animal model for a mechanistic understanding of candidate biomarkers. This talk will discuss a translational model of adaptive control based on interval timing tasks. Rodents can easily learn to perform interval timing, and they spontaneously adapt their behavior based on previous mistakes. Evidence will be presented to describe how the electrophysiological basis of post-error adaptation in mediofrontal cortex is remarkably similar between human and rat. These behaviors and electrophysiological patterns are dependent on mediofrontal dopamine D1 activity in rat. This finding motivated a translational test of the functional integrity of adaptive control in Parkinsonian patients. Both Parkinsonian patients and dopamine-depleted rats had similar deficits in behavior and in electrophysiological patterns during interval timing. In rat, dopamine depletion interrupted performance by attenuating spike-field coupling in mediofrontal cortex. In patients, deficits in an executive control battery correlated with the degree of electrophysiological attenuation. Collectively, these findings suggest that electrophysiological rhythms can be used as a common denominator in translatable rodent-human models, facilitating a mechanistic understanding of candidate biomarkers.

University of New Mexico.

ANTERIOR CINGULATE CORTEX AND THE EXPECTED VALUE OF CONTROL

Amitai Shenhav, Sebastian Musslick, Matthew M Botvinick, & Jonathan D Cohen
Princeton University

Despite being a frequent player in the neuroscience of cognitive control, the functions of dorsal anterior cingulate cortex (dACC) are still heavily debated. A particularly common finding is that dACC tracks how much cognitive control is required based on current task demands (e.g., conflict), and influences how control is deployed. More recent work has shown that dACC also tracks the subjective cost associated with exerting cognitive effort, suggesting an additional role for this region in estimating not only how much control is necessary, but how much is worth exerting. It therefore remains an open question to what degree the dACC is responsible for evaluating both control strength and control costs, and/or regulating control itself, and how these functions relate to what is known about the dACC's role in tracking reward, punishment, and violations of expectation for motor actions. Building on previous models of cognitive control and action valuation, we offer a normative model of cognitive control that considers how both the type and strength of control is determined based on potential payoffs and costs (including the cost of exerting control), similarly to how these calculations might be made when choosing motor actions. Within this framework, we suggest that a central function of the dACC is to determine and specify the optimal type and strength of cognitive control to engage at a given time. I will describe how this model can replicate classic and more recent findings from research on cognitive control, and how it accounts for a wide variety of findings within dACC.

C.V. Starr Foundation and the John Templeton Foundation.

ANTERIOR CINGULATE CORTEX FUNCTION AND DYSFUNCTION IN HEALTH AND DISEASE

Clay B Holroyd, & Akina Umemoto
University of Victoria

Many complex psychiatric disorders are characterized by constellations of heterogeneous clinical symptoms that resist diagnosis and treatment. The Research Domain Criteria (RDoC) framework prescribes defining such problems according to shared, underlying neurocognitive mechanisms. According to this perspective, these complex disorders reflect the extreme expression of personality traits that fall along continua throughout the wider population. For example, anterior cingulate cortex (ACC) dysfunction is associated with a variety of intractable mental disorders including depression, schizophrenia, attention deficit hyperactivity disorder, obsessive compulsive disorder, substance abuse, and more. Understood in the context of the RDoC framework, ACC function manifests as a dimension of personality that is differentially expressed across individuals, the extreme ends of which contribute to multiple psychiatric problems. Yet progress in applying this

framework is hampered by the fact that the normal function of ACC in healthy individuals is poorly understood. Here I will present a recent theory that holds that ACC is responsible for hierarchical control over extended behaviors, relate several personality traits to the normal expression of this function, and suggest how a common dimension underlying these traits might mediate the contribution of ACC to several neurocognitive problems. This argument will be supported with the results of computational simulations and event-related brain potential experiments.

2:45 P.M.—4:45 P.M.

Symposium 3.2

AUDITORY PREDICTIONS INDUCED BY EXTRACTED SENSORIAL RULES AND BY INTENTIONAL ACTIONS

Chair: Erich Schröger
University of Leipzig

Prediction denotes a hypothetical 'inferential' mechanism in the service of perception that considers prior information when interpreting the sensorial input. This is of special relevance for the auditory system which has to deal with dynamic and volatile signals that need to be analyzed on-line. Predictability can be based on some regularity inherent to the auditory stimulation (e.g., the next tick of a metronome is predictable after a few sample sounds) or to an association between an intention based action and its expected effect (e.g. ringing the bell of my friend's apartment causes the expectation of a well-known sound). This symposium collects recent work from groups located in UK, Australia, Spain, Hungary and the USA, revealing the cortical network engaged in extracting complex regularities (Chait), investigating the factors contributing to the newly detected primacy bias in auditory-based rule extraction (Todd), showing that action-based predictions are represented with sensory templates (SanMiguel), determining the influence of the actually applied force of the motor act (Neszmélyi), and yielding evidence for predictive coding failures in schizophrenia patients from action-based paradigms (Ford). We will argue that these new results fit well under the umbrella of the predictive coding framework.

DFG-Reinhart-Koselleck-Grant.

SENSITIVITY TO THE EMERGENCE OF PREDICTABLE STRUCTURE IN SOUND SEQUENCES

Nicolas Barascud¹, Ryszard Auksztulewicz¹, Theofilos Petsas¹, Sijia Zhao¹, Marcus Pearce², Karl Friston³, & Maria Chait¹

¹University College London, ²Queen Mary University of London, ³Wellcome Trust Centre for Neuroimaging, University College London

Patterns or regularities in on-going sound sequences are key cues to understanding complex auditory environments. The pattern of sound often conveys the identity and state of objects within the scene and also enables the listener to predict future events, supporting efficient interaction with the surrounding environment. In my presentation I will review recent behavioral and brain imaging findings from my lab that demonstrate just how sensitive we are to complex sound patterns, including those that we have never previously encountered and, indeed, maybe unlikely to encounter outside of the laboratory. Our findings suggest that the auditory brain is a remarkably well-tuned 'pattern seeker', continuously scanning the unfolding auditory input for regularities, even when listeners' attention is focused elsewhere. Brain responses reveal online processes of evidence accumulation - dynamic changes in tonic activity precisely correlate with the expected precision or predictability of ongoing auditory input - both in terms of deterministic (first-order) structure and the entropy of random sequences. Source analysis demonstrates an interaction between primary auditory cortex, the hippocampus and inferior frontal gyrus in the process of 'discovering' the regularity within the ongoing sound sequence. The results are consistent with precision based predictive coding accounts of perceptual inference and provide compelling neurophysiological evidence of the brain's capacity to encode high order temporal structure in sensory signals.

THE BIG PICTURE: CUMULATIVE KNOWLEDGE ABOUT CONTEXT ALTERS AUTOMATIC FILTERS OF RELEVANCE

Juanita Todd¹, Daniel Mullens¹, Jade Frost¹, Karlye Damaso¹, Andrew Heathcote², & István Winkler³

¹University of Newcastle, ²University of Tasmania, ³Hungarian Academy of Sciences, Institute of Cognitive Neuroscience and Psychology

Evoked potentials can be used to study how the auditory system utilizes patterning to extrapolate predictions about the most likely characteristics of upcoming sounds. The mismatch negativity (MMN) component is automatically evoked when sound deviates from predictions. MMN signals that the prediction was in error and therefore the underlying model may need updating to reflect a changed environment. MMN amplitude is largest when patterns are stable and errors are rare. By employing role-reversals in sound sequences (i.e., two tones alternating as probable and predictable ($p=.875$) or rare and unpredictable ($p=.125$)) we have shown that MMN amplitude does not faithfully reflect short-term pattern stability, but is instead subject to modulation by a primacy bias: More confident predictions are made for stimulus configurations matching the one first encountered than the reversed one. Data from three new studies will be used to demonstrate that susceptibility to this bias: (a) does not diminish with repeated exposure; (b) incorporates predictions about higher-order sequence patterning; and (c) is adjusted to reflect cumulative knowledge about the attributes that prove to have the most predictive value within the current context. The results are compatible with a hierarchical structure to perceptual inference reflecting patterns at multiple timescales, with higher levels imposing a first-impression bias on the lower ones.

MOTOR-DRIVEN SENSORY PREDICTIONS AND THEIR INFLUENCE ON PERCEPTION

Iria SanMiguel¹, & Erich Schröger²

¹University of Barcelona, ²University of Leipzig

Perception is an active process of interpreting sensory signals. This active process relies heavily on the brain's capacity to formulate predictions about upcoming sensory signals, which are then contrasted against the sensory input. This constant testing of predictions allows the sensory system to maintain a faithful internal model or representation mirroring the external sensory environment. A very important source of sensory prediction is our own motor behavior. Motor acts are executed with the intention of causing changes in the external sensory environment. Hence, it is proposed that a specific prediction of the expected sensory consequences is associated with every motor command. Studying motor-driven predictions provides a powerful tool to investigate the role of prediction in sensory processing, and particularly the neural representation of prediction in the sensory systems. The brain's response to self-triggered stimulation differs from its response to the identical stimuli when caused by an external agent. By comparing electrophysiological responses between self- and externally-generated sounds, and between motor acts with and without associated auditory consequences, we will show that sensory predictions stemming from motor acts are represented with sensory templates. That is, motor commands that have associated sensory consequences predictively activate the neural representation of the expected sensory input.

SELF-INITIATED TONES: FEEDBACK TO OPTIMIZE TONE-ELICITING ACTIONS

Bence Neszmeilyi, & János Horváth
Hungarian Academy of Sciences

Goal-directed behavior depends on the utilization of information about future events. Such information can be represented by various cognitive subsystems, which may or may not directly interact. The present study investigated the information flow between the motor and the auditory systems. Event-related potentials (ERPs) elicited by action-sound coincidences are smaller than those elicited by sounds in the absence of action. The auditory contribution to the coincidence waveform is estimated by subtracting an ERP related to actions not coinciding with sounds. This logic relies on the assumption that actions and action-related ERPs are identical in the two conditions. For paradigms with self-induced sounds, this assumption is not self-evident. In three experiments, participants pinched a force sensitive sensor, which triggered the presentation of a sound when the force reached a threshold (Motor-Auditory condition) or had no auditory effect (Motor condition). In the Auditory condition, a replay of a previous sound sequence was presented. Pinch-force profiles were markedly different between conditions: the applied force was stronger, and pressure was maintained for longer in the Motor-, than in the Motor-Auditory condition. This suggests that participants used the self-initiated sounds as feedback to optimize the to-be executed motor patterns. Importantly, however, separating the Motor ERPs by the applied force did not substantially affect the ERPs, which suggests that the observed self-initiation-related ERP attenuations are unlikely to be caused by this difference.

ACTION-BASED PARADIGMS REVEAL PREDICTIVE CODING FAILURES IN SCHIZOPHRENIA PATIENTS

Judith M Ford, Vanessa Palzes, Brian J Roach, & Daniel H Mathalon
VA Medical Center and University of California, San Francisco

The brain is in the prediction business. Predictions about imminent sensations can be made in at least two ways: We predict sensations that result from actions that produce them, and we predict sensations based on the past context. Action-based predictions are innate and avoid the need for appreciating and learning a context. Using action-based approaches, we can assess neural activity associated with movements and the emergence of a sense of agency associated with the movement. We asked if psychosis is associated with abnormal connectivity between motor and auditory cortical areas when pressing a button to deliver a tone. Patients with schizophrenia ($n = 35$) and age-matched controls ($n = 32$) pressed a button to deliver tones during the acquisition of hemodynamic functional brain imaging (fMRI) data. We used seed-based functional connectivity analyses to assess the degree of correlation between motor and auditory cortex. We related abnormalities in connectivity to symptoms of psychosis. There were strong anti-correlations between motor and auditory cortex in healthy controls, which were missing in patients with schizophrenia. The degree of abnormality was correlated with the severity of delusions in these patients. By involving active participation in sensations, action-based paradigms reproduce the experience of all animals that navigate the planet and move through their environments. Abnormalities of this action-based mechanism in the auditory system may contribute to disturbed thinking and consequent delusions. These errors of prediction are costly to society and patients.

2:45 P.M.–4:45 P.M.

Symposium 3.3

EQUAL, BUT NOT THE SAME: WHY PARTICIPANT DIVERSITY MATTERS IN THE STUDY OF PHYSIOLOGY-BEHAVIOR ASSOCIATIONS

Chairs: Michelle N. Shiota

Arizona State University and Lisa Gatzke-Kopp, Pennsylvania State University

This Symposium and Panel focus on the question addressed in an upcoming Special Issue of *Psychophysiology*: whether the associations of physiological mechanisms with psychological, cognitive, and behavioral processes are universal, or whether these mechanisms develop within biological (e.g. sex) and environmental (e.g. culture) contexts that can moderate links between physiology and behavior. Presenters highlight empirical examples that illustrate the need to systematically consider diversity in our research, not only in participant sampling, but also in examining relationships among variables that reflect important psychological processes. Implications of these findings for the field of psychophysiology will be discussed, along with the challenges researchers face in addressing these issues.

INTRODUCTION: WHAT IS A REPRESENTATIVE SAMPLE, AND WHO DOES IT REPRESENT?

Lisa Gatzke-Kopp, Department of Human Development and Family Studies,
Pennsylvania State University

EMPIRICAL TALKS:

PHYSIOLOGICAL COSTS OF NEUROTICISM ARE ATTENUATED IN U.S. LATINAS

Belinda Campos
University of California, Irvine

Neuroticism is a heritable and stable personality trait defined by high experience of negative emotion, being easily stressed and slow to soothe. Neuroticism poses a risk for poor social and health outcomes identified as major public health concerns. We tested the hypothesis that these costs of neuroticism would be attenuated in socio-cultural contexts that emphasize readily accessible social support, emotional positivity, and physical proximity in interdependent relationships. U.S. Latino culture fits these characteristics. Two studies, an online survey study (Study 1) and a laboratory study (Study 2), tested whether three key costs of high neuroticism less support (Study 1), more distress (Study 2), and blunted cortisol reactivity (Study 2) would be attenuated in U.S. Latinas relative to non-Latinas of European and East Asian cultural background. As hypothesized, moderation effects were found indicating that Latina women who had higher levels of neuroticism continued to feel supported, were not as psychologically distressed, and their cortisol reactivity was less blunted than that of their non-Latina counterparts.

CONVERGENCE IN FEELING, DIVERGENCE IN
PHYSIOLOGY: CONSEQUENCES OF DISGUST
AMPLIFICATION AND SUPPRESSION AMONG EUROPEAN
AMERICANS AND ASIAN AMERICANS

Jose Soto¹, Elizabeth Lee¹, & Nicole Roberts²
¹Pennsylvania State University, ²Arizona State University

Much empirical work documents the downsides of suppressing emotions. Emerging research points to the need for a more sophisticated and culturally-informed approach to understanding the consequences of emotion regulation. To that end, we employed behavioral, self-report, and psychophysiological measures to examine the consequences of two types of emotion regulation (suppression and amplification) in a sample of 28 Asian Americans and 31 European Americans. Participants were shown a neutral film and then a series of disgust-eliciting films during which they were asked to regulate their response by suppressing or amplifying their emotional behavior (counterbalanced). Despite self-reporting equal levels of disgust, European Americans showed greater skin conductance reactivity than Asian Americans in both regulation conditions, but not in response to a neutral film. These findings extend work on divergence in the consequences of emotion regulation across different cultural groups, which could help identify optimal emotion regulation strategies for health and well-being.

SEX AS A MODERATOR OF BRAIN-BEHAVIOR
ASSOCIATIONS DURING EARLY CHILDHOOD: AN EEG
ANALYSIS OF EXECUTIVE FUNCTIONS

Kimberly Cuevas¹, Susan D. Calkins², & Martha Ann Bell³
¹University of Connecticut, ²University of North Carolina, Greensboro,
³Virginia Polytechnic University

Executive functions (EFs) are linked with optimal cognitive and social-emotional development. Despite behavioral evidence of sex differences in early childhood EF, little is known about potential sex differences in corresponding brain-behavior associations. The present study examined changes in 4-year-olds' 6-9 Hz EEG power in response to increased executive processing demands (i.e., "Stroop-like" vs. "non-Stroop" day-night tasks). Although there were no sex differences in task performance, an examination of multiple scalp electrode sites revealed that boys exhibited more widespread changes in EEG power as compared to girls. Further, multiple regression analyses controlling for maternal education and non-EF performance indicated that individual differences in boys' and girls' EF performance were associated with different frontal neural correlates (i.e., different frontal scalp sites and different measures of EEG power). These data reveal valuable information concerning the emergence of sex differences in the neural systems underlying executive processing during early childhood.

DISCUSSANT: STRIKING WHILE THE IRON IS HOT: THE CASE FOR
ADDRESSING DIVERSITY NOW IN PSYCHOPHYSIOLOGY
RESEARCH
Jason S. Moser
Michigan State University

PANEL DISCUSSION: NEEDS, CHALLENGES, AND SOLUTIONS
Moderator: Michelle "Lani" Shiota, Arizona State University

FRIDAY, OCTOBER 2, 2015

1:45 P.M.–3:15 P.M.

Symposium 4.1

**USING BIOBEHAVIORAL PROFILES TO DECREASE
HETEROGENEITY, IMPROVE SPECIFICITY AND
PREDICTION OF RISK**

Chair: Kristin A Buss
The Pennsylvania State University

Many psychiatric disorders are considered to be neurodevelopmental in nature. The goal of much of the research in this area has been on identifying biomarkers that can predict onset, developmental course, and outcomes. However, considerable phenotypic heterogeneity exists among individuals identified within various temperamental risk and disorder groups. To add the mix, many of the physiological measures used commonly in the literature are sensitive to changes in behavior but not always specific to a particular process or pattern of behavior. This results in what looks like common biomarkers across various behaviors and disorders. The four talks in this invited symposium will highlight how careful examination

of biobehavioral profiles, especially within particular contexts, can increase specificity of underlying processes and identify unique patterns that improve prediction of risk. Hastings will present data from two ongoing longitudinal studies highlighting the value of person-specific models to create biobehavioral profiles that predict different outcomes. Fox will review a series of studies that demonstrate that the error-related negativity ERP component reflects the salience of committing an error. Shackman will present findings from children and an animal model that demonstrate both common and unique patterns of biobehavioral profiles of anxious temperament. Dennis will present data demonstrating that individual differences in discrete neurocognitive responses to threat predict which individuals will respond to attention bias modification training.

WHAT DO PERSON-CENTERED APPROACHES TO
EXAMINING MULTI-SYSTEM BIOBEHAVIORAL RELATIONS
BUY US?

Paul D Hastings, Joseph E Gonzales, Roberta Schriber, David Weissman, &
Amanda E Guyer
University of California, Davis

Two studies examined multi-system neurobiological subtypes of children in relation to behavior and adjustment. The first included PNS and HPA responses to peer contexts and children's social skills. Salivary cortisol levels and RSA were recorded in 122 preschool-aged children (M=3.5y) as they entered their classroom; self- and mother-reported social skills were collected 5 years later. Overall, preschoolers with higher RSA while with peers and greater cortisol increases after classroom entry had better self- and mother-reported social skills in childhood. There was a non-linear association between PNS and HPA response to classroom entry: preschoolers with the highest RSA had moderate HPA responses. This group reported more empathy, and were rated by mothers as more responsible, compared to other RSA-HPA groups. The second study used RSA and neuroimaging measures to predict depression in 218 Mexican-origin youths (M=16.5y). Resting RSA, Δ RSA to entering a MRI scanner, brain structure, and brain activation to Cyberball exclusion were recorded. Youths with larger hippocampal volume and greater subgenual anterior cingulate cortex (subACC) activation to exclusion reported more depression. Latent class analysis on RSA, Δ RSA, hippocampal volume and subACC activation identified three groups. Youths with stronger subACC activation to exclusion and more RSA suppression to entering the scanner, but average resting RSA and hippocampal volume, reported more depression than the other groups. The implications of both studies for models of biobehavioral development will be discussed.

HOW CAN WE BETTER UNDERSTAND THE LINK BETWEEN
THE ERROR-RELATED NEGATIVITY, TEMPERAMENT, AND
RISK FOR ANXIETY?

Nathan A Fox, & Tyson V Barker
University of Maryland

The error-related negativity (ERN) is a negative deflection in the event-related potential waveform following an erroneous motor response, and the magnitude of the ERN is related to subsequent changes in behavioral performance following an error (e.g., post-error accuracy and reaction time). A variety of data suggest that the ERN is associated with individual differences in anxious symptomatology, and is elevated amongst children and adults with an anxiety disorder. There is, however, considerable debate about why the ERN is related to anxiety, particularly because anxiety is unrelated to post-error behavior. There is growing evidence to suggest that the ERN is related to early temperament/personality factors, such as behavioral inhibition, a temperament identified in toddlerhood characterized by hypervigilance to threat and is a risk factor for anxiety. These findings suggest that the ERN may in part represent salience, particularly toward potential threat, of committing an error, rather than a signal to adjust behavioral control. Thus, the ERN/anxiety relation may be driven by stable individual differences in reactivity toward the environment. The current talk will provide an overview of theoretical models of the ERN and present data from both cross-sectional and longitudinal studies of the ERN, temperament, and anxiety that support the idea that the ERN represents the salience of committing an error.

NEURAL MECHANISMS UNDERLYING SIMILARITIES AND DIFFERENCES IN THE PRESENTATION OF EARLY-LIFE ANXIETY

Alexander J Shackman
University of Maryland

Children with an inhibited or anxious temperament (AT) are at risk for developing anxiety and depression. Like these disorders, AT is a multidimensional phenotype and children with extreme anxiety show different symptom profiles. Using multimodal brain imaging and a well-validated monkey model of childhood AT, we have provided evidence that this phenotypic heterogeneity reflects a combination of common substrates (brain regions shared by individuals with different presentations) and selective substrates (regions that are associated with particular phenotypic profiles). Elevated metabolism in the central (Ce) nucleus of the amygdala was a common feature of individuals with different presentations of AT ($n = 238$). Variation in each dimension of the anxious phenotype—HPA activity, freezing behavior, and expressive vocalizations—was predicted by activity in the Ce. Furthermore, reduced functional connectivity between the Ce and prefrontal cortex was associated with heightened anxiety in monkeys ($n = 89$) and anxiety disorders in children (8–12 years; $n=28$). We identified a second set of brain regions that predict particular dimensions of the anxious phenotype. Activity in these phenotype-selective regions distinguished individuals with high levels of cortisol, high levels of freezing, and low levels of spontaneous vocalizations, respectively. These findings provide a framework for understanding the mechanisms that lead to heterogeneity in the clinical presentation of emotional disorders and set the stage for developing improved early-life interventions.

FOR WHOM THE BELL TOLLS: NEUROCOGNITIVE INDIVIDUAL DIFFERENCES PREDICT EFFECTS OF ATTENTION BIAS MODIFICATION TRAINING

Tracy A Dennis, & Laura J Egan
Hunter College of the City University of New York

The anxiety-related threat bias, or exaggerated attention to threat, has been examined as a causal mechanism in anxiety. Computer-based attention bias modification training (ABMT) has shown promise as a novel treatment approach. However, emerging evidence demonstrates variability in ABMT response and little is known about those for whom ABMT might be most effective. We leverage the sensitivity and specificity of scalp-recorded event-related potentials (ERPs) to identify individual differences in discrete neurocognitive responses to threat that predict the magnitude of ABMT effects. In Studies 1 and 2, trait-anxious adults received ABMT vs. placebo training. In the ABMT group, those with larger ERPs reflecting early visual detection (N1) prior to training, and reduced magnitude of this response by completion of training, showed less stress reactivity. In contrast, those showing truncated recruitment of more controlled responses to threat (N2) prior to training showed more stress reactivity. In Study 3, embedding ABMT into an engaging and enjoyable format (i.e. a mobile app) led to expected reductions in threat bias and stress reactivity in trait-anxious adults, but primarily among those showing enhanced early threat detection. Taken together, findings suggest that individuals who show enhanced early threat detection combined with the ability to engage cognitive control may benefit most from ABMT. Results have the potential to improve identification of individuals who are most likely to respond to training, and refine ABMT to more effectively target intervention mechanisms.

1:45 P.M.–3:15 P.M.
Symposium 4.2

BRAIN SYSTEMS FOR ACTION PERCEPTION IN UNDERSTANDING CO-SPEECH GESTURE AND SIGNED LANGUAGES

Chair: Seana Coulson
University of California, San Diego

Watching a diver glide into the pool, a dancer pirouetting across a stage, or two boys wrestling in the grass, our brains extract meaning from the motion of the human body. This symposium will examine commonalities and differences in the neurocognitive mechanisms recruited for action perception and those used to process bodily motion with more symbolic characteristics. First, Coulson and colleagues address depictive or iconic gestures that accompany speech. Unlike the diver's intrinsically meaningful movements, co-speech gestures are meaningful because they resemble the visual properties of the things they represent, much as pictures do. EEG and ERP data suggest that while there are commonalities in the processing of pictures and iconic gestures, they differ in the engagement of brain

systems specialized for human action perception. Next, Holcomb and colleagues address signs in American Sign Language (ASL). These movements of the body are meaningful in virtue of the conventions of the linguistic community comprised of ASL signers. Comparing ERPs elicited by ASL signs in fluent signers versus non-signers, they find evidence for differential engagement of semantic processing systems indexed by the N400 ERP component. Finally, Corina describes ERP and fMRI data that suggests that in processing ASL signs, linguistic expertise mediates recruitment of neural systems for action perception, with reduced activation in fluent signers relative to non-signers.

SENSORIMOTOR CORTEX AND UNDERSTANDING CO-SPEECH GESTURES

Seana Coulson, Ying Choon Wu, & Scott Makeig
University of California, San Diego

EEG was recorded from healthy adults as they viewed short video clips of spontaneous co-speech gestures preceded by either congruent or incongruent cartoon contexts (e.g. a gesture showing an object being raised overhead paired with a cartoon showing a cat trapping a mouse with a flowerpot). Prior research in our lab has shown that, relative to incongruent stimuli, contextually congruent gestures elicit reduced amplitude N400 characteristic of semantic analysis. ERP gesture congruity effects were similar in time course to image congruity effects observed in the same participants, but differed in topography, suggesting gestures engage somewhat different brain regions. Here we utilized independent component analysis (ICA) to examine underlying source activities in the EEG. Event-related spectral perturbations (ERSPs) visualized spectral modulations (3-122 Hz) of IC activations during the 2.5 s intervals when gestures were on screen. A domain in and near the right superior parietal lobule and right post-central gyrus exhibited sensitivity to cartoon-gesture congruency. Relative to their incongruent counterparts, congruent gestures elicited greater event-related desynchronization (ERD) in the 7-12 Hz (alpha) and 17-20 Hz (beta) ranges from approximately 500ms after video onset to video offset. This cortical source domain overlaps areas known to respond to the perception of meaningful body movement, and implicated in the action perception system. Data suggest neural systems recruited during observation of patterned body movements also play a role in gesture comprehension.

TRACKING THE TIME-COURSE OF ASL WORD PROCESSING USING ERP REPETITION PRIMING

Phillip J Holcomb¹, Katherine J Midgley¹, Jonathan Grainger², & Karen Emmorey¹

¹San Diego State University, ²CNRS

A well-documented finding in cognitive electrophysiology is the attenuation of the ERP response to repeated compared to unrepeated words. Such repetition priming has been shown to influence several ERP components and has thus proven a useful paradigm for helping understand the time-course of word processing. Here we report a study with two groups of participants who viewed a series of ASL signs in a repetition priming paradigm. ASL deaf signers performed a go/no-go semantic categorization task (press to occasional signs for people, e.g., policeman) to 235 video clips of ASL signs. Forty critical items were repeated on the next trial. Non-signing hearing participants also viewed the same stimuli, but because they did not know the meaning of the ASL signs their task was to press to occasional signs that contained a dot superimposed at different locations near the face of the signer. The ERP data were time locked to several points during the temporal unfolding of each sign (e.g., clip onset and sign initial hold) in order to determine relationship between the time course of ERP repetition effects and the dynamic processing of sign content. Results indicate significant repetition effects throughout the time course of the ERP response, although the pattern of effects was quite different for the two groups, especially during the N400 epoch. The results will be discussed within the context of recent models of word processing.

SIGN LANGUAGE AS HUMAN ACTION

David P Corina
University of California, Davis

To what extent does the perception of a signed language, such as American Sign Language (ASL), rely on brain systems used for human action understanding? We present behavioral, fMRI and electrophysiology data that directly compare the processing of sign language to non-linguistic gestures in deaf versus hearing sign-naïve participants. Behavioral studies of repetition priming and lexical decision indicate that deaf signers and hearing sign-naïve subjects show surprisingly similar episodic perceptual memories for sign forms and human actions, though deaf signers relative to hearing non-signers utilize a global rather than local-compositional perceptual analysis of signs. A lexical decision experiment further shows that, while sign language recognition relies upon an internal body schema commonly evoked in models of human action understanding, reliance on this schema is present only when processing is non-optimal, e.g. as a result of having learned ASL later in life. Consistent with this latter finding, fMRI studies indicate less involvement of frontal-parietal action systems in signers processing signs and actions compared to hearing non-signers. Finally, an ERP study examines the time course of activation for linguistic signs and non-linguistic gestures and shows exquisite differentiation of processing by 400 milliseconds in deaf signers. Taken together these data suggest sign language perception draws on neural mechanisms utilized for human action perception, and that linguistic experience tunes this system for the rapid assessment of language and non-language forms.

National Science Foundation SBE-1041725, NIH NIDCD R01 DC01153.

1:45 P.M.–3:15 P.M.
Symposium 4.3

MIDLINER FRONTAL ERPS AND THETA PHASE ALIGNMENT

Chairs: Marjorie A Garvey, National Institute of Mental Health, NIH & Don M Tucker, Electrical Geodesics, Inc. and University of Oregon
Discussant: Uma Vaidyanathan, National Institute of Mental Health, NIH

Two much-studied event-related potentials (ERP) (the error-related negativity (ERN) and the feedback-related negativity (FRN)) are thought to index brain processes that monitor action outcomes. Although these ERPs are believed to be stimulus-evoked brain events, converging evidence suggests that they represent stimulus-induced theta phase alignment. This symposium will examine this evidence by presenting data on theta dynamics. The first presentation will address how theta rhythms of neural ensembles may reflect a method for synchronizing dorsal and ventral theta rhythms in order to balance the brain's self-regulatory functions. The second presentation will consider the role of theta dynamics in the convergence and divergence of feedback processing for risk taking and risk avoidance contexts. The third presentation will present new research on the contribution of midline theta to the medial frontal negativity (MFN) during self-evaluation and relate these findings to a model of frontal cortico-limbic dysfunction in depression. The fourth presentation will explore research that supports the role of the theta band activity in regulating information transmission between brain areas by affecting the timing of the emission and reception of short, high-frequency bursts of action potentials. Finally, the Chair and Discussant will lead a discussion regarding the importance of this work as a way to understand the brain processes underlying cognition and emotion regulation which, when dysfunctional, give rise to psychopathology.

MH42129 (Tucker) F31MH094052 (Waters) K01 DA034125 (CROWLEY) DA027737 (MAYES) The Swartz Foundation (Old Field NY).

DUAL ROUTES OF OSCILLATORY SYNCHRONIZATION

Don M Tucker
Electrical Geodesics, Inc and University of Oregon

The theta rhythm of neural ensembles may reflect a method for synchronizing broad populations. Robert Miller theorized that the phase of entrainment serving as a way to chunk or segment information into episodic elements. Although the primary regulation of limbic theta involves components of the dorsal limbic Papez circuit, with septal control linked closely to a hypothalamic oscillator, there is evidence that a second theta rhythm is centered on the amygdala and involves ventral limbic circuits. Given the functional differentiation of dorsal (spatial) and ventral (object) memory systems, and dorsal (extraversion) and ventral (introversion) motive control systems, an important research question is how the dual modes of limbic interact in balancing the brain's self-regulatory functions.

BRAIN ELECTROPHYSIOLOGY OF SELF-EVALUATIVE DECISIONS IN DEPRESSION

Allison Waters
University of Oregon

Measurable change in positive self-evaluation bias is a central characteristic of depression and recovery. In clinical practice, self-report questionnaires provide an effective way to measure changes in self-appraisal bias. I will review the contributions of research into the brain electrophysiology of psychometric self-evaluation and discuss how findings have (and have not) instructed models of depression neuropathology and treatment of mood disorders. I will present new research on the contribution of midline theta to the medial frontal negativity (MFN) during self-evaluation and relate these findings to a model of frontal cortico-limbic dysfunction in depression.

F31MH094052 (Waters) MH42129 (Tucker).

EVENT-RELATED THETA DYNAMICS IN ADOLESCENT RISK TAKING AND RISK AVOIDANCE

Michael J Crowley, Jia Wu, & Linda C Mayes
Yale University

Converging evidence suggests that performance monitoring processes, associated with activation of the medial frontal cortex, are reflected in a feedback-related event-related potential component (feedback related negativity, FRN ~250-350ms) and in a common oscillatory substrate in the theta rhythm (4-7 Hz). Most of this work employs tasks that involve reward vs. loss or reward vs. non-reward. At the same time, animal models of avoidance have implicated cortical theta as a relevant neural signature in avoidance learning, but very few studies examine these processes in humans. We extend consideration of theta dynamics to risk taking and risk avoidance contexts in a sample of adolescents (M age =14.9, SD 0.96, n=135). To study risk taking, we employed an EEG friendly version of the Balloon Analog Risk Task (BART). To study risk avoidance, we relied on a newly developed EEG task, the Balloon Risk Avoidance Task (BRAT). These two "mirror-image" tasks allow us to compare feedback-related processes across similar contexts that emphasize neural response for outcome feedback under conditions of risk-taking and risk avoidance. We examine the convergence and divergence of feedback processing for risk taking and risk avoidance contexts across behavior, ERPs, event-related spectral power, cross trial coherence, and beamforming localization of oscillatory sources.

K01 DA034125 (CROWLEY) DA027737 (MAYES).

SOURCE IMAGING OF HUMAN THETA EVENTS

Scott Makeig
Swartz Center for Computational Neuroscience, University of California,
San Diego

Studies of both human scalp potentials and invasively recorded data have associated triphasic or longer oscillatory EEG complexes with sensory perception in sensory cortex and, notably, with recognition of and response to implied or suggested challenges and opportunities in medial, frontal, and sensorimotor cortex. Independent Component Analysis (ICA), when well applied to sufficient scalp-recorded data, can identify multiple cortical sources of these events as well as specific source dynamics. Such theta complex events dominate the well-known Error-Related and Feedback-Related Negativities. Study of such events in the ICA-decomposed data shows that they are network events in which similar triphasic complexes appear in multiple source nodes with specific delays. The association of these theta network events with change in expected reward level suggests they may represent the outflow of or index limbic signals involving dopaminergic transmission. During memory encoding, longer trains of (6-Hz) theta oscillations may occur in medial frontal sources, but independent mode analysis reveals that on some trials the same source area may switch to a beta band (15-Hz) mode. Trial applications of Context ICA suggest that many context-varying factors may influence the appearance of theta complexes. All these results appear consistent with the posited role of theta band activity in context-appropriate regulation of the efficacy of information transmission between brain areas by affecting the timing of the emission and reception of short, high-frequency bursts of action potentials.

The Swartz Foundation (Old Field NY).

SATURDAY, OCTOBER 3, 2015

Symposium 5.1

**POTENTIAL MECHANISMS FOR THE DEVELOPMENT
AND MAINTENANCE OF THREAT SENSITIVITY IN
ANXIETY**

Chairs: Anna Weinberg¹, & Erik M Mueller²
¹McGill University, ²Justus-Liebig University Giessen

Hypersensitivity to threat plays a central role in the pathogenesis of anxiety disorders. In this symposium, speakers will provide evidence indicating that threat sensitivity is subject to genetic contributions, as well as evidence for multiple environmental pathways by which these inherited vulnerabilities might become penetrant on behavior. The five presentations encompass event-related potential (ERP), fMRI, and behavioral measures of threat sensitivity. First, Erik Mueller will present fear conditioning data suggesting lasting changes in brain response to conditioned stimuli, even one year later. Next, Shmuel Lissek will present psychophysiological and fMRI data supporting overgeneralization of conditioned fear in PTSD. Anna Weinberg will then discuss the influence of genetics and learning experiences on the threat-elicited Late Positive Potential (LPP), as well as links to individual differences in threat sensitivity. Next, Anja Riesel will discuss evidence suggesting the error-related negativity (ERN) is an endophenotype for pathological anxiety, as well as initial evidence that the ERN in anxiety can be successfully reduced by experimental manipulations. Finally, Alex Meyer will present ERP data from a large child sample, demonstrating the interaction of genetics and parenting styles on the ERN and its association with anxiety. In considering multiple influences on the development and maintenance of threat sensitivity, data presented at this symposium promise to shed light on the complex environmental and genetic pathways that predispose people to anxiety.

**HUMAN REMOTE FEAR MEMORY RECALL RAPIDLY
ACTIVATES FUSIFORM GYRUS ONE YEAR AFTER
CONDITIONING**

Erik M Mueller¹, & Diego A Pizzagalli²
¹Justus-Liebig University Giessen, ²Harvard Medical School

Short-term fear-conditioned visual stimuli have been previously found to rapidly (< 80 ms) activate visual brain regions including the fusiform gyrus (FG) on the conditioning day. Whether remotely fear conditioned stimuli (CS) evoke similar early processing enhancements is unknown. Here, 16 participants who underwent a differential fear-conditioning and extinction procedure on day 1 were presented the initial CS 24h after conditioning (recent recall test) and 9-17 months later (remote recall test) while EEG was recorded. Using a data-driven segmentation procedure of CS evoked event-related potentials, five distinct microstates were identified for both the recent and the remote memory test. To probe intracranial activity, EEG activity within each microstate was localized using low resolution electromagnetic tomography analysis (LORETA). In both the recent (41-55 ms and 150-191 ms) and remote (45-90 ms) recall tests, fear conditioned faces potentiated rapid activation in proximity of FG, even in participants unaware of the contingencies. These findings suggest that rapid processing enhancements of conditioned threat signals persist over time.

**OVER-GENERALIZATION OF CLASSICALLY CONDITIONED
FEAR – A CENTRAL YET UNDERSTUDIED MARKER OF
PTSD**

Shmuel Lissek
 University of Minnesota

A review of classical conditioning studies in the anxiety disorders implicates over-generalization of fear from conditioned danger-cues to resembling neutral stimuli as a robust conditioning marker of anxiety pathology, generally, and PTSD specifically. Such findings are consistent with the clinically observed PTSD process, by which fear to a traumatic event transfers to safe conditions that 'resemble' aspects of the trauma (DSM-5). Unfortunately, no psychobiological studies prior to the current program of work have examined this generalization process in PTSD using systematic generalization-gradient methods developed in animals. Generalization gradients refer to slopes of conditioned responding that decline as the test stimulus gradually differentiates from the conditioned danger-cue. The current program of work assesses generalization gradients in military trauma survivors with and without PTSD using behavioral, psychophysiological, and fMRI methods. Presented results demonstrate generalization abnormalities in

PTSD, elucidates the neural substrates of such abnormalities, and proposes a working neural-model of over-generalization in PTSD.

This work was supported by an R00MH080130 from the National Institute of Mental Health.

**GENETIC AND ENVIRONMENTAL INFLUENCES ON THE
THREAT-MODULATED LATE POSITIVE POTENTIAL**

Anna Weinberg¹, Chris Patrick², Noah Venables², Greg Hajcak³, Anja Riesel⁴, & Norbert Kathmann⁴

¹McGill University, ²Florida State University, ³Stony Brook University, ⁴Humboldt University-Berlin

Abnormal attention to threat has been proposed as a vulnerability marker for and maintaining factor in anxiety disorders. Anxious individuals appear to be characterized by increased disruption of attention by threat cues, and also tend to prioritize detecting threat at a cost to other personal goals. This talk will focus on the influence of genetics and parental styles on the association between anxiety and neural response to threat. In particular, I will discuss evidence suggesting that that individual differences in self-reported threat sensitivity relate to the magnitude of the Late Positive Potential (LPP) to threat. I will also present data from a twin sample suggesting that the threat-elicited LPP is subject to substantial genetic contributions, and, moreover, that the association between threat sensitivity and the LPP is heritable. However, the magnitude of the LPP is also subject to substantial environmental influence; to that end, I will also discuss preliminary data from an ongoing study that looked at the influence of parenting styles on the magnitude of the LPP to threatening content, as well as the degree to which task-irrelevant threatening images interfered with task performance.

OVERACTIVE PERFORMANCE MONITORING AS AN
ENDOPHENOTYPE FOR OBSESSIVE-COMPULSIVE
DISORDER – RESULTS REGARDING STABILITY,
SPECIFICITY & FLEXIBILITY

Anja Riesel¹, Julia Klawohn¹, Tanja Endrass², & Norbert Kathmann¹
¹Humboldt University-Berlin, ²University of Magdeburg

Overactive performance monitoring, indexed by enhanced error-related negativity (ERN), represents one of the most robust findings in OCD research. This talk illustrates that overactive performance monitoring qualifies as an endophenotype (EP) for OCD. To this end, data from unaffected relatives and longitudinal data from OCD patients will be presented. Further, data regarding the specificity of enhanced ERN for OCD compared to social and health anxiety will be presented. Results indicate that enhanced ERN amplitudes in OCD are state-independent and can also be observed in unaffected first-degree relatives. Not only OCD but also social anxiety and health anxiety seem to be characterized by an enhanced ERN. These results suggest that overactive performance monitoring may reflect an EP beyond the diagnostic borders of OCD. Following the mediator model of EPs, changes in the endophenotypic marker could lead to changes in risk or symptoms. So far, little is known about the flexibility of overactive performance monitoring in a clinical context. Experimental designs using divided attention and attentional bias modification (ABM) are promising in this regard. Data from a dual task show that divided attention normalizes performance monitoring in OCD. First results from single-session ABM point in a similar direction. Overall, the presented results support the role of overactive performance monitoring as a risk indicator for OCD or threat sensitivity more broadly and show that trainings that target performance monitoring are an interesting and important avenue for future research.

PATHWAYS TO ANXIETY IN CHILDREN: BDNF
POLYMORPHISM MODERATES THE ASSOCIATION
BETWEEN HOSTILE PARENTING STYLE AND ERROR-
RELATED BRAIN ACTIVITY IN OFFSPRING

Alexandria Meyer¹, Greg Hajcak¹, Sarah J Bufferd², Autumn J Kujawa³,
Rebecca S Laptook⁴, Dana C Torpey⁵, Elisabeth Hayden⁶, & Daniel N
Klein¹

¹Stony Brook University, ²California State University San Marcos,
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Psychotherapy Services of San Diego, ⁶Western University

To understand developmental trajectories leading to anxiety, it is necessary to elucidate transactions between genes, neural systems, and environmental risk factors. The error-related negativity (ERN) is a negative deflection in the event-related potential (ERP) occurring when individuals make mistakes, and is increased in children with anxiety disorders. Additionally, punishing errors results in a larger ERN that persists after punishment ends. We recently found that harsh parenting predicted a larger ERN in children, and ERN mediated the relationship between parenting and child anxiety, suggesting that parenting may shape children's error sensitivity and thereby risk for anxiety. Recent work has suggested that variation in the brain-derived neurotrophic factor (BDNF) gene may moderate the impact of early life adversity on outcomes and also fear-learning. We examined whether BDNF moderates harsh parenting to predict the magnitude of the ERN in children: 201 parents and children completed observational and parent-report measures of parenting when children were 3-years old; three years later, the ERN was measured and diagnostic interviews were completed. We found that harsh parenting predicted an increased ERN only among children with a met allele of the BDNF genotype, and evidence of moderated mediation: the ERN mediated the relationship between parenting and anxiety disorders only if children had a met allele. These findings suggest that children with the met allele are particularly vulnerable to the impact of harsh parenting and thereby anxiety disorders.

8:30 A.M.–10:00 A.M.

Symposium 5.2

**PSYCHOPHYSIOLOGICAL RESEARCH IN CHINA AND
JAPAN**

Chair: Terry D Blumenthal
Wake Forest University

In an effort to increase awareness of the rich psychophysiological science being conducted by our colleagues in Asia, the SPR Outreach Committee (chaired by Alfons Hamm) invited researchers in China and Japan to submit a symposium of a sample of their research. Shimin Fu (China) and Yasunori Kotani (Japan) se-

lected three submissions each for this symposium. It is our hope that these presentations will foster more interactions between SPR members and our Asian colleagues.

THE ASSOCIATION OF AEROBIC FITNESS WITH
PROACTIVE AND REACTIVE COGNITIVE CONTROL IN
PREADOLESCENT CHILDREN

Keita Kamijo, & Hiroaki Masaki
Waseda University

It has been hypothesized that the positive association between childhood fitness and cognitive control can be attributed to differences in the child's cognitive control strategy, which can involve either proactive or reactive control. To test this hypothesis, we compared lower-fit and higher-fit children's post-error task performance and error-related negativity (ERN) during a modified flanker task performed under two conditions, in which the probability of congruent and incongruent trials was manipulated, such that in the mostly congruent condition, 70% of trials were congruent and 30% were incongruent, whereas in the mostly incongruent condition, 30% of trials were congruent and 70% were incongruent. Analyses revealed that higher-fit children exhibited greater post-error response accuracy and larger ERN amplitude in the mostly congruent condition relative to the mostly incongruent condition. Such a pattern of results suggests their strategic shift from reactive control in the mostly congruent condition to proactive control in the mostly incongruent condition. In contrast, lower-fit children might be unable to enact this strategy shift, as reflected by a lack of changes in post-error response accuracy and ERN amplitude between conditions. These data suggest that greater aerobic fitness is associated with an increased ability to flexibly modulate cognitive control strategy to adapt to varying task demands.

This study was supported by Grants-in-Aid for Research Activity Start-up (24800066) and Scientific Research ((C) 24530925) from the Japan Society for the Promotion of Science.

THE INFLUENCES OF WORKING MEMORY
MANIPULATIONS ON THE VISUAL ATTENTION

Antao Chen
Southwest University

In the current study, we explored the influences of WM manipulations (maintain and suppress) on visual attention, combining behavior measurements with electrophysiological recordings. In the experiment, one of two memorized colors was cued to be maintained for the memory test (the cued maintained color), and the uncued one was to be ignored (the uncued ignored color). A visual search task was carried out concurrently, where the cued and the uncued color might appear opposite to the target (cued condition and uncued condition, respectively) or not (neutral condition). The behavioral performance revealed that RTs were delayed in the cued condition but were promoted in the uncued condition, relative to the neutral condition. Results of ERPs showed (1) inhibitory processing was observed in the uncued condition with smaller P1 amplitude than in the other conditions, and (2) a guidance effect was observed in the cued condition with larger N2pc amplitude than in the other conditions. The early ERP components suggested that inhibiting the ignored information promoted detection of the target on the opposite side, as well as a guiding role of the maintained WM contents competing for visual attention with the visual search on the opposite side. Therefore, the WM contents did influence visual attention but the attentional manipulations, such as maintaining or inhibiting in WM, determined the selection of visual attention. This conclusion can integrate the controversies in the interaction between visual attention and WM, of which the mechanisms will be discussed.

This study was supported by the National Natural Science Foundation of China (31170980, 81271477), the Foundation for the Author of National Excellent Doctoral Dissertation of PR China (201107), and the New Century Excellent Talents in University (NCET-11-0698).

THE INTENTION TO CONCEAL RECRUITS THE RIGHT PREFRONTAL CORTEX ACTIVITY IN THE CONCEALED INFORMATION TEST

Izumi Matsuda
National Research Institute of Police Science

In Japan, the concealed information test (CIT) has been applied to real criminal investigations. To increase its probative value, it is important to elucidate cognitive processes underlying physiological responses during the CIT. In the CIT, a perpetrator recognizes crime-relevant information and intentionally conceals its recognition. It has been repeatedly confirmed that the recognition of the crime-relevant information elicits an orienting response, such as skin conductance response and P300. However, the effect of the intention to conceal has rarely been investigated. In the present study, thirty participants committed a mock theft of two items and then received two CITs: one for an item they had to conceal and the other for an item they had already disclosed. Only when the participants intended to conceal the crime-relevant item, a late positive potential (LPP) with a parietal-occipital dominant distribution occurred in a latency range of 500–1000 ms. The sLORETA estimated its cortical sources in the right prefrontal cortex, the region which has been argued to be associated with cognitive control and withdrawal motivation. In the CIT, encountering crime-relevant information to be concealed would recruit withdrawal-motivated controlled processing reflected by the right prefrontal cortex activity.

FUNCTIONAL EEG SPECTRAL FIELD POWER IN TONIC CUFF-PRESSURE PAIN: IN SEARCH OF THE VIABLE BIOMARKER FOR HUMAN PAIN

Andrew CN Chen
Capital Medical University

The global cost of suffering of human pain is estimated to be 500 billion dollars annually. Currently, pain is assessed solely in subjective terms, but no objective physiology is established. The biomarker of human pain obviously becomes a grave challenge in contemporary psychophysiological research. 15 young male adults were recorded with 128-ch high density EEG, analyzed in 3 stages, during eyes-open (EO) and eyes-closed (EC) conditions: pain-free baseline, slight-pain, and severe-pain. In each stage 2 min of EEG was analyzed in a patented spectral field power (SFP), unit of spatial EEG quantity. One-way ANOVA was used for statistical analysis. SFP in the EC condition showed significant change across 3 stages ($p < 0.01$). In the severe-pain stage, the subjective pain rating was found to correlate with objective alpha-1 EEG SFP significantly ($r = 0.41$, $p = 0.03$). However, such a psychophysiological association between pain rating and EEG was no longer present when the physical stimulation pain threshold dimension was partialled out ($i = 1.49$, $p = 0.16$). In searching for biomarkers of human pain, the subjective pain level and EEG alpha-1 field power in an eyes-closed condition seem significantly associated. Nevertheless, the physical dimension of stimulation energy has to be taken into account in analyzing the biomarker of experimental pain. In clinical pain, how to measure the neurobiological pathology in cognitive neuroscience still remains a great challenge.

DIFFICULTY OF VISUAL ODDBALL TASK MODULATES AMPLITUDE OF P3 ELICITED BY TASK-IRRELEVANT AUDITORY DISTRACTORS

Fumie Sugimoto¹, & Jun'ichi Katayama²
¹Kyushu University, ²Kwansei Gakuin University

Previous studies have shown that distractor stimuli in a three-stimulus oddball task elicit the P3 component of event-related brain potentials (ERPs), and its amplitude increases when the task is difficult. The present study investigated whether the difficulty of a visual task also affects the processing of stimuli in a different modality, i.e., auditory stimuli. In experiment 1, participants performed a three-stimulus oddball task by discriminating visual target stimuli (15%) from visual standard stimuli (70%). Easy and difficult conditions were set depending on the difficulty of the discrimination. Visual or auditory distractors (15%) were presented in a separate condition. The results showed that the amplitude of the P3 elicited by both the visual and auditory distractors was larger in the difficult condition than in the easy condition. In experiment 2, participants performed easy and difficult two-stimulus visual oddball tasks by discriminating targets (20%) from standard stimuli (80%). Distractors were presented 500–700 ms after 12% of the oddball stimuli. Although the visual distractor P3 enlarged in the difficult condition, the amplitude of the auditory distractor P3 was not affected by the task difficulty. These results indicate that the resource allocation to the visual modality enhances the processing of not only visual but also auditory task-irrelevant stimuli.

li. However, the cross-modal enhancement occurs only when the auditory stimuli are in the same stimulus sequence as task-relevant visual stimuli.

RACIAL IN-GROUP BIAS IN NEURAL RESPONSES TO OTHERS' SUFFERING

Shihui Han
Peking University

Humans empathize for others' pain but do not empathize everyone equally. They exhibit greater empathy for racial in-group than out-group individuals' suffering. What are the neural mechanisms underlying racial in-group bias in empathy? What sociocultural and biological factors influence the racial in-group bias in empathic neural responses? Can we reduce racial in-group bias in empathic neural responses by laboratory manipulation and real life experiences? Our recent brain imaging research will be presented, that (1) shows neuroscience evidence for racial in-group bias in empathic neural responses in multiple brain regions (e.g., anterior cingulate and anterior insula) and in different time windows (e.g., the P2 and P3 components of ERPs); (2) reveals distinct neural responses to racial in-group and out-group members' pain at the levels of neural population and neural transmitter; (3) suggests an association between oxytocin receptor gene and racial in-group bias in empathic neural responses; and (4) uncovers how experiences (e.g., real life experience and laboratory manipulation) can reduce racial in-group bias in empathic neural responses. Taken together, our findings indicate that racial in-group bias in empathy is mediated by multiple level mechanisms. Understanding the neural, cognitive, and genetic mechanisms underlying racial in-group bias in empathy helps us to reduce the racial in-group bias that is not tolerated by the current society. Implications of our findings will be discussed.

8:30 A.M.–10:00 A.M.

Symposium 5.3

EMOTION AND LANGUAGE IN INTERACTION – WHY AND HOW CONTEXT MATTERS

Chair: Cornelia Herbert, University of Ulm
Discussant: Cornelia Herbert, University of Ulm

We text, post, blog, and tweet. Language increasingly dominates our communication behavior and the way we express emotions. Still, written language has long been considered a purely cognitive phenomenon bearing no relation to bodily, affective or sensorimotor processing. In recent years, embodiment theories and neuroscience have proven otherwise. This symposium aims to demonstrate how emotion and language construe each other in contexts as diverse as communication in daily life. To start with, neurophysiologic data will be presented investigating how emotions are decoded from written words when these are embedded in social settings. It will be shown that words related to own and other people's emotions trigger differential responses in emotional brain systems and expressive behavior. Even a variety of imaginary communicative contexts as encountered in virtual communication can modulate the affective quality of words and influence their processing in visual and semantic brain regions. Importantly, these effects are not restricted to virtual communication: the mere perception of emotional facial expressions can influence language comprehension already in children; language in turn guides emotion processing facilitating conceptual processing of emotional faces by activation brain regions involved in sensory processing and semantic retrieval, whereas loss of language representation leads to loss of emotion classification. This argues against a purely cognitive foundation of language. Language and emotion are social phenomena mutually influencing each other and our behavior.

MY EMOTION – YOUR EMOTION: BRAIN AND BODY IN EMOTIONAL COMMUNICATION

Cornelia Herbert
University of Ulm

Language is embodied and closely related to the self. This has been shown for the processing of words and sentences. What does this relationship between words, self, body and the brain imply for the verbal communication of emotions? Evidence from a series of studies will be reviewed that used electroencephalography (EEG), functional imaging and psychophysiological methods to explore how emotions are decoded from words when these refer to the reader's own or other people's emotions (e.g., my vs. his fear, pleasure). EEG, memory and reaction time data suggest that healthy subjects intuitively respond to positive self-related content but that discrimination between own and other-related emotions is an elaborate process appearing at later cortical processing stages. Functional imaging reveals activation in a large-scale network involved in relevance detection (amygdala), integration of bodily and sensory signals (insula), and self-referential processing (VMPFC). Physiologically, evaluation of own and other-related emotion words compared to words of neutral meaning increases autonomous-nervous system activity (heart rate, skin conductance). However, participants are facially more expressive when they evaluate positive emotions of other people. Crucially, selective blocking of facial muscle activity impairs evaluation of words describing other people's emotion but has little effect on the evaluation of own emotions. Together, the results argue in favor of a differentiated view of embodiment when processing own and other-related emotions from language stimuli.

This research was supported by the German Research Foundation (DFG-HE5880/3-1).

SENDER IDENTITY AND SENDER COMPETENCE ENHANCE PROCESSING OF SOCIO-EMOTIONAL LANGUAGE FEEDBACK

Sebastian Schindler, & Johanna Kissler
University of Bielefeld

The personal significance of a language statement depends on its context. Three studies are presented that investigate how the implied source of evaluative statements alters their processing. Participants' brain event-related potentials (ERPs) were recorded in response to word-streams consisting of positive, negative, and neutral trait adjectives, stated to either represent personal feedback from a human or to be generated by a computer. In experiment 1 the computer was portrayed as acting randomly, in experiment 2 it was portrayed as a socially intelligent system. In experiment 3, human sender competence was further manipulated in that feedback was said to be given by either an expert psychotherapist or a naïve rater (in addition to a random computer). All experiments revealed strong effects of perceived sender. In experiment 1, feedback from a human amplified the early posterior negativity (EPN) and the Late Positive Potential (LPP). Emotional content enhanced the LPP. In contrast, in experiment 2, EPN was modulated by emotional content only, while P3a and LPP responded to both sender and content. Experiment 3 replicated the effects from experiment 1 and further revealed a larger N1 when the human sender was thought to be an expert. Evidently, both perceived social competence and perceived humaneness amplify visual processing at distinct processing stages. For humans, feedback by others is vital as belonging to a community reflects a strong motivational desire. This has robust repercussions even for processing single word messages in imaginary communicative context.

EMOTIONAL FACIAL PRIMING OF LANGUAGE COMPREHENSION

Pia Knoeferle, & Katja Münster
University of Bielefeld

In a series of visual-world eye-tracking studies, we investigated the effects of facial emotions and of action depictions on spoken language comprehension in 5-year olds, younger, and older adults. The action depictions modulated comprehension in all three age groups in a qualitatively similar manner, albeit with different time courses. Emotional facial priming affected the young and older adults' comprehension (in a qualitatively different manner depending on valence). Moreover, the type of prime face (e.g., schematic faces such as smileys vs. natural faces) mattered, with somewhat more pronounced effects of natural faces than for smileys.

LANGUAGE CONSTRUCTS EMOTION

Kristen Lindquist
University of North Carolina

In this talk, I present evidence for the psychological constructionist hypothesis that language plays a constitutive role in emotion by shaping affective perceptions and experiences into instances of discrete emotions (e.g., anger, fear, disgust). I first present evidence that healthy participants and patients with neurodegenerative disease cannot perceive discrete emotions on faces when they cannot access the meaning of emotion words. Next, I present meta-analytic data from neuroimaging experiments demonstrating that brain regions associated with emotional experiences and perceptions (e.g., inferior frontal gyrus, dorsomedial prefrontal cortex, lateral temporal cortex) overlap with regions involved in semantics. Finally, I close with meta-analytic evidence showing different brain activity when emotion words are included versus not included in studies of emotion experiences. Neuroimaging studies that include emotion words in the experimental task find greater activity within the inferior frontal gyrus and thalamus when participants experience emotions, regions associated with semantic retrieval and sensory processing. By comparison, studies that do not include emotion words find greater amygdala activity when participants experience emotions, a region associated with processing uncertain stimuli. These findings are consistent with the psychological constructionist view that words prompt retrieval of emotion concept knowledge that is used to disambiguate the discrete emotional meaning of otherwise ambiguous affective feelings.

Poster Session Abstracts

POSTER SESSION I WEDNESDAY, SEPTEMBER 30, 2015 7:00 P.M.–9:00 P.M.

AUTHORS PRESENT FOR DISCUSSION AND QUESTIONS

Poster 1-1

PUPILLOMETRY REFLECTS DECISION THRESHOLD INCREASE DURING EVIDENCE ACCUMULATION

Daniel R Barto, & James F Cavanagh
University of New Mexico

Descriptors: pupillometry, decision-making, sensory discrimination

The process of making a decision during uncertainty requires cognitive control resources that are not apparent during easy decisions. For instance, a decision during uncertainty requires an accumulation of sensory evidence culminating in a discrete choice determined by a decision threshold. While much is known about mechanisms that resolve uncertainty in sensory accumulation, much less is known about the resolution of uncertainty by decision threshold adjustment. Pupil dilation, previously implicated in a variety of cognitive and affective states, has been shown to index decision threshold adjustment during selection of valued options. In this study, pupil dilation was collected while subjects performed a sensory discrimination task. Subjects were required to indicate the coherent directional movement of a group of dots against a background of random dot movement. Conflict was operationalized by varying the angle of dot movement, creating high (e.g. 11:55 vs. 12:05 on a clock) and low (e.g. 10:00 vs. 2:00) conflict conditions. Hierarchical Drift Diffusion Modeling indicated that the decision threshold (and not the evidence accumulation rate) was selectively altered by this manipulation. In conditions of high conflict, there was a significant increase in pupil dilation change from baseline as compared to conditions of low conflict. These results indicate that pupil dilation can predict decision threshold adjustment in the presence of noisy sensory evidence.

Poster 1-2

LATE POSITIVE POTENTIALS REFLECTS THE RELATIONSHIP BETWEEN EMOTION INTENSITY AND MEMORY RECALL

Darin R Brown, & James F Cavanagh
University of New Mexico

Descriptors: emotion, memory, multi-sensory

How does emotion affect memory? Beyond arousal-enhanced encoding, we know very little about this process, and less about the systems that mechanistically underlie these effects. The current study utilized electrophysiology to investigate the manner by which multimodal emotional processing affects memory encoding. Participants (N = 27) were presented simultaneous visual and auditory stimuli (IAPS & IADS) that were either valence congruent (e.g. positive picture, positive sound) or valence incongruent (e.g. positive picture, negative sound). EEG indicated that early window late positive potential (350ms – 700ms) significantly differed between multi-sensory emotion conditions, whereby amplitudes were larger as stimulus pairs became more negatively valenced. Following the presentation of 160 emotional stimulus pairs, participant's memory of the images was tested. During recall (old/new forced choice), stimuli with faster RTs had higher confidence ratings, yet stimuli with slower RTs had higher ratings of arousal during encoding. Moreover, larger LPP amplitudes in all time windows (early, middle, late) during encoding predicted slower RTs during recall, mirroring self-report findings. The fact that arousal leads to slower recall RT is counter-intuitive, yet is replicable across self-report and EEG measures. These findings suggest that LPP amplitudes faithfully reflect complex dynamic aspects of emotion perception as well as memory encoding, and will be a useful tool for understanding the complexities of emotion-enhanced memory encoding.

Poster 1-3

INTOLERANCE OF UNCERTAINTY MODULATES PERFORMANCE AND NEURAL ACTIVITY DURING THE ANTICIPATION OF PUNISHMENT

Jessica I Lake¹, Zachary P Infantolino², Jeffrey M Spielberg³, Laura D Crocker⁴, Cindy M Yee¹, Wendy Heller⁵, & Gregory A Miller¹

¹University of California, Los Angeles, ²University of Delaware, ³VA Boston Healthcare System, ⁴Veterans Affairs San Diego Healthcare System, ⁵University of Illinois at Urbana-Champaign

Descriptors: uncertainty, punishment, anticipation

Intolerance of uncertainty (IU) is associated with the maintenance of worry, a symptom present across a range of anxiety disorders. Individual differences in IU are known to modulate neural activity during the anticipation of uncertain affective events. Nevertheless, the neural and behavioral consequences of IU when the uncertainty of outcomes is contingent on performance remain unclear. We addressed these questions using a modified monetary incentive delay task with reward and punishment related to reaction time performance in a crossed design during fMRI. We predicted that higher IU would be associated with greater activation in neural regions implicated in motivational processing and less activation in regions implicated in cognitive control. Results indicated that higher IU was associated with less neural activation during cued anticipation in bilateral ventromedial prefrontal cortex and dorsolateral prefrontal cortex. Higher IU was also associated with shorter reaction times across conditions when punishment was possible, whereas IU did not modulate behavior across conditions when reward was possible. These findings suggest that, although the IU construct is valence-nonspecific, IU has a more potent effect on performance when anticipated outcomes are negative. Present results also indicate that in certain contexts IU can enhance performance, despite down-regulation of cognitive control regions, possibly driven by enhanced motivation and reduced response inhibition. Such findings have important implications for understanding the role of uncertainty in psychopathology.

Poster 1-4

IMPACT OF PSYCHOSOCIAL STRESS ON WORKING MEMORY AND P300 IN SCHIZOPHRENIA

Lee J Jaspense¹, Jessica I Lake¹, Peter E Clayson¹, Holly K Hamilton¹, Peter Bachman², Kenneth L Subotnik¹, Joseph Ventura¹, Gregory A Miller¹, Keith H Nuechterlein¹, & Cindy M Yee¹

¹University of California, Los Angeles, ²University of Pittsburgh

Descriptors: schizophrenia, working memory, stress

Working memory impairment and increased stress vulnerability are prominent in schizophrenia. It is unclear to what extent these domains of dysfunction influence each other, especially given commonalities in their biological substrates. To examine the consequences of psychosocial stress exposure on working memory, a 2-back working memory task was administered to 79 schizophrenia patients and 57 healthy comparison subjects, before and after participants completed the Trier Social Stress Test. We hypothesized that patients would show deficits in working memory updating and attention allocation relative to healthy subjects before stress, as reflected in poorer performance accuracy and attenuation of P300 amplitude. We also predicted that schizophrenia patients would display greater declines in performance and P300 amplitude post-stress. As hypothesized, patients were less accurate than healthy subjects on the n-back task overall. This main effect was qualified by a significant ordinal Stress × Group interaction, with psychosocial stress impairing schizophrenia patients' accuracy, while performance in healthy subjects was not impacted. There were no effects of group or stress on P300 amplitude. These initial results suggest that schizophrenia patients are uniquely vulnerable to stress-related impairments in working memory, despite comparable efficiency to healthy subjects in information processing as reflected by P300 amplitude. It is also possible that accuracy and P300 amplitude may be differentially sensitive to stress-related impairments.

NIMH Center Grant P50 MH066286.

Poster 1-5**ALCOHOL USE IS ASSOCIATED WITH CONFLICT-RELATED THETA AND PREPARATORY SENSORIMOTOR BETA: A COTWIN-CONTROL ANALYSIS**

Jeremy Harper, Stephen M Malone, & William G Iacono
University of Minnesota

Descriptors: response inhibition, alcohol use, twin differences

Alcohol misuse is associated with a cluster of problematic behaviors, including risk taking and impulsivity, suggesting deficient inhibitory control and behavioral regulation. Human and primate EEG research indicates that successful inhibition involves midfrontal theta and sensorimotor beta activity, which are related to conflict detection and movement preparation/termination, respectively. Prior work has shown reduced theta in alcoholics compared to controls, but no study to date has examined drinking and inhibition-related theta or beta in a population-based sample. We assessed the association between alcohol use and midfrontal theta and sensorimotor beta in a large sample of twins performing a Go/Nogo task. Time-frequency analysis of surface Laplacian-filtered EEG revealed a negative association between nogo theta power and alcohol use. Sensorimotor beta power decreased following go and nogo stimuli, indicating early motor preparation in both conditions, and drinking was associated with a larger beta decrease. These findings suggest that alcohol use is associated with hypoactive conflict-related theta and hyperactive motor preparation beta, which may be mechanisms underlying substance-related impulsivity and behavioral disinhibition. A cotwin-control analysis of twin differences in drinking, which are unconfounded by all shared genetic and environmental factors that influence use, was consistent with a causal effect indicating theta power reduction was a consequence of use. If confirmed, this would provide the first causal evidence of alcohol exposure on brain dynamics.

The research was supported by NIH grant R01 DA036216.

Poster 1-6**EXAMINING NEGATIVE MENTAL STATES AND THEIR ASSOCIATION TO PSYCHOMETRIC AND ELECTROENCEPHALOGRAPHIC MEASURES OF COGNITIVE PERFORMANCE IN AUSTRALIAN NURSES**

Ty Lees, George Kalatzis, & Sara Lal
University of Technology Sydney

Descriptors: cognition, electroencephalography, nurses

The consistent presence of negative mental states such as depression, anxiety and stress, can lead to the development of cognitive impairment. Additionally, these states have also been associated with reduced workplace performance. Despite these links being well documented; research examining the impact of depression, anxiety and stress on the cognitive performance of health professionals remains limited. Twenty-two healthy nurses participated in the study, in which a two lead bipolar EEG positioned at Fp1 (frontal pole), Fp2, C3 (central) and C4 was recorded during a baseline and an active phase. The Depression, Anxiety, Stress scale (DASS) was used to measure the states of depression, anxiety and stress; while the Mini-Mental State Exam (MMSE) and Cognistat tests were used to assess cognitive performance. All data were compared to an age, gender and weight matched cohort of non-nurses. Significant associations between negative mental states and frontal pole EEG gamma activity as well as the outcomes of MMSE and Cognistat were revealed. These results associate increased gamma activity in the frontal poles to an increased severity of negative mental states; furthermore increased severity of these states was associated with poorer cognitive performance. The study reaffirmed that negative emotional states can alter cognitive performance, as measured by EEG and psychometrics. Furthermore, the more severe negative mental states experienced by nurses may be attributable to their occupational demands and may explain why the affected cognitive profiles of the two groups differ.

Poster 1-7**COGNITIVE LOAD IMPACTS EMOTION REGULATION STRATEGY CHOICE**

Lara Vujovic, & Heather L Urry
Tufts University

Descriptors: emotion regulation, cognitive load, pupillometry

Recent theories suggest that cognitive load reduces resources required for emotion regulation (ER). Theories further suggest that some ER strategies (e.g., reappraisal) are more engaging and resource-intensive than other ER strategies (e.g., situation selection/modification and distraction). However, whether cognitive load predicts differential use of ER strategies has not been extensively documented in empirical studies. Thus, in the present work, we treated pupil diameter, an index of cognitive load, as a predictor of ER strategy choice in a laboratory task. In this task, 58 participants viewed negative and neutral pictures and had the option to use a number of ER strategies. For one, they could press a key to end picture presentation (situation selection/modification). In addition, they could indicate whether they had used distraction, reappraisal, and rumination (or none). In general, negative pictures prompted people to use all of the available strategies more so than neutral pictures. Moreover, as hypothesized, we found evidence that larger pupil diameter prior to the situation-ending key press predicted more key presses and less reappraisal. Interestingly, and contrary to our hypothesis, there was no relationship between pupil diameter and distraction. This may be because the situation-ending key press was perceived to be an easier and/or more salient option. Overall, this pattern suggests that cognitive load reduces the resources required to use resource-intensive, engaging ER strategies and instead promotes use of less resource-intensive, disengaging ER strategies.

Poster 1-8**THETA ACTIVATION RELATED TO KIN REJECTION DURING MOTHER-CHILD CYBERBALL**

Lauren C Vazquez, Jia Wu, & Michael J Crowley
Yale Child Study Center

Descriptors: Cyberball, mother-child, theta

The current study investigates how mother-child dyads respond to social rejection with one another compared to social rejection with a stranger. Twenty-three dyads of mother and child (child mean age: 10.26 years; child age range = 9–12 years; standard deviation = 1.137; 9 females; 20 Caucasians, 1 African-American, 2 Asian-Americans) completed an adapted Cyberball paradigm while electroencephalography (EEG) was acquired. Cyberball is a virtual ball-toss game in which a participant plays with two other players and experiences inclusion and ostracism events. In this case, participants were made to believe they were playing with the other member of the dyad and a stranger. Dyads were exposed to conditions of kin rejection, during which they thought the other member of the dyad had excluded them from play, and stranger rejection, during which they thought a stranger had excluded them. Using an event-related design, we found greater medial frontal theta oscillations (4–7 Hz) activation in mothers during early (i.e., 200–300 ms) processing of rejection by kin events compared to rejection by a stranger ($t = 2.447$, $p = 0.024$). Conversely, children did not show this same difference in medial frontal theta oscillations between events. Additionally, greater theta activation during kin rejection was related to mother's self-report total score on an ostracism measure ($r = .46$, $p = .035$). Our findings support previous studies that use Cyberball and oscillations to examine attachment-related events in middle childhood.

Poster 1-9

**UNIQUE SPATIAL AND SPECTRAL EEG
BIOMARKERS CHARACTERIZE THE EMG
STARTLE RESPONSE**

Mengting Liu, Chad Forbes, Kelly Jordan, & Adam Magerman
University of Delaware

Descriptors: startle, electroencephalography

The EMG startle response is considered a defensive reaction to potential threats that manifests as a unique eye blink-like pattern in the EMG. Extant research has demonstrated that the amygdala mediates the startle response; unfortunately in EEG studies the isolation of amygdala activation is near impossible. Thus having the ability to isolate a startle response pattern and ultimately amygdala activity in the EEG could be particularly beneficial for EEG researchers. Little is known, however, about what aspects of the startle response reliably engender specific patterns in the EEG. The purpose of this study was to examine spatial and spectral EEG patterns that reliably index the EMG startle response. 169 participants were administered acoustic startle probes while EEG and EMG activity were simultaneously recorded throughout. Significant eye blinks were labeled as biomarkers to the startle response and normal blinks served as the control group. A common spatial pattern (CSP) spatial filter identified significant differentiable patterns in frontocentral and bilateral frontal cortex between startle responses and controls. In addition, a spatial-spectral filter of spectrally weighted CSP indicated that the theta band in frontocentral and alpha band in bilateral frontal cortex holds the most discriminant components. To further verify, a classifier was applied to the identified spatial and spectral patterns. The cross validation yielded a 77.3% classification accuracy. Findings suggest amygdala activity may be assessed via EEG spatially in specific frequency bands.

Poster 1-10

**THE EARLY P2 ERP COMPONENT REVEALS
ATTENTION BIAS FOR NEGATIVE, UNEXPECTED
BEHAVIOR**

Hannah I Volpert¹, Rita Jeronimo², & Bruce D Bartholow¹
¹University of Missouri-Columbia, ²University of Lisbon

Descriptors: person perception, attention, expectancies

Expectancies concerning how people will act are formed from acquired knowledge about what those other people are like, and are used to interpret their ongoing behaviors (see Olson, Roese, & Zanna, 1996). Previous person perception research has shown both a congruency effect, in which expectancy-violating (EV) behavior elicits more effortful and elaborated cognitive processing than expectancy-consistent (EC) behavior, and a positive-negative asymmetry, in which negative behaviors are more influential on perceivers' judgments than positive behaviors. The current research investigated whether the valence of EV information affects very rapid attentional processes thought to tag goal-relevant information for more elaborative processing at later stages. Event-related brain potentials (ERPs) were recorded as participants read depictions of behavior that either were consistent with or violated established impressions of fictitious characters. Consistent with predictions, an early attention-related ERP component, the frontal P2, differentiated negative from positive EV behavior but not EC behavior. This effect occurred much earlier in processing than has been demonstrated in prior reports of EV effects on neural responses, suggesting that impression-formation goals tune attention to information that might signal the need to modify existing impressions.

Poster 1-11

**EEG ENTROPY PREDICTS INTENSIVELY-MEASURED
COGNITIVE PERFORMANCE IN HEALTHY
OLDER ADULTS**

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University of Victoria

Descriptors: aging, multiscale EEG entropy, multilevel linear modeling

Numerous functional neural markers have been investigated in healthy and pathological cognitive aging. The present study considered electroencephalographic (EEG) complexity as a predictor of intensively-measured cognitive performance

using data from a prospectively-recruited sample (n = 29) of healthy (non-demented) older adults (65 to 80 years). EEG activity was recorded from 9 scalp channels under eyes-closed (EC) and eyes-open (EO) conditions. Multiscale sample entropy (MSE) was calculated for 30-second segments at each sensor and averaged within frontal (F3, Fz, F4), central (C3, Cz, C4), and parietal (P3, Pz, P4) regions across all timescales. Within a month of the EEG recording, each participant completed 4 to 6 separate occasions (n = 149) of computerized simple response time (SRT) and go/nogo testing. The 6 MSE scores (3 regions by 2 conditions) were used to predict response speed (RS) on the SRT and go/nogo tasks in a 3-level linear model that allowed individual performance to vary randomly within and across testing occasions. Higher levels of parietal EO MSE were associated with increased mean RS, and higher levels of frontal EO MSE predicted attenuation of within-person RS slowing on go/nogo relative to SRT trials. In contrast, higher frontal EC MSE correlated with a self-report measure of trait anxiety. These results suggest that EEG MSE may be sensitive to subtle individual differences in cognitive functioning among healthy older adults. Data from future study waves will illuminate macro-longitudinal trajectories of EEG MSE in relation to cognitive performance.

This study was supported by Alzheimer Society Research Program/Pacific Alzheimer Research Foundation Doctoral Award #1343 to BPM.

Poster 1-12

**THE IMPACT OF MINDFULNESS TRAINING ON
BRAIN MATTER VOLUME IN OLDER ADULTS
WITH SUBJECTIVE COGNITIVE DECLINE: A SIENA
ANALYSIS**

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Descriptors: meditation, subjective cognitive decline

The coming of age of "baby-boomers" urges researchers to develop early interventions for pathological aging. Subjective cognitive decline (SCD) is a proposed preclinical Alzheimer's disease (AD) prodrome, operationalized in the present study as, "Are you concerned or worried that you are experiencing significant decline in your thinking abilities, more than just normal aging?" Fourteen older adults (65–80 years of age; 7 with SCD, 7 without SCD) were randomly assigned to either an eight-week Mindfulness-Based Stress Reduction (MBSR) intervention modified for older adults or a psychoeducation control intervention focused on the cognitive changes that occur in aging. Pre- and post-intervention 1.5 Tesla structural MRI scans were conducted to measure total brain matter volume change. Using FSL SIENA analyses, average total brain matter volume change was significantly greater in the MBSR group than the psychoeducation group, but there was no significant difference between the diagnostic groups by time. Due to the limited sample size, a three-way interaction of intervention by diagnostic group by time could not be tested. These findings are consistent with prior studies suggesting that rapid structural neuroplasticity is possible, further suggesting that MBSR may be useful as an early AD intervention. Future research will replicate this procedure with a larger initial sample and perform region of interest analyses.

Poster 1-13**MINDFUL OBSERVANCE PREDICTS EFFICIENT COGNITIVE CONTROL: AN EEG STUDY OF THETA-BAND OSCILLATIONS**Emilio A Valadez, & Robert F Simons
University of Delaware*Descriptors: electroencephalography, mindfulness, attention*

Mindfulness is the state of nonjudgmental awareness of experiences in the present moment and is related to a number of psychological benefits, including enhanced attention and emotion regulation. Findings from recent event-related potential studies of mindfulness meditators suggest that mindfulness may improve cognitive control in part through enhanced frontal midline theta oscillatory activity, which is thought to reflect the medial prefrontal cortex signaling the need for cognitive control. In the present study, 24 participants completed a modified version of the Eriksen flanker task while brain activity was recorded through electroencephalography. Participants also completed the Five Facet Mindfulness Questionnaire (FFMQ). Results of a path analysis indicated that, of the five FFMQ subscales, observance (of somatic sensations) significantly predicted frontal midline theta oscillatory power changes following incongruent stimulus presentation ($\beta = -0.492, p = .008$) as well as following error commission ($\beta = -0.544, p = .003$). These effects remained significant after controlling for worry and depression symptoms as measured by the Penn State Worry Questionnaire and Beck Depression Inventory-II, respectively. Although mindful observance predicted reduced frontal midline theta activity during the flanker task, it did not predict changes in the proportion of correct responses ($\beta = -0.121, p = .555$) or in reaction time ($\beta = 0.259, p = .255$), suggesting that mindful observance is associated with greater efficiency of cognitive control signaling.

Poster 1-14**TEST-RETEST RELIABILITY OF THE FEEDBACK-RELATED NEGATIVITY COMPONENT**Kathryn T Roberts, Zachary P Infantolino, & Robert F Simons
University of Delaware*Descriptors: feedback-related negativity, test-retest reliability*

The feedback-related negativity (FRN) is a negative deflection in the event-related potential (ERP) that is thought to reflect the binary evaluation of outcomes (i.e., positive vs. negative). As evidence accumulates linking psychopathology (e.g., depression) to individual differences in FRN amplitude, some have suggested that the FRN serves as a biomarker for depression. To consider the FRN's possible role as a biomarker or endophenotype, temporal stability must first be established. No known studies have addressed this with test-retest periods that exceed 24 hours or with sessions that are not confounded with experimental condition. To attend to this gap in the literature, the present study examined the temporal stability of the FRN over a month-long period. Forty-four undergraduates completed a Five-Doors Task on two occasions separated by four weeks. Test-retest reliability of the FRN, measured as the mean amplitude in the 200–300 ms window following feedback presentation, was examined for intersubject stability (i.e., Pearson's r) and score agreement (i.e., intraclass correlation). Across all five conditions (winning 25 cents, winning 5 cents, losing 25 cents, losing 5 cents, and no change), Pearson ($r_s = .65-.78$) and intraclass (ICCs = .50–.69) correlations indicated that the FRN is a moderately stable, trait-like ERP measure. Implications for considering the FRN as a risk factor for psychopathology are discussed.

Poster 1-15**THE EFFECT OF EGO DEPLETION ON ERROR MONITORING**Xiaoqian Yu, Geoffrey Potts, & Emanuel Donchin
University of South Florida*Descriptors: ego depletion, event-related potentials, error-related negativity*

Ego depletion refers to the state when self-control capacity is exhausted, and the energy for mental activity is low. According to the resource model, self-control is a limited resource; its exertion causes fatigue and impaired performance in subsequent tasks requiring self-control. The current study investigated the neural mechanisms underlying self-control by examining whether effortful controlled behavior (ego depletion) impairs subsequent error monitoring. Given the contagious nature of yawning, the study instructed subjects to suppress yawning while

watching a yawning video and to react spontaneously while watching a speech video. Subjects completed an Eriksen flanker task following each video. Dense array EEG with 128-channels was used to record brain activity during the flanker task in a sample of 30 subjects. The error-related negativity (ERN), an index of the error monitoring systems, was measured to determine whether prior ego depletion affected the conflict-monitoring system. Preliminary results showed decreased amplitude in ERN of subjects in the yawning condition compared to the control group. There were no significant differences in post-error positivity (Pe) and reaction time to error and correct trials between two groups. This suggests a weaker error monitoring system after ego depletion.

Poster 1-16**AGE-RELATED SHIFTS IN HEMISPHERIC DOMINANCE FOR SYNTACTIC PROCESSING**Michelle Leckey, & Kara D Federmeier
University of Illinois at Urbana-Champaign*Descriptors: syntax, aging*

Recent findings from visual half field presentation studies have shown that syntactic anomalies elicit a left hemisphere (LH) P600 event-related potential response alongside a right hemisphere (RH) N400 effect in a young adult sample with no history of familial sinistrality (FS-). In the same age group, FS+ participants show the strikingly different pattern of a bilateral P600 response. The aging literature has documented a tendency for patterns of asymmetrical processing to shift toward a more bilateral pattern with advancing age. With this in mind, 48 older adult participants (24 FS-, 24 FS+) underwent EEG recording whilst making judgments on simple two-word phrases. In the FS- group the LH P600 response remained in the older adult sample; however, the N400 effect was no longer present and, instead, RH-biased processing also elicited a P600 response. In the FS+ group the bilateral P600 remained, but the waveforms for these participants showed greater individual variability than those in the FS- group. These findings suggest that, as with many other cognitive functions, syntactic processing becomes more bilateral with age, with the RH being capable of the same type of processing as the dominant LH. The possibility that this more bilateral functioning is due to a decrease in inter-hemispheric inhibition across the lifespan – which, in turn, is affected by familial sinistrality – is discussed.

Poster 1-17**THE EMOTIONAL IMPACT OF WRITTEN IRONY**Dominic Thompson¹, Ian G Mackenzie², Hartmuth Leuthold², & Ruth Filik¹
¹University of Nottingham, ²University of Tuebingen*Descriptors: irony, emotion, emoticons*

Irony is generally thought of as saying the opposite of what is meant, and may fulfill a number of social and emotional functions such as conveying humor or ridicule. One function that is controversial is whether irony increases or decreases the positive or negative impact of a message, compared to literal language. Emoticons often accompany irony in writing, and have been suggested to increase enjoyment of communication. We aim to examine the emotional impact of positive and negative written irony, and the additional influence of emoticons. Previous studies have used offline tasks, thus failing to capture immediate emotional responses. To examine online emotional responses to irony, we used psychophysiological measures while participants read short stories ending with comments that were either ironic or literal, positive or negative, and with or without an emoticon. We used electrodermal activity (EDA) as a direct measure of arousal, and facial electromyography (EMG) to detect muscle movements indicating presence and degree of emotional expressions. Negative ironic messages received more smiles than negative literal messages, suggesting that irony reduces negativity. Ironic praise received more frowns than other messages, perhaps because it is hard to interpret. This effect was removed with an emoticon present, indicating the importance of emoticons in clarifying intent. Higher arousal, as well as fewer frowns and more smiles were observed for messages with an emoticon than without, suggesting emoticons increase positive emotions in communication.

Poster 1-18**STRESS VARIATIONS TO STIMULATE YOUR ATTENTION AND MEMORY**

Emma Rodero

Pompeu Fabra University and University of California, Los Angeles

Descriptors: stress, cognitive processes, electrodermal activity, heart rate
 How the brain processes speech is a crucial question among media researchers, cognitive psychologists, and linguists. One of the most important formal features to improve attention and memory is prosody. Prosody is a supra-segmental linguistic element composed by intonation, stress and rhythm. Some authors have demonstrated that prosody is a determining factor for the cognitive processing. The degree to which a speaker commands prosodic skills, such as stress in this study, may determine whether a discourse is conveyed effectively—ensuring that the listener correctly processes the information. Therefore, this study explores the effect of different stress strategies applied to audio commercials on the cognitive processing of the listener. A within-subjects experiment was conducted in which participants listened to 16 radio commercials varying the stress strategy. The first model did not employ any strategy, the second one had five stressed words, the third one had ten, and the fourth model had 15 stressed words. Dependent variables were self-reported effectiveness and adequacy, psychophysiological arousal and attention, and sentence recognition. We employ two self-perception scales, psychophysiological measures (heart rate and skin conductance), and a recognition test. Results showed that radio commercials presented with moderate stress (5 or 10 words) achieved better effectiveness and recognition, elicited greater sympathetic nervous system activation and less heart rate than the commercials with no stress strategy or with many stressed words (15 in each message).

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Poster 1-19**THE COMT GENOTYPE AND NICOTINE ENHANCE P300 NEURAL SUBSTRATES OF WORKING MEMORY**David E Evans¹, Steven K Sutton², Kade G Jentink¹, & David J Drobos¹
¹Moffitt Cancer Center, ²Colorado State University

Descriptors: nicotine, COMT, working memory
 Nicotine-induced enhancement of cognitive control processes such as attention and working memory may contribute to the reinforcement of cigarette smoking. The cognitive enhancing effects of nicotine may in part be a consequence of its role as a dopamine agonist. Catechol-O-methyltransferase (COMT) degrades dopamine. Dopamine levels are higher in the brains of individuals who possess at least one MET allele on the COMT gene. The MET allele has also been associated with greater cognitive control. Understanding the independent and interactive effects of nicotine administration and COMT carrier status on neural (ERP) substrates of cognitive control may help in furthering our understanding of nicotine dependence and the potential use of cognitive pharmacotherapies to assist with smoking cessation among smokers with cognitive deficits. 73 never-smokers performed a working memory task (N-back) during two experimental sessions. During one session a 7 mg Habitrol nicotine patch was administered 4 hours prior to performance of the N-back, and during the other a placebo patch was administered (double-blind and counterbalanced). Analyses focused on posterior and frontal P300 ERP amplitudes in response to stimuli during the N-back task. Findings indicated that parietal P300 was greater for the lighter load memory conditions among the MET/MET genotype. Frontal P300 amplitude was greater in the nicotine condition across all working memory conditions. Findings will be discussed in the context of dopaminergic working memory substrates and previous parietal versus frontal P300 findings.

NIDA/NIH R21DA027001 (PI David Evans) and R21DA024226 (PI David Drobos).

Poster 1-20**THE MOTIVATIONAL VALUE OF PRIMARY AND SECONDARY REINFORCERS IN REWARD TASKS AS INDEXED BY THE MFN AND LPP**Colleen T O'Leary, & Geoffrey Potts
 University of South Florida*Descriptors: motivation, emotion, event-related potentials*

Both the medial frontal negativity (MFN) and the Late Positive Potential (LPP) components of event-related potentials index attention towards motivationally salient targets. Previous studies using a monetary reward task have shown a larger MFN to worse than expected rewards and a larger LPP to higher magnitude rewards. The feedback in these studies is usually represented by text showing the amount of money gained or lost making this a secondary reinforcer. However, no studies have looked at images instead of money as the feedback. Given that the images would serve as a primary reinforcer here, we would expect larger LPP and MFN to the images, compared to the money. In the current study, images from the International Affective Picture Set varying in valence (positive/negative) and arousal (high/low) were presented to participants in the place of money. The preliminary analyses (N = 30) suggest that images elicit a larger LPP than money, with negative images eliciting an even larger LPP than positive images. In conditions where the outcome was worse than expected, the MFN was larger for the images than for money. These results provide preliminary support for the theory that primary reinforcers are more motivationally salient. If these results are substantiated further, it could have important implications for reward tasks, with images being a potential substitute for money.

Poster 1-21**THE EFFECT OF DOPAMINE GENETICS ON NEURAL REWARD SENSITIVITY AND RISKY CHOICE**Heather E Soder, Troy A Webber, Jong Y Park,
 Marina A Bornovalova, & Geoffrey F Potts
 University of South Florida*Descriptors: dopamine, medial-frontal negativity, risk-taking behavior*

When making decisions individuals evaluate several possible outcomes of their choice; however, some display heightened reward sensitivity, despite the potential for future negative consequences, which can lead one to make risky choices. Rewards are processed in the mesolimbic dopamine reward system, and this system is in part modulated by genetic polymorphisms that are associated with dopamine transmission. The current study tested if genetic polymorphisms that are associated with enhanced dopamine neurotransmission will be more neurally reward sensitive, score higher on self-reported impulsivity, and make riskier choices. In a sample of undergraduate psychology students, five genetic polymorphisms were genotyped and used to create a genetic risk score that represented dopamine transmission efficiency. Two groups (high and low efficiency) were created via median split and then compared on neural reward sensitivity (assessed by event-related potentials, specifically, the medial-frontal negativity [MFN] and the error-related negativity [ERN]), impulsivity (assessed via self-report), and risky choice (measured using the Balloon Analogue Risk Task and self-report measures). Results indicated that individuals with higher levels of dopamine displayed a less negative MFN and more drinking behaviors than those with lower levels of dopamine. These results suggest that individuals with higher levels of dopamine are less sensitive to punishments, which could lead them to make riskier choices.

Poster 1-22**THE DIFFERENCES BETWEEN MEAN BLOOD FLOW AND VASCULAR REACTIVITY AND THEIR RELATIONSHIPS WITH AGE, FITNESS, AND COGNITION IN OLDER ADULTS**

Benjamin Zimmerman, Bradley P Sutton, Kathy A Low, Chin Hong Tan, Mark A Fletcher, Nils Schneider-Garces, Edward L Maclin, Gabriele Gratton, & Monica Fabiani
University of Illinois at Urbana-Champaign

Descriptors: aging, arterial spin labeling, cardiorespiratory fitness

Cognitive declines, especially in executive tasks, are associated with normal aging. Some of these deficits are likely linked to age-related changes in cerebrovascular health. In order to gain a better understanding of how cerebrovascular health impacts cognitive aging and relates to age and cardiorespiratory fitness (CRF), arterial spin labeling (ASL), a functional magnetic resonance technique, was used to study the cerebral blood flow (CBF) in healthy older adults ranging in age from 56–88. Past research in our lab using the same method found that estimated CRF fully mediated the effects of age on the mean CBF over six slices through frontal and parietal gray matter, but was unable to demonstrate a relationship between mean CBF and cognitive function. Here we present measures of both mean blood flow and activation blood flow collected on a subset of those participants one year later in the visual cortex. We extended our previous findings, demonstrating that the mediation of the age effects on mean CBF by CRF also occurred in the gray matter of the visual cortex. Additionally, we found that the change in CBF in the visual cortex to a flashing checkerboard stimulus, but not the mean CBF, was associated with neuropsychological measures of executive function. These results indicate that the measures of baseline CBF and activation CBF are separable measures of vascular health that relate differentially to measures of physiology and cognition. Measures of cognitive function seem to be related more strongly to measures of activation CBF rather than the baseline CBF.

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Poster 1-23**HIPPOCAMPAL VOLUME AND CONNECTIVITY ARE RELATED TO THE INTEGRITY OF MEMORY REACTIVATION PROCESSES IN NORMAL OLDER ADULTS**

John A Walker, Kathy A Low, Nirav N Patel, Neal J Cohen, Gabriele Gratton, & Monica Fabiani
University of Illinois at Urbana-Champaign

Descriptors: memory reactivation, hippocampus, long-term memory

Current theories propose that the hippocampus is indispensable for relational memory (Eichenbaum & Cohen, 2001), which enables the binding of independent elements analyzed in separate cortical regions into an integrated memory representation. Previously we showed that presenting only one item of a previously studied pair prior to a test display elicits reactivation of the cortical representation of the unrepresented companion, that is, cortical activity based on the retrieval of relational memory (Walker et al., 2014). Here, we used a combination of the event-related optical signal (EROS; a neuroimaging technique with high spatial and temporal resolution), structural magnetic resonance imaging (sMRI), and diffusion tensor imaging (DTI) to determine whether structural properties and functional connectivity of the hippocampus are associated with an individual's ability to reactivate related representations in the cortex. Normal older participants (age 55–78) were presented with face-scene pairs to study and later tested using yes-no recognition, with a preview of an old or new scene prior to each test display. We found that hippocampal volume, diffusivity, and fractional anisotropy were strongly correlated with behavioral performance as well as with the reactivation of face areas in the left superior temporal sulcus (STS) to the presentation of related scenes during the preview period. These data demonstrate that even in normal individuals, hippocampal integrity is associated with the ability to reactivate related memory representations in the cortex.

Poster 1-24**EFFECT OF ECONOMIC DISTRESS ON PHYSICAL HEALTH IS MEDIATED BY LOW COPING EFFICACY AND CARDIAC REACTIVITY TO NEGATIVE STIMULI**

Alexander F Danvers, Brandon G Scott, Irwin N Sandler, Tim S Ayers, Sharlene A Wolchik, Linda J Luecken, Jenn-Yun Tein, & Michelle N Shiota
Arizona State University

Descriptors: health, socioeconomic status, stress

Low socioeconomic status (SES) has been linked consistently to worse physical health. One potential mechanism for this effect may involve depletion of coping resources, as emotional stress is also linked to poor health. We examined relations among subjective economic distress, self-reported general coping efficacy, physiological reactivity to a set of emotionally disturbing photos, and self-reported overall physical health, in a sample of young adults (mean age 26.7 years, 49.4% male) participating in the 15-year follow-up of a parental bereavement intervention. A path model in Mplus was used to assess the roles of coping efficacy and cardiac interbeat interval (IBI) reactivity to the photos in mediating the effects of economic distress on health. Those reporting greater economic distress also reported lower coping efficacy ($\beta = -.425, p < .001$). In turn, lower coping efficacy predicted greater shortening of IBI in response to the photos ($\beta = .229, p = .002$). In a regression predicting overall physical health, greater IBI reactivity ($\beta = .208, p = .006$); higher economic distress ($\beta = -.185, p = .043$); and worse coping efficacy ($\beta = .224, p = .006$) all independently predicted worse health. However, the mediated effect from economic distress to IBI reactivity through coping was statistically significant ($\beta = .048, p = .049$), and the mediated effect from economic distress to coping efficacy to IBI reactivity to health was marginally significant ($\beta = -.020, p = .079$). Implications for addressing health disparities are discussed.

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Poster 1-25**GENDER DIFFERENCES IN RELATIONSHIP OF ATTACHMENT STYLE TO RSA REACTIVITY DURING A NEGATIVE EMOTION TASK**

Makenzie J O'Neil, Claire I Yee, Brandon G Scott, Irwin N Sandler, Tim S Ayers, Sharlene A Wolchik, Linda J Luecken, Jenn-Yun Tein, & Michelle N Shiota
Arizona State University

Descriptors: attachment, emotion, respiratory sinus arrhythmia

Prior research suggests that heightened parasympathetic influence on the heart, indexed by respiratory sinus arrhythmia (RSA), may serve as a marker of emotion regulation in response to an upsetting stimulus. In contrast, reduced RSA may indicate emotional distress. Prior work has also found that attachment avoidance is associated with a tendency to distance one's self from emotionally distressing situations, and deny or suppress negative emotions. The present analyses asked whether attachment style moderates RSA reactivity to negative emotion stimuli, with gender as a potential moderator. Participants were adults who had participated 15 years previously in an intervention for parentally bereaved children. They viewed a set of emotionally disturbing photos, instructed not to try to control their emotions, while cardiac activity was recorded. Participants also completed an attachment style questionnaire. Attachment anxiety was unrelated to RSA reactivity to the photos. Among men, higher attachment avoidance was associated with RSA increases while viewing the photos, whereas low avoidance was associated with reduced RSA ($r = .287, p = .04$); the opposite was true for women ($r = -.31, p = .06$). These correlations are significantly different, $z = 3.204, p = .001$. Thus, men showed the expected pattern, with avoidance predicting a physiological indicator of heightened emotion regulation – even when instructed not to regulate – whereas avoidance predicted a physiological sign of greater distress among women. Implications for possible sex differences in attachment avoidance are discussed.

NIMH Grant R01-MH49155.

Poster 1-26**INHIBITORY INPUTS ACCOUNT FOR P50 SUPPRESSION BETTER THAN REFRACTORY PERIODS**

Anna Dalecki, Stuart J Johnstone, & Rodney J Croft
University of Wollongong

Descriptors: P50 suppression, inhibition, refractory period

P50 suppression refers to the amplitude-reduction of the P50 event-related potential to the second (S2) relative to the first (S1) of identical auditory stimuli presented 500 ms apart. Theory suggests that refractory periods (RP) and/or inhibitory inputs (II) underlie P50 suppression. The present study manipulated the interval between stimulus pairs (IPI: 2, 8 s) and direction of participants' attention (Attention, Non-Attention) in 21 healthy undergraduates to determine which theory best explains P50 suppression. The rationale is that: 1/RP and II predict opposite effects on S2P50 of manipulating the functionality of the mechanism responsible for S2P50 suppression; 2/IPI2 (relative to IPI8) will reduce functionality of the mechanism responsible for S2P50 suppression, because it results in less recovery of (and a greater challenge to) that mechanism – RP would thus predict reduced S2P50, whereas II would predict enhanced S2P50 amplitude; and 3/ Where the mechanism responsible for S2P50 suppression is challenged (i.e. at IPI2, due to insufficient recovery), Attention (relative to Non-Attention) will enhance functionality of this mechanism – RP would thus predict increased S2P50, whereas II would predict reduced S2P50 amplitude. In the Non-Attention paradigm, reducing IPI from 8 to 2 s tended to increase S2P50 amplitude, and in the 2 s IPI paradigm, directing attention towards the stimuli reduced S2P50 amplitude, with both effects supporting the II hypothesis only. These results will be discussed in relation to the reported P50 suppression impairment in schizophrenia.

Poster 1-27**PACE YOURSELF: INTRINDIVIDUAL VARIABILITY IN CONTEXT USE REVEALED BY SELF-PACED EVENT-RELATED BRAIN POTENTIALS**

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University of Illinois at Urbana-Champaign

Descriptors: language, reading, N400

Event-related potentials (ERPs) have revealed multiple mechanisms by which contextual constraints impact language processing, but little work has examined the trial-to-trial dynamics of context use. Recent reading time (RT) studies have revealed substantial intra-individual variability, suggesting that a reader may utilize multiple different sentence-processing strategies that wax and wane over the course of an experiment and may be obscured in averages. Such variability is overlooked in RSVP ERP studies that do not afford control over the rate of input. To assess intra-individual variability in context use, we utilized a concurrent self-paced reading and ERP paradigm. Participants read sentences that were strongly or weakly constraining and completed with an expected or unexpected word. Our findings revealed both quantitative and qualitative changes in the ERP as a function of target word RTs. Slower RTs were associated with smaller N400s. Additionally, prediction-related costs varied as a function of RTs. For faster RTs, a frontal positivity was seen to unexpected endings in strongly constraining sentences, replicating RSVP patterns. However, a bilateral anterior N200 was found among unexpected items that generated the slowest RTs, likely reflecting the cognitive control of motor execution. Collectively, our findings suggest that effects of context vary across trials within a single individual during the construction of message-level semantic representations. Co-registering behavioral and neural effects of context offers a window into these single-item dynamics.

Poster 1-28**HEMISPHERIC DIFFERENCES IN MATHEMATICAL EXPRESSION PROCESSING: EVENT-RELATED POTENTIALS EXPOSE DIFFERENCES IN WHEN AND HOW THE HEMISPHERES APPRECIATE ANSWER TYPES**

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University of Illinois at Urbana-Champaign

Descriptors: hemispheres, arithmetic, sentences

Mathematical expressions are similar to sentences in having contexts (“ $6 \times 3 =$ ”) that prepare the reader for a completion that is congruent/correct (“18”) or incongruent/incorrect (“20”), and, in prior ERP studies using arithmetic problems, N400-like effects are typically reported. Equation answers additionally elicit a late positive complex (LPC) larger for incorrect than correct answers and a P3b (for correct answers). Incorrect answers that are closely related to the correct one tend to elicit effects that are intermediate between correct and incorrect/unrelated answers. Despite known hemispheric differences in sentence processing, there have been no ERP studies investigating each hemisphere's response to math problems. To address this gap, we presented equation contexts serially at central fixation, and then critical answers (correct, incorrect/related, or incorrect/unrelated) were presented to either the left visual field (right hemisphere, LVF/RH), right visual field (left hemisphere, RVF/LH) or centrally while recording ERPs. In RVF/LH, there was an effect of correctness prior to the traditional N400 window that was insensitive to relatedness. In contrast, in LVF/RH, this effect was reduced and instead there was an LPC (largest for incorrect/unrelated answers) that was sensitive to relatedness, suggesting a special role for the RH in more extensive assessment of proposed answers. Responses in central presentation depended on time window: whereas the LPC appeared to be an average of the hemispheres, the earlier effect of correctness was more similar to RVF/LH.

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Poster 1-29**TYPE D PERSONALITY EFFECTS ON CARDIOVASCULAR AND EMOTIONAL RESPONSES TO IMAGES AND MUSIC**

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The University of Alabama in Huntsville

Descriptors: Type D, reactivity, music

Previous research has found that people with Type D personality experience maladaptive cardiovascular responses. The present study examined the effects of Type D personality on the physiological and emotional responses to music excerpts and aversive images. The study contained a $2 \times 2 \times 2$ (Audio: tone, music by Visual: fixation cross, image by Type D: Type D, non Type D) mixed design with a 2×2 (Music Arousal: high, low by Music Valence: pleasant, unpleasant) nested within the Music factor. Undergraduates completed the Type D scale, viewed audiovisual stimuli, and rated subjective arousal and valence. Reactivity was assessed with pulse amplitude change from baseline. Type D personality had no independent effect on pulse amplitude when music or images were paired with neutral stimuli, although a trend for an Audio*Type D interaction was found where Type D individuals responded differently than non Type D students to music but not to tones. When music and images were combined, high arousal music resulted in lower pulse amplitudes for the sample. Moreover, Type D students experienced higher pulse amplitudes than non Type D students. For subjective ratings in response to concurrent images and music, the sample reported higher arousal levels for high arousal music than for low arousal music. Further, Type D students reported higher arousal levels than non Type D students. The data suggest that music, with aversive images, may be a way to engage right hemispheric processing that results in the heightened negative affect and maladaptive cardiovascular response observed in Type D.

Poster 1-30**RESTING CARDIAC INDICATORS DIFFERENTIATE DISPOSITIONAL FEAR FROM GENERAL DISTRESS**Casey M Strickland, James R Yancey, & Christopher J Patrick
Florida State University*Descriptors: heart rate, heart rate variability, internalizing*

Resting heart rate (HR) has been linked in previous studies to trait anxiety and to anxiety disorders. Resting heart rate variability (HRV) (the baseline difference in HR when inhaling versus exhaling), an indicator of autonomic nervous system functioning, has been linked to emotion regulation and positive emotionality, and lower HRV has been linked to major depression and bipolar disorders. The present study examined resting HR and HRV (assessed during an eyes open/closed rest period) as indicators of trait fear and general distress (assessed using well-validated scale measures) in a sample of 508 adult community subjects. There was a significant association between dispositional fear and mean HR level in the current sample in the eyes open ($r = .19, p < .001$) and eyes closed ($r = .21, p < .001$) portions of the resting assessment, with individuals higher in dispositional fear showing higher HR. Further, decreased resting HRV was significantly related to higher reported levels of general distress in both the eyes open ($r = -.11, p = .029$) and eyes closed ($r = -.11, p = .021$) conditions. Together, these findings suggest that rate and variability of resting cardiac activity may serve as differential indicators of two related but separable aspects of internalizing psychopathology—dispositional fear and pervasive distress.

Poster 1-31**DISTINCT BRAIN CORRELATES OF GENERAL DISINHIBITION VS. SUBSTANCE ABUSE: EVIDENCE FROM AN ERP/GAMBLING TASK PARADIGM**Colin B Bowyer¹, Noah C Venables¹, James R Yancey¹, Christopher J Patrick¹, Greg P Hajcak², & Darrell A Worthy³¹Florida State University, ²Stony Brook University, ³Texas A&M University*Descriptors: externalizing, disinhibition, event-related potentials*

The hierarchical model of externalizing psychopathology, as operationalized by the Externalizing Spectrum Inventory (ESI; Krueger et al., 2007), views impulse control problems as arising from a general disinhibitory liability, along with specific influences that shape this liability in distinct ways. The ESI includes 23 content scales that all load onto a general disinhibition (DIS) factor, with some scales loading additionally on subfactors reflecting callous-aggressive tendencies and substance abuse (SA). The DIS factor has established neural correlates, most notably reduced amplitude of the P3 ERP response. However, distinct neural correlates of the SA factor have yet to be identified. The current work tested for differential relations of the DIS and SU factors with ERP components elicited by reward versus loss feedback in a lab gambling task. Data from 208 adult subjects revealed significant negative rs for ESI substance abuse with reward positivity (RewP; Hajcak Proudfit, 2014) and for general disinhibition with P3. Regression analyses revealed dissociable relations: High SA scores uniquely predicted reduced RewP, whereas elevations on the disinhibition factor uniquely predicted reduced P3 amplitude. Results suggest that reduced RewP reflects reward-related dysfunction connected to problematic SU, whereas reduced P3 indexes impaired stimulus post-processing associated with general disinhibitory liability.

Poster 1-32**PSYCHONEUROMETRIC ASSESSMENTS OF INHIBITORY CONTROL AND THREAT SENSITIVITY: GENETIC/ ENVIRONMENTAL BASES AND ETIOLOGIC OVERLAP WITH PSYCHOPATHOLOGY**Noah C Venables¹, James R Yancey¹, Mark D Kramer², Brian M Hicks³, Lindsay D Nelson⁴, Casey M Strickland¹, Robert F Krueger⁵, William G Iacono⁵, & Christopher J Patrick¹¹Florida State University, ²Minneapolis Veterans Affairs Medical Center, ³University of Michigan, ⁴Medical College of Wisconsin, ⁵University of Minnesota*Descriptors: psychoneurometric, fear, disinhibition*

Inhibitory control and threat sensitivity are neurobehavioral dispositions hypothesized to be appreciably heritable and effectively assessable using indicators from

differing measurement domains. However, little is known about the etiologic bases of these constructs operationalized as psychoneurometric variables (i.e., conjointly through scale-report and task-physiology), or the etiologic basis of relations between these variables and clinical problems. The current work addressed these important questions in a sample of adult twins ($N = 454$). Inhibitory control was operationalized in reverse (i.e., as disinhibition) through scores on scale measures of disinhibitory and aggressive tendencies combined with P3 brain response indicators from two lab tasks. Threat sensitivity was operationalized using a scale measure of dispositional fear together with physiological (i.e., startle, facial EMG, heart rate) indicators of reactivity to aversive visual stimuli. We found appreciable heritabilities for psychoneurometric indices of both disinhibition (.68) and threat sensitivity (.45), and the two showed distinctive phenotypic associations with externalizing and fear psychopathology, respectively. Further biometric analyses will be presented clarifying the role of genetic versus environmental influences in accounting for observed associations of psychoneurometric indices with psychopathology. Findings will be discussed in the context of initiatives directed at incorporating psychophysiological measures into assessments of mental health problems.

Poster 1-33**ALCOHOL HANGOVER IMPACTS REWARD PROCESSING WITHIN THE MEDIAL-FRONTAL CORTEX**Ashley Howse, Cameron D Hassall, & Olave E Krigolson
University of Victoria*Descriptors: event-related potentials, reinforcement learning, clinical factors*

Over the past two decades studies using electroencephalography have provided key evidence that the neural responses evoked by rewards and punishments respond in a pattern that would be predicted by reinforcement learning theory (e.g., Sutton and Barto, 1998). With that said, a lot remains unclear about the factors that influence the functional efficacy of the medial-frontal learning system. For example, behavioral evidence suggests that alcohol hangover impacts motor control and cognitive functioning (Cherptel et al., 1998; Verster, 2007) and thus alcohol hangover may be one of the factors that would impair the medial-frontal system. In the present study, we aimed to provide the first electroencephalographic evidence of an impairment to the reward processing system of the human medial frontal cortex during alcohol hangover. Participants in our study completed a learnable gambling task while electroencephalographic data were recorded. In line with previous work, we found that the reward positivity (RP; Holroyd et al., 1997; Krigolson et al., 2014), a component of the human event-related brain potential (ERP), was elicited by wins during the gambling paradigm. Further, and importantly, a reduction in RP amplitude was observed for hangover relative to control participants. The results of the present study are important as a hangover-induced impairment of the medial-frontal system may reduce individuals' ability to execute corrective behaviors—such as driving a motor vehicle.

NSERC, NSHRF, and CFI Grants.

Poster 1-34**REWARD EXPECTANCY AND THE REWARD POSITIVITY: A NON-LINEAR RELATIONSHIP**

Chad Williams, Cameron D Hassall, & Olave E Krigolson
University of Victoria

Descriptors: event-related potentials, reinforcement learning, reward processing

Reinforcement learning theory posits that prediction errors – the difference between an expected outcome and an actual outcome – scale in magnitude to the degree of expectancy mismatch between the expected and actual outcome. In the present study we sought to extend the research of Holroyd and Krigolson (2007) examining the effect of reward expectancy on neural prediction error signals. Participants performed a time estimation task that varied in difficulty while electroencephalographic data was recorded. Within the task, participants were correct if they fell within a response window (e.g. 900ms – 1100ms) and task difficulty was manipulated by varying the degree to which the size of the response window changed following correct and error trials (see Holroyd & Krigolson, 2007). As such, we made it possible to examine very unexpected errors, i.e., errors in the very easy condition in addition to other degrees of expectancy (very expected, expected, control, unexpected, very unexpected). As we predicted, the amplitude of the reward positivity (Holroyd et al., 2008) increased linearly between the easy, control, and hard conditions. Interestingly however, we found that the reward positivity did not differ in amplitude between very expected and expected conditions nor between the unexpected and very unexpected conditions. In sum, our results reveal a sigmoidal relationship between degree of expectancy and the amplitude of the reward positivity—a result with interesting implications for reinforcement learning theory as it is not in line with theoretical accounts.

NSERC, NSHRF, CFI.

Poster 1-35**PARASYMPATHETIC AND SYMPATHETIC CONTRIBUTIONS TO ERP MEASURES OF SELECTIVE ATTENTION IN CHILDREN AND ADULTS**

Ryan J Giuliano, Christina M Karns, Eric Pakulak, Theodore Bell, Seth Petersen, Elizabeth A Skowron, & Helen J Neville
University of Oregon

Descriptors: event-related potentials, selective attention

An emerging body of research has demonstrated that neural and autonomic regulatory mechanisms are closely integrated (Thayer & Lane, 2009), yet surprisingly few studies have measured both in an experimental context, and little is known about how this relationship changes over development. Here, we recruited 3–5 year old children and adults to complete an event-related potential (ERP) measure of auditory selective attention while we concurrently measured respiratory sinus arrhythmia (RSA) and pre-ejection period (PEP) as indices of parasympathetic and sympathetic function, respectively. Baseline EEG, RSA, and PEP were acquired during a 5-minute neutral video before the ERP task. In children, greater parasympathetic augmentation from task to baseline was associated with a larger effect of selective attention from 100–200 ms. In adults, greater sympathetic activation during the selective attention task was associated with a larger effect of selective attention from 100–200 ms. Taken together, results suggest that the contributions of the parasympathetic and sympathetic nervous systems to selective attention change over the course of development. Early in life, physiological contributions to sustained selective attention may be most important for regulating one's affective state via increased parasympathetic activation. Later in life, sustained attention may be more linked to the level of sympathetic arousal during the act of attentional engagement. Importantly, this pattern of physiological responding may differ when assessing more active inhibitory control measures.

Poster 1-36**MAPPING PERSONALITY AND IMPULSIVITY ONTO ERROR PROCESSING: LINKS WITH THE ERROR-RELATED NEGATIVITY AND ERROR POSITIVITY**

Kaylin E Hill, & Dan J Foti
Purdue University

Descriptors: error-related negativity, impulsivity, personality

The error related negativity (ERN) is a negative deflection in the event-related potential (ERP) waveform that occurs within 100 ms after the commission of an error on speeded tasks. The error positivity (Pe) is a positive deflection following the ERN, 200–400 ms post-error. While impulsivity is related to a blunted ERN, it is not yet known which facets of impulsivity exhibit this relationship. Furthermore, the ERN and clinical phenomena have been related to personality traits from the Five Factor Model (e.g., neuroticism, conscientiousness), yet no study to date has comprehensively measured personality and impulsivity in relation to the ERN. The present study aims to answer these questions through the utilization of the UPPS-P impulsive behavioral scale and Five Factor Model Rating Form (FFMRF) within a large sample. Two hundred and twenty-nine adults completed an arrow flankers task while ERP data was recorded, and then completed the UPPS-P and FFMRF. Correlations were used to relate the ERN, Pe, and post error slowing to self-report measures. Next, we considered potential interactions between traits using multiple linear regression. We found a significant interaction between Conscientiousness and Negative Urgency in predicting ERN amplitude ($\Delta R^2 = 2.8\%$, $\beta = .17$, $p < .05$). Among individuals high in Conscientiousness, Negative Urgency was related to a smaller ERN, and vice versa. This finding builds upon previous research linking both conscientiousness and impulsivity to the ERN, suggesting meaningful interrelationships between these traits in predicting ERN amplitude.

Poster 1-37**ANTICIPATORY AND CONSUMMATORY PROCESSING OF MONETARY INCENTIVES: RELATIONSHIPS WITH DEPRESSION AND IMPULSIVITY**

Keisha D Woodall¹, Brittni K Novak², & Dan Foti²
¹Ball State University, ²Purdue University

Descriptors: event-related potentials, reward, depression

As part of the environmental contribution to behavior, rewards and punishments are fundamental components that guide future action. Individual differences in reward sensitivity have been linked with symptoms of depression and trait impulsivity, yet no study to date has considered the interplay between these dimensions. In the current study, we assessed symptoms of depression using the Depression Anxiety Stress Scales and trait impulsivity using the UPPS-P. Reward processing was assessed using the monetary incentive delay (MID) task, which has been widely applied in neuroimaging research to explicitly separate neural activity elicited by reward anticipation and outcome. ERP data was recorded during an adapted version of the MID task in a large sample ($N = 92$). Anticipatory reward processing was captured by three ERPs: the cue-P3 elicited by the incentive cues, the contingent negative variation (CNV), and the stimulus-preceding negativity (SPN). Consummatory reward processing was captured by two additional brain responses: the reward positivity (RewP) and feedback-P3 (fb-P3). Across the full sample, all five neural indices were modulated by monetary incentives (all p 's $< .001$). Building upon past research, interrelationships were found between depression and trait impulsivity in predicting neural activity: interactions between Depression and Lack of Premeditation were observed in prediction of two neural measures, the CNV ($\beta = .24$, $p < .05$) and the RewP ($\beta = -.19$, $p < .05$), even after adjusting for age, gender, and the other facets of impulsivity.

Poster 1-38**DOES CAFFEINE AFFECT EMOTIONAL PROCESSING?**

Frances H Martin, & Emma Hayes
University of Newcastle

Descriptors: caffeine, emotion

Caffeine has been shown to increase ERP component amplitudes and decrease latencies in response to attention related tasks and ERP amplitudes are enhanced in response to emotionally arousing stimuli. The aim of this study was to explore the effect of caffeine on emotional processing using event-related potentials. Sixteen females aged between 18 and 35 completed two experimental sessions in which they were given either caffeine (200mg) or a placebo under double blind conditions. Participants viewed both high and low arousing pleasant, unpleasant and neutral stimuli (IAPS) while EEG activity was recorded. N1, N2, and P3 peak amplitudes and latencies were analyzed for the effects of caffeine on arousal and valence. P3 amplitude was enhanced in pleasant and unpleasant conditions but not neutral conditions. This enhancement was greater under caffeine conditions than under placebo conditions. Caffeine generally flattened the expected valence and arousal effects compared to placebo for N1 and N2 amplitude. The results support the negativity-bias model of emotional processing. The differential effects of caffeine on the early and late components of the ERP suggest that caffeine acts differentially on early and later attentional and emotional processes.

Poster 1-39**POOR BODY IMAGE EXACERBATES HEMODYNAMIC REACTIVITY TO A LABORATORY STRESSOR IN WOMEN: ASSESSING THE MODERATING ROLE OF MINDFUL BODY AWARENESS**

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Descriptors: women's health, mindfulness, stress

Poor body image is prevalent in women and is associated with stress, depression and disordered eating. The following study assessed whether mindful body awareness could moderate the effect of poor body image on stress responses in women. Body image is a multifaceted construct encompassing attitudes toward and perceptions of one's body and behaviors involved in monitoring and evaluating one's body. Mindful Body Awareness (MBA) is characterized by awareness and recognition of normal, non-emotive bodily processes and physical sensations. MBA considers one's sensitivity toward and belief in how well they can sense, predict, and describe their bodily functions and sensations. The present study investigated the roles of body image and MBA in hemodynamic and state anxiety responses to a laboratory stressor and assessed the moderating effect of MBA on the relationship between poor body image and stress. Forty women completed assessments of body image and MBA. Blood pressure and heart rate were monitored during a standardized laboratory stress protocol. Women with poor body image displayed greater hemodynamic reactivity to the stressor than women with high body image. Conversely, women high in MBA displayed less hemodynamic reactivity than women with low MBA. Moderation analyses revealed that MBA significantly buffered the effect of poor body image on hemodynamic reactivity. The fact that MBA attenuated the deleterious effects of poor body image on stress in women lends further support for the development of mindfulness-based interventions aimed at stress reduction.

Seattle Pacific University Faculty Research Grant.

Poster 1-40**AS DIFFERENT AS DAY AND NIGHT: EEG AND COGNITION PREDICT EXECUTIVE FUNCTION DEVELOPMENT FROM 24 TO 36 MONTHS**

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Descriptors: executive function, electroencephalography

Typically developing young children show wide variation in comprehension and completion of executive function (EF) tasks. It is unknown what factors contribute to early success on EF tasks, such as the widely used Day-Night task. We use

longitudinal data to show that EF and EEG collected at 24 mo predict performance on the Day-Night task at 36 mo. One hundred fifty-three children participated in a battery of tasks at both ages. At the 24 mo visit we evaluated early EF using DCCS (Zelazo, 2006), A-not-B (Diamond et al., 1997), and crayon delay (Goldsmith & Rothbart, 1991). EEG was recorded during quiet attentive baseline. At 36 mo children completed the Stroop-like Day-Night task, which measures EF, specifically inhibitory control. Hierarchical regression was used to statistically predict performance on Day-Night at 36 mo. At step 1, performance on DCCS, A-not-B, and crayon delay predicted 5 percent of variance in Day-Night performance at 36 mo ($F = 2.82, p = .04$), with crayon task contributing unique variance ($\beta = .20, p = .02$). EEG power from frontal electrodes (F3, F4, F7, F8) was added at step 2, increasing the total variance accounted for to 11 percent ($F = 2.35, p = .057$). Power at F4 ($\beta = -.30, p = .08$) and F8 ($\beta = .47, p = .003$) contributed unique variance to the full model. These data demonstrate that the foundations for these individual differences in early EF can be traced to toddler neural activity and cognition.

R01-HD049878.

Poster 1-41**INFANT FRONTOPIRIETAL FUNCTIONAL CONNECTIVITY, MATERNAL INTERACTION STYLE, AND RISK FOR ANXIETY IN EARLY CHILDHOOD**

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Descriptors: EEG coherence, anxiety, attention

There are high levels of stability in the developmental trajectories of children with early-identified behavior problems (Hill et al., 2006). Understanding early predictors of behavior problems is important for identifying mechanisms underlying the development of these adjustment difficulties. The frontoparietal network has been linked to attentional control (Corbetta & Schulman, 2002) and children with anxiety problems exhibit attention biases (Perez-Edgar et al, 2011). We examined whether infant frontoparietal functioning and early attention were predictive of difficulties with behavior beyond infancy. Three hundred typically developing children participated. Infant frontoparietal EEG coherence was recorded during resting baseline at 5 mo. Development occurs in a context; thus, parenting behaviors were coded at 10 mo as mothers interacted with infants. Mothers rated infant attention at 5 and 10 mo and completed the Child Behavior Checklist (CBCL) at 36 mo. Using hierarchical regression, 5 mo frontal-parietal EEG coherence and 5 mo mother-rated infant attention accounted for 7 percent of variance in 36 mo CBCL Anxiety ($F = 4.10, p = .01$), with right hemisphere EEG coherence providing unique variance ($\beta = .16, p = .05$). Next, 10 mo maternal sensitive behaviors and 10 mo mother-rated infant attention accounted for an additional 5 percent of variance in 36 mo CBCL Anxiety ($F = 4.81, p = .001$), with maternal behavior providing unique variance ($\beta = -.22, p = .01$). Results suggest infant neural and infant environmental contributors to early developing behavior problems.

Funding provided by NIH/NICHD R01-HD049878 and R03-HD043057.

Poster 1-42**CLINICAL CORRELATES AND NEURAL SUBSTRATES OF P50 SUPPRESSION DEFICITS IN SCHIZOPHRENIA**

Holly K Hamilton, Terrance J Williams, Katherine L Narr, Joseph Ventura, Kenneth L Subotnik, Gregory A Miller, Keith H Nuechterlein, & Cindy M Yee

University of California, Los Angeles

Descriptors: P50 suppression, schizophrenia, diffusion tensor imaging

We evaluated the P50 component of the ERP, an index of sensory gating measured during a paired-stimulus paradigm, as an intermediate phenotype between clinical symptoms and neuronal mechanisms that might also contribute to higher-order cognitive dysfunction in schizophrenia. Despite considerable evidence that schizophrenia patients exhibit impaired suppression of the P50 to the second of two identical stimuli, the associated clinical significance and neural mechanisms remain poorly understood. We therefore sought to more fully characterize P50 suppression deficits in schizophrenia. Data obtained from 52 schizophrenia patients and 41 healthy participants replicated prior research, detecting a P50 suppression deficit in patients. Investigation of the clinical correlates of P50 in patients revealed associations between impaired suppression and clinician ratings of attention difficulties as well as poor working memory performance. In examining the neural substrates of P50 gating with diffusion tensor imaging in a subsample of patients, we found associations between P50 deficits and compromised structural integrity of white matter tracts connecting brain regions previously implicated in P50. By characterizing the relationship of P50 to symptoms and cognitive dysfunction in schizophrenia and isolating biological mechanisms that might be involved in P50 suppression, present findings provide support for P50 as a viable biomarker for guiding the development of interventions that target cognitive impairments in this chronic mental illness.

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Poster 1-43**RECOGNITION MEMORY FOR AFFECTIVE IMAGES IN SCHIZOPHRENIA**

Peter E Clayson¹, Holly K Hamilton¹, Leland J Jasperse¹, Margaret M Bradley², Peter J Lang², Peter Bachman³, Kenneth L Subotnik¹, Gregory A Miller¹, Keith H Nuechterlein¹, & Cindy M Yee¹

¹University of California, Los Angeles, ²University of Florida, ³University of Pittsburgh

Descriptors: schizophrenia, recognition memory, emotional images

Schizophrenia patients show robust deficits in recognition memory, although there is evidence for improved performance to emotionally salient words relative to neutral words. To determine whether emotion can enhance memory and compensate for memory deficits in other contexts, recognition memory to emotionally salient images was examined in patients with schizophrenia. It was hypothesized that patients would exhibit improved performance and an enhanced late positive potential (LPP), an index of emotional salience, to emotion-eliciting images similar to healthy controls. Behavioral and EEG data were recorded in 39 schizophrenia patients and 26 healthy controls during a memory recognition test of previously studied or unstudied emotional images. Participants were instructed to indicate whether images were old or new and whether the images were remembered or known. Across both groups, analyses indicated larger LPP to previously studied images than to new images and larger LPP to high-arousing images than to low-arousing images. Interactions were not significant. Performance accuracy and proportion of remembered to known ratings for previously studied images were similar for the two groups and were similar for low- and high-arousing images. Thus, schizophrenia patients showed memory performance comparable to that of healthy controls when recollecting emotional images. However, it is unclear to what extent the affective salience of images enhanced recognition memory in patients and controls in the absence of an arousal effect on performance.

Poster 1-44**EVALUATING DOPAMINE'S RELATIONSHIP TO PERFORMANCE MONITORING USING SPONTANEOUS BLINK RATE**

Tobin R Dykstra, Hans S Schroder, & Jason S Moser
Michigan State University

Descriptors: error-related negativity, spontaneous blink rate, dopamine

Error monitoring involves the detection and signaling of mistakes, and is thought to optimize behavior. Associated with error monitoring, the error-related negativity (ERN) is a deflection in the event-related potential which peaks 50–100 milliseconds after an erroneous response in simple two-choice tasks. Reinforcement learning theory suggests that the ERN results from a dip in phasic dopamine (DA) release when task outcomes are worse than expected. However, the precise relationship between DA and the ERN is not well understood. We attempted to address this issue by assessing tonic (extracellular) DA levels via spontaneous blink rate (SBR). Myriad studies indicate that increased SBR is reflective of increased levels of tonic DA. Participants (N = 59 females) completed an arrow version of the Eriksen flanker task while continuous EEG was recorded. SBR was collected during a four-minute rest period following the flanker task. Results revealed that high SBR related to a smaller ERN. SBR also related to the negativity following correct responses (the CRN). The observed relationship demonstrates a link between SBR and the ERN that, to our knowledge, was previously unknown. These findings suggest that higher tonic levels of DA are related to reduced performance monitoring.

National Science Foundation Graduate Research Fellowship Program (HSS).

Poster 1-45**MINDING EMOTIONS: INVESTIGATING THE EFFECTS OF MINDFULNESS ON AFFECTIVE PROCESSING**

Yanli Lin, Megan E Fisher, James D Finch, Sean M Roberts, & Jason S Moser

Michigan State University

Descriptors: mindfulness, late positive potential, emotion

Mindfulness, commonly conceptualized as a way of being that involves directing non-judgmental attention to the present, is associated with healthy emotion regulation, however little is known about the underlying mechanisms. Moreover, the term mindfulness has been used interchangeably as a state, trait, and contemplative practice, but few mindfulness studies have accounted for such distinctions. Consequently, the present study sought to investigate the effects of state mindfulness, trait mindfulness, and mindfulness meditation on affective processing, as indexed by the late positive potential (LPP) of the event-related brain potential. Participants (N = 120) completed the Five Factor Mindfulness Questionnaire as a measure of trait mindfulness and were randomly assigned to one of four groups: a mindful state induction group, a mindful meditation group, a combined meditation and state induction group, and a control group. Participants then viewed neutral and low and high arousal negative images while continuous EEG was recorded. Results revealed that participants in the mindfulness groups exhibited smaller LPPs to negative images than those in the control group, suggesting that mindfulness as a state and meditative practice similarly modulated emotional responsivity toward unpleasant emotionally evocative stimuli. Importantly, differences and interactions among the forms of mindfulness emerged (e.g., the moderating effect of trait mindfulness), illustrating the interactive nature of mindfulness as a polythetic construct.

Poster 1-46**OLFACTION AND SOCIAL INTERACTION –
PHYSIOLOGICAL RESPONSES IN A VIRTUAL
ENVIRONMENT**

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& Paul Pauli¹

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Descriptors: odor, social interaction

Olfactory cues influence social behavior in different ways. For example, pleasant odors have been shown to boost prosocial behavior and perceived attractiveness. A virtual reality paradigm has been established in order to measure the influence of odors of different valence on social interaction in a realistic environment. 60 Participants were first guided into a virtual office (passive trials) and positioned in front of a virtual agent standing in the middle of the room and gazing at the floor while they were exposed to an either positive or negative odor. Then agents looked up toward the participant showing either a happy, neutral, or angry expression. During passive trials, facial electromyography (EMG), skin conductance level (SCL), and the late positive potential (LPP) were recorded. Between blocks, participants were rated for valence, arousal and sympathy. In following active trials, participants approached the agents in the office, using a joystick to decide about the distance they wanted to keep from him. Results indicated that pairing of the agents with unpleasant (vs. pleasant) odors led to higher arousal and lower sympathy and valence ratings. Additionally, in trials with unpleasant odor, the SCL was higher and facial mimicry was reduced. On the LPP, no differential effect of odor stimulation could be found. Interestingly, participants approached the agent paired with the unpleasant odor less than they did the one paired with the pleasant odor. In summary, results indicated odor exposure modulates social interaction, that is unpleasant odors facilitates avoidance,

Research Training Group RTG 1253/2, funded by the DFG.

Poster 1-47**MENTAL AND PHYSICAL (MAP) TRAINING AS A
NEUROBEHAVIORAL INTERVENTION FOR COGNITIVE
CONTROL AND RUMINATION IN DEPRESSION**

Brandon L Alderman, Ryan L Olson, Christopher J Brush, & Tracey J Shors
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Descriptors: depression, cognitive control, event-related potentials

Treatments for major depressive disorder (MDD) have moderate success rates and are often accompanied by unpleasant side effects. Despite the evidence supporting conventional treatments, there is a need to develop adjunctive and alternative treatments for depression. Inspired by animal laboratory studies demonstrating that mental and physical training increases neurogenesis and adaptive coping (Curlik & Shors, 2012; Shors et al., 2012), we translated these neuroscientific data into a clinical intervention known as MAP training. The mental training incorporates focused-attention (FA) meditation while the physical training incorporates aerobic exercise. We examined the effects of a combined 8-week MAP training intervention on behavioral and ERP indices of cognitive control and measures of rumination and depressive symptoms in individuals with and without a clinical diagnosis of MDD. Sixty-nine participants (36 healthy, 33 MDD; mean age = 21 years) completed the 8-week MAP intervention, which included two 30-min FA meditation and two 30-min aerobic exercise sessions per week. Findings revealed significant improvements from pre- to post-intervention on N2 and P3 component amplitudes ($p < .05$) elicited by a flanker task, and reductions in rumination ($p < 0.001$) and depressive symptoms ($p < 0.001$). These improvements occurred without a significant change in aerobic fitness, $p = 0.68$. The findings suggest that an 8-week MAP training program may be successful at reducing rumination and symptoms of depression through improvements in cognitive control.

Supported by The Charles and Johanna Busch Memorial Fund at Rutgers, The State University of New Jersey.

Poster 1-48**MEMORY SUPPRESSION MEASURED WITH P300 FAILS AS
A COUNTERMEASURE IN THE COMPLEX TRIAL
PROTOCOL**

J Peter Rosenfeld, Anne C Ward, Jesse Drapekin,
Elena Labkovsky, & Samuel Tullman
Northwestern University

Descriptors: P300 CIT, memory suppression, deception

Instructed memory suppression was reported with behavioral (Anderson & Green, 2001) as well as ERP data (Bergstrom et al., 2013). We (Hu et al., 2015) too reported such effects: reduction of base-peak(b-p) P300 in suppressors vs. simply guilty subjects, in the complex trial protocol version (Rosenfeld 2011) of the concealed information test. In that protocol, critical or noncritical items are presented in the first part of the trial; targets (T) or non-targets (NT) are presented about 1 second later. In Hu et al, a mock crime protocol was used to detect episodic information, a stolen ring. The T/NT ratio was 50/50, so about every other trial subjects had to switch responses. In the presently reported studies we 1) repeated the Hu et al. study, but with semantic information (subject names) as the key items. Results: “suppressor” b-p ($t [20] = 9.5, p < .0001$) and peak-peak (p-p) probe P300s ($t [20] = 10.2, p < .0001$) were larger than irrelevant P300s. P-p probe-irrelevant differences were greater in the “suppressor” group ($t [20] = 3.4, p < .004$). (There was no suppression but a “don’t think of a pink elephant” effect). 2) repeated the Hu et al study, changing only the T/NT ratio to 20/80, to reduce demand of response switching. Results: “suppressor” b-p ($t [14] = 3.8, p < .003$) and p-p probe P300s ($t [14] = 6.9, p < .0001$) were larger than irrelevant P300s. There was no difference between b-p or p-p probe-irrelevant differences between groups ($p > .1$). We suggest 1) task demand, not suppression was operating in the Hu et al. study 2) semantic information won’t be suppressed.

Poster 1-49**REWARD SENSITIVITY DEFICITS IN MELANCHOLIA**

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University of Illinois at Chicago

Descriptors: melancholia, reward sensitivity, EEG asymmetry

Dysfunctional reward processing has long been considered an important feature of major depressive disorder (MDD). However, empirical findings on reward processing and MDD remain mixed. As MDD is a heterogeneous disease, one possible explanation for this mixed literature is that reward dysfunction may not be a universal feature of all forms of depression, but is instead associated with specific subtypes within MDD. In particular, melancholic MDD may demonstrate a distinct profile of reward deficits, as it is characterized by an almost complete loss of interest, or reactivity to, pleasurable or other rewarding stimuli (APA, 2013). The current study examined the association between melancholic symptoms and reward sensitivity. Reward sensitivity was measured through EEG alpha asymmetry during a monetary reward task in 254 people. Diagnoses and MDD severity were determined using the Structured Clinical Interview for DSM-IV (SCID) and Hamilton Rating Scale for Depression (HRSD), respectively. Melancholic symptoms were assessed via the Hamilton Endogenomorphy Subscale (HES; Thase et al., 1983). Results showed that melancholic symptoms predicted a reduced relative left frontal asymmetry during reward anticipation, and this finding was evident above and beyond overall depressive severity, $\beta = -.34, t(253) = -2.16, p < .05$. These results suggest that dysfunctional reward sensitivity may only be associated with melancholic symptoms, not depression in general. If replicated, this finding could have important implications for conceptualization of key dimensions of MDD.

Poster 1-50**FRONTAL THETA PHASE SYNCHRONY AFTER FEEDBACK PRESENTATION PREDICTS BEHAVIORAL ENGAGEMENT**Kyle J Curham¹, Andrew W Bismark², & John JB Allen¹¹University of Arizona, ²VISN-22 Mental Illness, Research, Education and Clinical Center (MIRECC)*Descriptors: feedback-related negativity, engagement, phase-locking*

The Feedback Related Negativity (FRN) is a medial-frontal event-related potential (ERP) in the theta (4–7 Hz) range that occurs to worse-than-expected feedback. A previous study using the current dataset showed a diminished FRN when participants passively observed, not participating in choice-selection. It has been shown that theta synchrony between medial and lateral frontal sites predicts theta power, which in turn predicts behavioral adaptation. This study compared inter-trial phase synchrony when participants actively participated or passively observed a 4-choice gambling task. Participants were presented with win/loss feedback after each choice. Participants only behaviorally engaged with the task during the self-choice condition. During the first observation condition, participants watched as choices were made by the computer. In a third condition, participants passively observed, but the time between choice and feedback was varied. Forty-six participants completed the task with 64-channel EEG data available. Single-trial data were convolved with Morlet wavelets to extract instantaneous power and phase. Inter-trial phase locking and power Z-scores were computed by permutation t-tests, and compared between win and loss conditions. Difference scores were entered into a one-way repeated measures ANOVA to compare self-choice and observation conditions. Increased phase locking was observed on loss relative to win trials, only in the self-choice condition. This suggests that medial frontal inter-trial phase synchrony is a marker of behavioral engagement.

Poster 1-51**THE INTERACTION BETWEEN TRAIT AND STATE WORRY ON THE ERN DURING A WORRY INDUCTION TASK**Laura Zambrano-Vazquez¹, Philipp Ziebell², Amy E Bowles¹, Danielle A McGarrh¹, & John JB Allen¹¹University of Arizona, ²University of Würzburg*Descriptors: state worry, trait worry, error-related negativity*

Diverse hypotheses have emerged to explain the relationship between enhanced ERN and high levels of trait anxiety, and specifically worry. While some views emphasize the role of motivation and emotion suggesting that enhanced ERN amplitudes observed in individuals with anxiety results from a tendency to have a stronger response given the aversiveness of an error. Others suggest that the enhanced ERN is observed in anxious individuals as a result of a compensatory transient control designed to maintain good performance under situations in which worrying produces a high cognitive load, thus challenging performance. The proponents of this view suggest that any increase in levels of state worry should result in a higher cognitive load thus leading to increased transient control and ultimately an enhanced ERN. This study tested this possibility by comparing differences in ERN amplitude before and after a five-minute worry induction period that specifically targeted each individual's greatest current worries. A mixed linear model tested the interaction between state and trait worry on the ERN. Consistent with the Compensatory Error Monitoring Hypothesis (CEMH), among those with high trait worry there was an increase in ERN amplitude after the worry induction regardless of reported level of state worry. Nonetheless, results were not supportive of the CEMH for non-clinical ranges of trait worry. Although the CEMH is designed to explain larger ERNs in those with high trait worry, it may not account for worry-related state changes in ERN in those with low trait worry.

This work was supported in part by a National Science Foundation Graduate Research Fellowship (2011097808).

Poster 1-52**PROBING BINOCULAR RIVALRY: PRE-STIMULUS ALPHA DETERMINES WHETHER SUPPRESSED-EYE PROBES ELICIT A SWITCH IN PERCEPTUAL DOMINANCE**Brian A Metzger¹, Kyle E Mathewson², Evelina Tapia¹, Gabriele Gratton¹, Monica Fabiani¹, & Diane M Beck¹¹University of Illinois at Urbana-Champaign, ²University of Alberta*Descriptors: binocular rivalry, awareness, attention*

Binocular rivalry occurs when disparate images are shown simultaneously but separately to each eye. Perceptual dominance reverses over time with one image temporarily dominating perception while the other is suppressed. Probes presented to the suppressed eye are typically seen by participants and tend to cause perception to shift to the suppressed-eye image. Here we ask what determines whether and how quickly perception switches. We combine behavior and EEG (ERPs) to test the hypotheses that 1) suppressed-eye probes elicit a shift in attention to the suppressed-eye image and 2) the degree to which probes are processed influences how rapidly perception switches. We find that suppressed-eye probes elicit larger N1 and P3b activity relative to dominant-eye probes, suggesting that suppressed-eye probes draw attention to the image in the suppressed-eye. A comparison of ERPs evoked by suppressed-eye probe as a function of reversal latency reveals two novel findings. First, single-trial P3b component amplitudes are negatively correlated with reversal latency, such that as P3b amplitude increases, reversal latency decreases. Second, probes presented to the suppressed eye at a moment in which alpha power is low are associated with faster reversals than probes presented when alpha is high. Taken together, these results suggest that the level of cortical excitability (indexed by the amplitude of alpha) influences the probability that the probe attracts attention to the suppressed-eye image, leading to a rapid switch in perceptual dominance.

Poster 1-53**USING FACIAL ELECTROMYOGRAPHY TO DETECT PRESERVED EMOTIONAL PROCESSING IN THE VEGETATIVE STATE**Chris M Fiacconi, & Adrian M Owen
University of Western Ontario*Descriptors: vegetative state, emotion, facial EMG*

Recent advances in our understanding of the residual cognitive abilities of vegetative state (VS) patients suggest that such patients can exhibit a considerable degree of cognitive functioning despite their inability to generate overt responses when prompted. These findings raise the question of whether such patients also exhibit preserved emotional functioning when probed with tasks that do not require such overt responses. To examine this possibility, we tested a VS patient and a group of healthy control participants using facial electromyography (EMG) to measure activity in the zygomaticus major and corrugator supercilii muscles in response to auditorily presented jokes and non-jokes. To ensure that the observed muscle activity reflected the perception of humor, we time-locked our EMG analyses to the onset of the critical phrase (i.e., punchline) in each sentence. Interestingly, we found a remarkable parallel between the pattern of muscle activity elicited by jokes and non-jokes in the VS patient and healthy control participants. Specifically, we observed greater activity in the zygomaticus major muscle in response to jokes relative to non-jokes for both healthy control participants and the VS patient. Moreover, both the VS patient and healthy controls demonstrated less activity in the corrugator supercilii muscle for jokes relative to non-jokes. Taken together, these findings suggest that some VS patients are capable of high-level language comprehension, and that they can derive and express humor in a manner similar to healthy control participants.

Poster 1-54**EXAMINING THE ROLE OF INTEROCEPTIVE CUES IN FEELING-OF-KNOWING JUDGMENTS**

Chris M Fiacconi, & Stefan Köhler
University of Western Ontario

Descriptors: meta-memory, interoception, autonomic feedback

Past research on meta-memory judgments has revealed that participants can accurately predict whether a currently unrecalable piece of information will nonetheless be correctly recognized in the future. Guided by the framework that autonomic feedback can play a key role in shaping cognitive processing, we asked whether this feedback serves as a basis for a particular class of meta-memory judgments, namely, feeling-of-knowing (FOK) judgments. After studying a series of face-name pairs at encoding, participants were asked to make a FOK judgment (i.e., rate how likely you are to recognize the name associated with this face) in response to previously seen and novel faces while changes in cardiovascular activity were recorded. Critically, the relationship between the pattern of cardiovascular activity at retrieval and FOK ratings was moderated by participants' ability to perceive their heartbeat, such that greater increases in cardiac rate for old relative to novel items were associated with a larger corresponding difference in FOK ratings for participants with high interoceptive awareness. These results highlight the role of interoceptive cues in meta-memory processes, and suggest that FOK judgments are shaped by autonomic feedback when this feedback is accurately perceived. Our results support the idea that there may indeed be "feelings" in feelings-of-knowing.

Poster 1-55**"WHAT DID I DO TO DESERVE THIS?": POSITIVE FEEDBACK-RELATED WORDS WHEN DIVORCED FROM ANY ACTION-CONSEQUENCE STRING**

Ethan Vought, Adithya Chandregowda, Katherine Schrum, Roberto Infante,
& Emanuel Donchin
University of South Florida

Descriptors: feedback-related negativity, medial-frontal negativity, N200

Negative feedback (and to a smaller extent positive feedback) elicits a medial frontal negativity (i.e., FRN). Most studies on the FRN have focused on presenting feedback in response to actual task performance. In the present study, we examine the degree to which negative words will also elicit a medial frontal negativity (MFN) even if these words do not provide feedback on actual task performance. Two groups of healthy participants were presented with a random sequence of words from four categories: words associated with positive feedback (e.g., win), words associated with negative feedback (e.g., incorrect), names of animals (e.g., cow) and nonsense strings (e.g., bhjkli). Group A (n = 13) participants were instructed to count the number of times they saw nonsense strings and ignore all other stimuli. Group B (n = 12) participants were instructed to count the number of times they saw names of animals (neutral stimuli) and ignore all other stimuli. Results were subjected to principal component analysis (PCA). Results indicated that words associated with negative feedback did not elicit a medial frontal negativity (FRN/N200) possibly indicating that they are not salient to an individual when task irrelevant. Positive feedback related words, on the other hand, elicited a small negative deflection around 250 ms in group B from fronto-central sites. Further investigations are required to evaluate the nature of this negative wavelet.

Poster 1-56**MAINTENANCE OF ITEMS IN WORKING MEMORY DEPENDS ON THE BRAIN REACTIVITY TO NEGATIVE STIMULI**

Jessica Figueira¹, Isabela Lobo¹, Erick Conde², Eliane Volchan³, Mirtes Pereira¹, Letícia Oliveira¹, & Isabel David¹

¹Federal Fluminense University, ²Federal University of Pernambuco, ³Federal University of Rio de Janeiro

Descriptors: cognition, emotion, individual differences

Emotional stimuli have the ability to preferentially capture attention and, consequently, access working memory. The Late Positive Potential (LPP) reflects emotional stimulus processing and is an important index of individual emotional reactivity. The aim of this study was to understand how individuals

with distinct traits of emotional reactivity store items in working memory during neutral or negative contexts. 33 volunteers (22 women) performed a change detection paradigm, preceded by a neutral or a negative image, while EEG was recorded to obtain the LPP. Two stimulus arrays composed by two or four colored squares were presented sequentially. Participants pressed one of two buttons to indicate whether the sequential arrays were identical or different. An index that reflects the number of items held in working memory (K) was extracted from the behavioral data. We also computed brain reactivity by subtracting the mean amplitude of the LPP obtained in the negative condition from neutral condition. It was showed that the brain activity correlated with K when the task was preceded by a neutral image (neutral context; $\rho = 0.44$; $p < 0.05$). However, there was not a correlation when the previous images were negative (negative context; $\rho = 0.08$; $p = 0.71$). Exclusively during the neutral context, the more participants were impacted by the emotional pictures, the more items they retained in working memory. Reactivity to emotional stimuli and emotional context are important factors for maintenance of items in working memory.

Poster 1-57**EFFECTS OF ALCOHOL AND CAFFEINE ON THE CONFLICT ADAPTATION EFFECT (OR DOES A RED BULL AND VODKA GIVE YOU WINGS?)**

Kira Bailey, Denis M McCarthy, Bruce D Bartholow, Michael T Amlung,
David H Morris, & Mason H Price
University of Missouri-Columbia

Descriptors: conflict adaptation, alcohol, caffeine

Caffeine is commonly believed to offset the effects of alcohol, but some evidence suggests that cognitive processes remain impaired when caffeine and alcohol are co-administered. The current study examined the effects of alcohol and caffeine on conflict adaptation in brain and behavior in order to understand how their consumption, separately and in combination, affects the adaptive control of behavior in response to changing environmental demands. Non-dependent, young adult drinkers completed a flanker task after consuming one of five beverages: Alcohol + Caffeine; Alcohol + Placebo caffeine; Placebo alcohol + Caffeine; Placebo alcohol + Placebo caffeine; Alcohol alone. Accuracy, response time, and the N2 component of the event-related potential were analyzed according to previous and current trial flanker compatibility. Compared to either alcohol alone or the placebo conditions, the current findings indicate that the co-administration of alcohol and caffeine heightened neural responses and eliminated the typical conflict adaptation effect in RT. Interestingly, this occurred not because the caffeine groups showed reduced control following conflict, but rather because caffeine significantly improved performance in terms of smaller compatibility effects (CEs) on post-compatible trials. This resulted in the post-compatible CE being as small as the post-incompatible CE. Caffeine appears to eliminate the need to adjust control following conflict, possibly because control is already maximally deployed even when conflict has not occurred.

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Poster 1-58**EEG SPECTRAL POWER CHARACTERISTICS OF VERBAL CREATIVE TASK FULFILLMENT WITH AND WITHOUT MENTAL EFFORT**

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I.M. Sechenov Institute of Evolutionary Physiology and Biochemistry, Russian Academy of Sciences

Descriptors: verbal creativity, self-induced stereotype, EEG spectral power
 This EEG pilot study (31 sites, modification 10/10 system) aimed to reveal task-related differences in story production with and without mental effort to continue creating the plot of a story until the volunteer had decided that the story was complete and could be finished. We hypothesized it would be harder to continue task fulfillment after self-decision that the story is finished and could lead to more desynchronization of the cortex. 12 right-handed subjects [19.4 ± 1.2 , 4 men] created stories based on situational pictures from Guilford, Sullivan Social IQ Test. At first they had to create (2–3 min) events and the main plot of the story and voluntarily press the button when they were ready to tell it. They were not stopped by researcher at that moment but had to continue story creation (new events and changes of the plot) for not less than 2 minutes. Repeated measures ANOVA revealed significant effect for factor TEST in alpha1 frequency band ($F(1,11) = 6.33, p < 0.05$). Averaged means of EEG power in alpha1 frequency band (8–10Hz) for each zone were higher during creation of the story with mental effort comparing the 1st part of the task with self-regulated creative production. Subjects' reports suggested formation of self-induced story plot stereotype during self-regulated creative production (first), which was hard to overcome in additional time period. An attempt to overcome self-formed stereotype demanded an increase of top-down regulation and attention rearrangements. Future work is needed to reveal the basis of successfully overcoming self-induced stereotype.

Poster 1-59**AUTONOMIC PHYSIOLOGY AND EVENT-RELATED POTENTIALS IN MOTHERS DURING EXECUTIVE FUNCTION**Rose E Jeffries, Ryan J Giuliano, & Elizabeth A Skowron
University of Oregon

Descriptors: executive function, autonomic tone, cumulative risk
 Previous findings suggest that measures of executive function (EF) are related to individual differences in autonomic tone and brain activity relating to self-regulation. There is little research on how parents' EF is associated with their autonomic tone at rest and in response to challenge, despite studies implicating both as key risk factors in the context of cumulative risk (CR). Participants were 50 mothers recruited from DHS, Head Start, and a longitudinal study of girls involved with the juvenile justice system. Three dimensions of CR exposure were assessed (psychosocial, sociodemographic, and physical), as well as income-to-needs ratio. Participants completed a 45-minute working memory (WM) task, during which event-related potentials (ERPs) were acquired and parasympathetic tone (respiratory sinus arrhythmia; RSA) and sympathetic tone (pre-ejection period; PEP) were assessed. Results showed that mothers reporting greater CR exposure displayed lower baseline RSA, and a lower income-to-needs ratio was associated with lower WM, supporting the link between chronic stress and executive and autonomic function. Further, mothers who displayed higher WM exhibited greater delay activity ERPs and greater RSA reactivity, such that their RSA values increased more from baseline to the start of the WM task compared to low-WM participants. Participants with higher WM capacity and greater ERPs also showed increased SNS activation during moderate-difficulty trials. Overall, these findings suggest that co-activation of SNS and PNS is associated with greater WM in a high-risk sample.

Poster 1-60**MIGRAINE INCREASES N1 AMPLITUDE TO UNATTENDED SOUNDS**Toni A Patrick, Patrick L Woody, Katelyn R Baker, Stephanie Allen-Winters, April Collins, & Jeffrey J Sable
Christian Brothers University

Descriptors: migraine, N1, P2

Chronic migraine has come to be recognized as a neurological disorder with broad effects on the brain, including effects between migraine episodes. We compared auditory event-related brain potentials (ERPs) in adults with and without migraines, with special interest in the N1 because of its relationship with automatic attention. Participants were not experiencing a migraine at the time of the study. While watching a silent video, participants heard tone pairs with 500 ms between tones and 1 or 5 seconds (in randomized order) between pairs. N1 peak amplitudes were significantly larger in migraineurs, especially after 5-second inter-pair intervals. N1 amplitudes in migraineurs were elevated after both the first and second tones in the pairs, indicating sustained enhancement of the response. There also was a P2 interaction in which the peak amplitudes were larger in migraineurs after the first tone than the second, regardless of inter-pair interval. These findings are in line with a generally elevated level of excitation in migraineurs.

Poster 1-61**OPTIMIZING COMBINED FMRI-DTI-TMS-EEG METHODS TO IDENTIFY AND REGULATE REWARD VALUATION DURING NICOTINE CRAVING**Travis E Baker¹, Alan Tucholka², Stephane Potvin¹, Paul Lesperance¹,
Didier Jutras-Aswad¹, Kevin Larcher³, & Patricia Conrod¹
¹Université de Montréal, ²Barcelona Beta Brain Research Center, ³Montréal
Neurological Institute

Descriptors: multimodal imaging, addiction, reward positivity
 Substance dependent individuals exhibit attenuated reward positivity to monetary rewards (Baker et al. 2011). By contrast, in smokers, this reduction is normalized by feedback indicating future opportunities to smoke. The reward positivity is an ERP component hypothesized to reflect reward processing by anterior cingulate cortex (ACC). Here, we adopted a novel multimodal neuroimaging strategy aimed to reduce this reward valuation bias using the reward positivity as a biomarker of the ACC valuation function. First, TMS at 10 Hz over the left dorsal lateral prefrontal cortex (DLPFC) has been shown to stimulate the ACC, and TMS at 1Hz is thought to drive an inhibitory response. We predicted 10Hz TMS would enhance the reward positivity to monetary rewards, and 1Hz TMS would dampen the reward positivity to cigarettes rewards. Participants (21 males) were required to be smokers who were not currently trying to quit smoking. fMRI and DTI were used to characterize structural and functional mechanisms associated with cigarette and monetary reward valuation. For each session, either Sham or TMS/EEG was applied prior to the two virtual T-maze tasks (Task 1: win/lose money, Task 2: win/lose puffs on a cigarette). A robotic arm positioned and maintained the TMS coil at the most active voxel in the left DLPFC based on subject's fMRI data. Our findings confirm our predictions and will likely motivate further study of the application of combined neuroimaging methods in addiction treatment development and evaluation.

Poster 1-62**US AND THEM: INGROUP/OUTGROUP MEMBERSHIP MODULATES EARLY NEURAL MECHANISM OF FAIRNESS EVALUATION IN THE ULTIMATUM GAME**Zhen Zhang¹, Sheng Yuan¹, Shaoying He², Roman Osinsky³, Johannes Hewig³, & Yiwen Wang¹¹Tianjin Normal University, ²Fuzhou University, ³University of Würzburg*Descriptors: fairness consideration, group membership, Ultimatum Game*

Previous behavioral studies have shown that ingroup/outgroup membership influences individual's fairness considerations. However, it is not clear yet how group membership influences brain activity when a recipient evaluates the fairness of asset distribution. In this study, subjects participated as recipients in an Ultimatum Game with alleged members of both an experimentally induced ingroup and outgroup. They either received extremely unequal, moderately unequal, or equal offers from proposers while electroencephalogram was recorded. Behavioral results showed that the acceptance rates for unequal offers were higher when interacting with ingroup partners than with outgroup partners. Analyses of event-related potentials revealed that proposers' group membership modulated offer evaluation at earlier and later processing stages. Most important, the feedback-related negativity (~250 to 350 ms post offer onset) was more negative for extremely and moderately unequal offers compared to equal offers in the ingroup interaction whereas it did not show differential responses to different offers in the outgroup interaction. Thus, early mechanisms of fairness evaluation are strongly modulated by the ingroup/outgroup membership of the interaction partner.

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Poster 1-63**EXPLAINING PARENTAL CO-VIEWING: THE ROLE OF SOCIAL FACILITATION AND PHYSIOLOGICAL AROUSAL**Collin K Berke, Travis Loof, Rebecca Densley, Eric E Rasmussen, & Justin R Keene
Texas Tech University*Descriptors: co-viewing, physiological arousal, mere presence*

The research related to the co-presence of a parent and child (called co-viewing) consistently shows that the mere act of watching TV or consuming other media alongside a child encourages the adoption of lessons or messages, both positive and negative, contained in media content. Scholars suggest two reasons for the effect of co-viewing. First, co-viewing may encourage learning of the content because it sends an implicit message to the child that the content is approved by and important to the parent. Second, co-viewing may affect physiological arousal and thereby enhance learning of the content—this explanation is consistent with the social facilitation effect found in social psychology research. In addition, we know from previous research that the level of arousing content in a message affects the level of physiological arousal over the course of the message. This abstract reports how the presence or absence of a parent in the room with a child and the level of arousing content in a long-form educational message affect physiological arousal as measured through skin conductance level. There was significant interaction effect of parental mediation and level of arousing content ($p < .001$). So, it would appear that the mere presence of a parent changes a child's arousal. Specifically, if the message is high in arousing content, the parent causes the skin conductance level to be facilitated; however, if the message is low in arousing content, then the parent causes the skin conductance level to be inhibited.

Poster 1-64**EXCITATION TRANSFER AND INSTANT REPLAY**Glenn Cummins, & Collin K Berke
Texas Tech University*Descriptors: excitation transfer, physiological arousal, mass communication*

The use of instant replay is common as a means of bridging the periodized action within televised sports. This content feature may have one possible

benefit—to sustain or elevate viewers' level of physiological arousal during pauses within game broadcasts. Excitation transfer, a robustly supported theory examining emotional response to stimuli, was used to examine arousal transfer between sequential events in sports broadcasts. Specifically, the purpose of this experiment was to compare excitation transfer effects between sequential events where instant replay was present or absent. It was predicted that instant replay would yield elevated tonic physiological arousal (Skin Conductance Level change from baseline) to subsequent events relative to its absence. It was also predicted that this effect would be greater in response to exciting events. The main effect for Excitement of Play approached significance, $F(1, 64) = 3.53$, $p = .065$, suggesting elevated arousal during a subsequent event. Additionally, analysis revealed a Replay X Time interaction [$F(19, 1216) = 1.68$, $p = .03$, Quadratic Contrast $p = .05$] where elevated arousal resulting from replay was evident during middle portions of ensuing stimuli. In addition, self-reported enjoyment was greater in response to exciting play, particularly when accompanied by replay [Excitement of Play X Replay, $F(1, 110) = 7.90$, $p < .001$]. In sum, results generally support excitation transfer by explaining lingering elevated arousal responses to events that followed an exciting play with a corresponding effect on self-reported enjoyment.

Poster 1-65**HRV AND ELECTROPHYSIOLOGICAL RESPONSES TO ERROR FEEDBACK VARY BY COGNITIVE VERSUS AFFECTIVE TASK FRAMING**Jonathan M Highsmith, Katie A Lehockey, Eric M Watson, James Loveless, Alexandra Stephenson, & Daniel E Everhart
East Carolina University*Descriptors: feedback negativity, executive functioning, emotion*

Electrophysiological studies engaging cognitive or affective systems may result in widely divergent regulation strategies, with different psychophysiological responses to task related errors. The anterior cingulate cortex (ACC) is thought to participate in error monitoring and to mediate top-down executive regulation of both cognitive and affective responses, due to interconnection with frontal and limbic structures. The current study was undertaken to investigate feedback negativity (FN) and heart rate variability (HRV) responses to cognitive and affective eliciting tasks. Twenty-one undergraduate participants underwent electroencephalographic and heart rate measurement concurrent with completion of a pattern-learning (cognitive) task and a gambling (affective) task. Both tasks elicited a significant FN response for mid-frontal electrodes. Between task comparisons identified significant FN amplitude differences for the FZ electrode, $t(20) = -2.83$, $p = .01$, $d = 1.30$. Similarly, HRV data identified a LF/HF ratio power difference for the gambling task, $t(20) = 8.407$, $p < .001$, $d = 3.76$, suggesting autonomic nervous system activation difference by task, which was significantly related to mid-frontal FN amplitude differences. Results suggest that gambling task errors results in elicitation of more affective responses than errors elicited from a cognitively framed task.

Poster 1-66

SUBJECTIVE, BEHAVIORAL AND
ELECTROPHYSIOLOGICAL INDICATORS OF
NONCONSCIOUS EMOTION PROCESSING IN DISSOCIATIVE
DISORDER: A CASE STUDY OF MULTIPLE PERSONALITY
DISORDER

Sara F Ribeiro, Isabel B Fonseca, Nuno Conceição, Ana Marques, &
Margarida Cipriano
University of Lisbon

Descriptors: Dissociative Identity Disorder, nonconscious emotion processing, event-related potentials

A subliminal emotion stimulation paradigm was used to study emotion processing in a patient with Dissociative Identity Disorder in two self-states, in two moments with a one-hour break in between. In the first, the patient does not allow the dissociative parts to process the stimuli, keeping the task to herself. In the second she lets go of the control exerted and about seven parts fight to expose themselves to the task with one and then others winning momentary prominence. Emotion stimuli belonged to three valence categories (positive, negative, neutral). A fourth category was a grey slide (faint). Each of these four categories was associated with a specific mask (four equivalent abstract neutral stimuli), in a backward and forward masking stimulation (sequence: mask–stimuli–mask). Subjective preferences and ERPs (averaging by emotion category and regression to 200 ms baseline; Fz, Cz and Pz, IS10/20) were recorded. Subjective preferences and ERPs recorded in both moments/self-states were qualitatively different: during the first, subjective preferences were to the faint condition (55.6%) and ERPs maximum positive amplitude was higher to negative stimuli; during the second moment subjective preferences were distributed almost equally by the four conditions and ERPs amplitude was higher to positive stimuli. Subjective ratings of dislike were stable in both self-states, predominantly to negative condition (55.6%). These results emerging from structural dissociation are discussed in terms of their implications for the literature of implicit (emotion) processing.

Poster 1-67

PSYCHOPHYSIOLOGICAL EFFECTS OF ADDERALL USE

Stephanie J Smith, Bradly T Stone, & Robin R Johnson
Advanced Brain Monitoring, Inc

Descriptors: CNS stimulants, neurophysiology

CNS stimulants are widely used and rarely associated with impairment, but increase culpability in traffic injuries by 30.3%. To identify psychophysiological factors that may be associated with impairment with the CNS stimulant, Adderall, our laboratory administered synchronized neurophysiology (EEG and ECG) during cognitive assessment of vigilance and memory (M-AMP). Using a double-blind, placebo controlled, within subject, cross over design with $n = 18$ participants, we examined the neurocognitive effects of 30 mg of Adderall. The M-AMP consisted of a 20-minute 3-choice vigilance task (3CVT), two 5-minute passive vigilance tasks, and a 5-minute image recognition task (SIR). The 3CVT required participants to discriminate a target from two non-target shapes. The passive vigilance tasks ask participants to keep pace with an auditory (APVT) or visual (VPVT) stimuli, and the SIR required memorization of 20 target images, and identification in a field of 100 images. We found that Adderall increased heart rate during the APVT, VPVT, and SIR, $F(1,33) \geq 5.43$, $ps \leq 0.05$; and resulted in greater hemispheric asymmetry in Delta (1–3 Hz) and Theta (3–7 Hz) in these tasks as well, $F(1,33) \geq 4.25$, $ps \leq 0.05$. The 3CVT had no effects. Performance was also not altered, overall, for the 3CVT, APVT, or VPVT. However, increased accuracy for target stimuli was found during the SIR; $F(1,33) = 4.83$, $p < 0.05$. While performance was not substantially or negatively impacted with stimulant use, increase heart rate and Delta/Theta asymmetry may indicate impaired attention and processing.

This work was funded through a Phase II SBIR awarded to Johnson, Robin; N44DA-12-1206.

Poster 1-68

SCHEMATIC FACES ARE NOT REAL FACES: COMPARING
STIMULUS TYPES USING THE N170

William Kendall, Quentin Raffaelli, Alan Kingstone, & Rebecca Todd
University of British Columbia

Descriptors: face perception, schematic faces, N170

In investigations of emotional expression, schematic faces are useful stimuli because they can be precisely controlled. However, these stimuli are then often treated as comparable to real faces, which could be problematic. In two experiments, we compared emotional faces presented with varying degrees of schematization: in addition to standard greyscale photos, we applied roto-scoping software to create heavily outlined versions of the same photographs with high vs. low contrast. To vary featural complexity, simple cartoon faces underwent the same treatment to create two schematic stimulus types. The resulting set contained five types of faces - three photo-based and two schematic - which non-linearly spanned a range from photos to simple cartoons. In experiment one, participants viewed rapidly presented faces and were instructed to identify which emotion was present, with presentation times varying from 17 to 66 ms. Our results showed that as faces were represented less realistically, detection became easier, and this was most pronounced at the shortest presentation times. In experiment two, we used the same stimulus set, but only three stimulus types (i.e., photos, cartoons, and a transitional type between the two), to examine whether the N170, a face-sensitive ERP component, codes for different levels of schematization. We found that each of the three electrode sites typically examined in N170 studies reflected processing of different dimensions along which the faces varied. Our data suggest that schematic faces may be processed as qualitatively different from real ones.

This project was supported by the National Science and Engineering Research Council of Canada (NSERC).

Poster 1-69

ERROR PROCESSING IN DAILY SMOKERS: THE INFLUENCE
OF INDIVIDUAL DIFFERENCES IN BEHAVIORAL
INHIBITION AND ACTIVATION SENSITIVITY AND
SMOKING ABSTINENCE

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University of Texas MD Anderson Cancer Center

Descriptors: smokers, error-related negativity, behavioral inhibition, behavioral activation

Although evidence supports that smokers have deficits in error processing-related ERP signals (ERN and Pe), it is unknown whether such deficits are influenced by individual differences in behavioral inhibition and activation sensitivity and by smoking abstinence, two factors thought to influence error processing. Based on the existing literature, we hypothesized that higher behavioral inhibition and activation and smoking abstinence would be associated with greater error-related ERP signals. To test these hypotheses, we recruited 24 daily non-treatment-seeking smokers who smoked 10 or more cigarettes per day and administered the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) scales to measure behavioral inhibition and activation sensitivity. Participants attended two counter-balanced laboratory sessions: one after smoking regularly and the other after 24 hours of abstinence. At each session, we recorded participants' EEG during the modified Flanker task. We did not find an effect of smoking abstinence on ERN or Pe magnitude. Unlike findings from the general population, smokers with higher BIS scores had relatively smaller ERN magnitude than those with lower BIS scores. In addition, we found that smokers with higher BAS Fun Seeking scores had greater ERN magnitude than those with lower Fun Seeking scores during the abstinent session, but this relationship was reversed when the smokers were nonabstinent. These findings suggest that individual differences in behavioral disposition and abstinence status both influence error processing deficits in smokers.

Poster 1-70**CENTRAL AND REFLEXIVE MEASURES OF REACTIVITY TO HUMAN AND PRIMATE EROTICA**Leiszie Lapping-Carr¹, Taylor L Oliver², Adam Duckro¹, & Stephen D Benning¹¹University of Nevada, Las Vegas, ²Chapman University*Descriptors: sexual response, late positive potential, postauricular reflex*

Using measures of vasocongestion, women typically exhibit sexual reactivity to a broader range of stimuli than men. However, for women, these measures may reflect a defensive response against sexual violation rather than assessing sexual arousal. Thus, we included central ERP and reflexive measures of emotional processing during erotic and non-erotic pictures with heterosexual undergraduate participants. Erotic pictures included opposite sex couples, men having sex with men, women having sex with women, and erotic primates. Non-erotic pictures encompassed humans, primates, and landscapes. Both men and women had greater late positive potential (LPP) ERP amplitude to erotic than non-erotic pictures. Though men also had smaller P3 amplitude to the startle probe during erotic human vs. non-erotic human pictures, women had smaller probe P3 amplitude during erotic human vs. non-erotic primate pictures. Reflexive activity did not track with the ERP findings. Women had larger postauricular reflexes during opposite-sex erotica vs. non-erotic primates, whereas men had larger postauricular reflexes during men having sex with men vs. non-erotic pictures and opposite-sex erotica. However, women's startle blink magnitude did not differ among picture categories, and men showed smaller startle blink magnitude during opposite sex erotica vs. erotic primates. Overall, ERP measures broadly reflected what would be expected from emotional arousal, but postauricular and startle blink modulations indexed different emotional processes separate from those measured by prior vasocongestion research.

Poster 1-71**PSYCHOPATHY FACTORS, POSTAURICULAR AND STARTLE BLINK REFLEXES DURING EMOTIONAL PICTURES AND SOUNDS**Stephany M Molina, & Stephen D Benning
University of Nevada, Las Vegas*Descriptors: psychopathy, postauricular reflex, startle blink*

Psychopathy is a personality disorder that can be divided into two dominant factors: fearless dominance (FD) and impulsive antisociality (IA). FD has been linked to reduced fear-potentiated startle, whereas IA has not been implicated with similar deficits. Due to the lack of research examining appetitive processing in this two-factor model of psychopathy, we sought to elucidate these relationships. In the current study, a sample of community participants screened from an emergency room viewed and listened to emotional pictures and sounds. Startle blink and postauricular reflex magnitudes during the pictures and sounds were correlated with FD and IA. Results indicated that IA was significantly related to greater startle blink potentiation during aversive vs. neutral pictures. In particular, greater startle blink potentiation during mutilation vs. neutral pictures was found for individuals high in IA. There were no relationships between FD and startle during pictures or sounds, nor were there any relationships between IA and startle during sounds. Regarding the postauricular reflex, individuals high in FD demonstrated reduced potentiation when viewing pleasant vs. neutral pictures. However, greater postauricular reflexes occurred when those high in FD listened to emotionally valenced sounds vs. neutral sounds. No relationships between IA and pictures or sounds were found. Our findings suggest visual appetitive deficits and acoustic emotional excesses in individuals high in FD. Further research elucidating this relationship and our unexpected startle blink findings is needed.

Poster 1-72**CHILDHOOD AFFECTION MODERATES TOUCH EFFECTS ON RSA RESPONSES TO LABORATORY STRESS**C. Jessie Duncan, David K Parkhurst, Kaylee Rosenbusch,
Nicole A Roberts, & Mary H Burleson
Arizona State University*Descriptors: respiratory sinus arrhythmia, physical affection, stress*

The childhood psychosocial environment can have long-term effects on physiological responses potentially indexing emotion regulatory capacity. We examined whether retrospective reports of parental affection during childhood uniquely predicted respiratory sinus arrhythmia (RSA) during spousal interactions in the laboratory among 186 married couples. Spouses completed a measure of perceived childhood physical affection and parental emotional support. Couples subsequently attended a laboratory session in which they were randomly assigned to either have an emotionally positive conversation, touch (hug) after sitting quietly, both (talk then hug), or neither (sit quietly). When examining RSA during the recovery period after the touch/talk manipulation, there was a significant interaction between experimental condition and reports of childhood affection: for women who reported higher levels of physical affection from their mother during childhood, RSA was higher in the touch condition than the other conditions, whereas for women reporting lower levels of maternal physical affection during childhood, RSA was lower in the touch condition than the other conditions. These relationships were not present for other aspects of maternal support, for paternal affection, or for the husbands in the study. However, husbands showed a significant positive relationship between childhood affection from their father and RSA. Thus, affectionate touch in childhood appears to play a unique role in contributing to physiological flexibility or regulatory capacity in adulthood, as indexed via RSA.

Poster 1-73**ELECTRODERMAL ACTIVITY AND HIGH FREQUENCY HEART RATE VARIABILITY DURING DYADIC BASELINES**Jasara N Hogan, Alexander O Crenshaw, Katherine JW Baucom, & Brian R Baucom
University of Utah*Descriptors: couples, baselines*

In dyadic research, resting baseline data are typically collected with both partners in the same room. However, individuals in high-quality relationships may evidence more energetically efficient functioning when simply in the presence of their partner (e.g., Porges, 2007). The current study tests whether baseline physiological functioning is significantly different when individuals are alone versus with their spouse and whether that difference is moderated by relationship satisfaction. Participants were 25 married couples (N = 50) who completed two resting baselines, one alone and one with their partner present, while high frequency heart rate variability (HF_HRV) and electrodermal activity were measured. Consistent with expectations, there were significantly more non-specific skin conductance responses (NS-SCR; $B = 0.35$, $p = 0.04$) and lower HF_HRV ($B = -1.08$, $p = .03$) during baselines with partner versus alone, and these differences were moderated by relationship satisfaction (NS-SCR: $B = .06$, $p = .03$; HF_HRV: $B = -0.67$, $p < .001$). On average, there was evidence of greater stress-related physiological activity when in a partner's presence versus alone. However, individuals in more satisfied relationships showed greater parasympathetic inhibition while individuals in less satisfied relationships showed greater sympathetic activation. These findings have both substantive and methodological implications, and highlight the value of considering subtle forms of inter-personal responding in dyadic psychophysiological research.

Poster 1-74**ATTENTIONAL BLINK: AN ANTECEDENT TO BINGE EATING BEHAVIOR**

Greg A Denke, & Connie Lamm
University of New Orleans

Descriptors: attention, emotion, binge-eating

There are numerous factors that may play a role in obesity; binge-eating behavior is one of them. Binge-eaters often show disordered attentional processes, e.g. rumination. This study examined how attentional sub-processes contribute to binge-eating behavior. EEG was collected while participants played the attentional blink game—a rapid serial visual presentation task in which one event (target 1) triggers an attentional gap preventing the observation of a second event (target 2). To determine if this attentional gap is strengthened by emotion, we utilized both negative and neutral trials. This task was used to ascertain the neural correlates underlying attentional sub-processes that may contribute to binge-eating behavior. We examined two ERPs: 1) P2 activation, which has been linked with orientating of attention, and 2) N2 activation which has been linked with attentional conflict. We found decreased P2 activation and increased (more negative) N2 activation for binge-eaters compared to nonbinge-eaters in the negative condition for trials in which target two was not identified correctly. This pattern of P2 and N2 results suggests that binge eaters may have difficulty orienting away from negative stimuli thereby increasing attentional conflict, which together contribute to erroneous responding. Thus, this study shows a dual attentional deficit that may contribute to binge-eating behavior and obesity.

Poster 1-75**IMPLICIT PROCESSES PREDICT BEHAVIORAL INTENTIONS TO ADHERE TO ADVANTAGE-FRAMED AND DISADVANTAGE-FRAMED HEALTH MESSAGES**

Katie A Leheckey¹, Daniel E Everhart², Alexandra J Stephenson², Eric M Watson², Kelly D Bickel², & Jonathan M Highsmith³

¹MedStar National Rehabilitation Hospital, ²East Carolina University, ³South Texas Veterans Healthcare System

Descriptors: electroencephalography, individual differences, behavioral intentions

Interpreting treatment recommendations and forming adherence behavioral intentions (BI) is a highly complex process, with innumerable implicit cortical and affective mechanisms. While BI often predict adherence behaviors, the mechanisms driving BI remain unclear. To investigate possible predictors of BI, 77 adults completed trait and coping surveys, underwent simulation of receiving an advantage-framed (ADV) or disadvantage-framed (DIS) obstructive sleep apnea (OSA) diagnosis and treatment recommendations, rated affective responses and indicated BI, and participated in resting EEG recording. Multiple regression analyses were used to investigate the influence of implicit processes such as traits and coping tendencies, electrophysiological biomarkers, and emotion on BI. Full multiple regression model for BI to ADV included trait behavioral inhibition (BIS), active and humor coping strategies, valence and control affective responses, and resting EEG recordings (EEG), $F(6, 68) = 4.431$, $p = 0.001$, $R\text{-squared} = 0.281$, 95% CI [0.0684, 0.368]. Full multiple regression model for BI to DIS included BIS, humor, control, and EEG, $F(7, 67) = 4.252$, $p = 0.001$, $R\text{-squared} = 0.308$, 95% CI [0.151, 0.465]. Post-hoc analyses indicated that lower use of humor and positive affect after viewing the message were associated with higher BI to ADV, while lower use of humor, higher elicitation of feelings of control, higher BIS, and greater relative right baseline frontal cortical activity were associated with higher BI to DIS. Findings highlight implicit mechanisms driving BI formation.

Poster 1-76**AN EXPLORATION OF THE RELATIONSHIP BETWEEN HEART RATE VARIABILITY AND CARDIOVASCULAR EMOTIONAL DAMPENING**

James P Loveless, Katie N Clements, Eric M Watson, Matthew C Whited, Karl L Wuensch, & D. Erik Everhart
East Carolina University

Descriptors: emotional dampening, heart rate variability

Higher resting blood pressures have been shown to be related to increased difficulties with appraising and responding to emotionally laden stimuli. This phe-

nomenon suggests an intimate link between cardiovascular functioning and emotion regulation, and has been termed cardiovascular emotional dampening. The present study sought to replicate previous findings of the emotional dampening literature, and extend them via exploring its relationship with heart rate variability (HF HRV). Eighty-eight (52 women) healthy undergraduate students completed self-report inventories, and a 10-minute recording of heart rate and blood pressure. Afterwards, participants completed the Perception of Affect Task, an emotion recognition task requiring participants to identify emotions from pictures of faces and from sentences with emotional content. Women ($M = .89$, $SD = .05$) outperformed men ($M = .85$, $SD = .06$) on the PAT, $r = -.24$, $n = 88$, $p = .02$, 95% CI [-0.431, -0.034]. Participants' resting diastolic blood pressure ($M = 78.65$, $SD = 7.51$) was unrelated to emotion recognition accuracy, $r = .07$, $n = 88$, $p = .49$. Likewise, their resting systolic blood pressure ($M = 124.89$, $SD = 11.42$) was also unrelated to emotion recognition accuracy. As with blood pressure, participants' resting HF HRV was unrelated to emotion recognition accuracy, $r = -.03$, $n = 88$, $p = .82$. The findings of this study highlight the subtle nature of the cardiovascular emotional dampening, and the need for more refined research methodologies in future studies (i.e. implicit emotion recognition tasks).

Poster 1-77**AFFECTIVE AROUSAL AND SHOOTING BEHAVIOR**

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Descriptors: affect, arousal, threat sensitivity

Two studies investigated the relationship between heightened affective arousal and performance in a threat detection task. In the first study, we measured electrodermal activity (EDA) while participants listened to neutral music and then completed a Shooter Bias Task in which they used a realistic gun controller to attempt to shoot armed individuals and avoid shooting unarmed individuals. Results revealed that increases in EDA activity during the music listening portion of the experiment predicted lower sensitivity in the Shooter Bias Task. That is, those individuals with greater bodily arousal were less able to distinguish armed from unarmed individuals and thus made more shooting errors overall. In the second study, we examined whether heightened arousal is a causal driver of decreases in threat sensitivity by manipulating affective arousal directly. Participants listened to one of three different music selections meant to elicit either high-arousal negative affect, neutral affect, or high-arousal positive affect before completing the same Shooter Bias Task used in Study 1. EDA activity was once again recorded throughout the experimental session. Results revealed that increases in affective arousal do cause decreases in threat sensitivity, but only when the arousal is negatively-valenced. Implications for potential interventions aimed at reducing the impact of heightened arousal on threat sensitivity among individuals who regularly make critical shooting decisions are discussed.

National Science Foundation (BCS-1422327).

Poster 1-78**WHY IS IT SO HARD TO WAIT? BRAIN RESPONSES TO DELAYED GRATIFICATION PREDICT IMPULSIVITY AND SELF-CONTROL**

Barbara Schmidt¹, Clay B Holroyd², Stefan Debener³, & Johannes Hewig¹
¹University of Würzburg, ²University of Victoria, ³University of Oldenburg

Descriptors: reward positivity, delay of gratification, impulsivity

Being able to wait is very important. It means that we do not only focus on immediate outcomes but also on later ones that are bigger. But even if waiting pays out, it is still hard. To investigate mechanisms that are responsible for this, we looked at brain responses during a delay of gratification task. We conducted a repeated-measures EEG study and assessed personality via several questionnaires. In two separate experimental sessions, participants played a game where they could win either a big or small reward either immediately or in six months. The event-related potential (ERP) after the feedback of the current outcome revealed that participants' brains coded the small reward in six months as the worst and the big reward immediately as the best outcome. The same pattern emerged in subjective valence and arousal ratings of outcomes. We then computed the ERP differences between the worst and the best outcome, called the reward positivity. High reward positivity predicted higher impulsivity ($r = .6$, $p = .004$) and lower self-control scores ($r = -.5$, $p = .01$). In addition, retest-reliability of the reward positivity was quite high ($r = .6$, $p = .004$), indicating that it reflects a temporally stable mechanism. The results shed light on the neural processes that are active in delay of gratification. When the brain is making a large difference between immediate and delayed outcomes, participants are more prone to act impulsive and have less self-control.

Poster 1-79**ELECTROCORTICAL EVIDENCE OF SOCIAL CONDITIONING USING SHORT SOCIAL-EVALUATIVE VIDEO CLIPS AS UNCONDITIONED STIMULI**

Nicole Wiggert, Frank H Wilhelm, & Jens Blechert
 Salzburg University

Descriptors: classical conditioning, social learning, event-related potentials

Aversive social learning plays an important role in the development and maintenance of social anxiety. Past classical conditioning (CC) studies predominantly relied on electric or acoustic unconditioned stimuli (US), whereas naturalistic social conditioning mostly involves interpersonal events as US. Here we investigate neural correlates of aversive social learning by utilizing a recently developed stimulus set (E.Vids) comprising 3-sec videos by actors delivering social evaluative sentences. Sixty healthy participants (40 female) underwent a CC task with disapproving and insulting statements as US (US-neg). Neutral statements served as control stimuli (US-neu). Conditioned stimuli (CS) were static images of the actors with a neutral facial expression. CS+ actor pictures predicted US-neg videos of those actors, while CS- actor pictures predicted US-neu videos of the other actors. Event-related potentials to the CS as well as CS valence and arousal ratings were measured. Ratings confirmed the expected differential conditioning effect. Larger parietal – occipital P300 amplitudes for the CS+ vs. CS- suggested differential motivational stimulus salience. Remarkably, differential CS ratings were maintained one month after testing. Results of this novel, ecologically improved CC paradigm suggest that social conditioning could underlie the formation of attentional biases to potentially threatening social stimuli and that resulting evaluations can be relatively persistent.

Poster 1-80**FUNCTIONAL BRAIN ACTIVITY DURING SCENE PROCESSING: EFFECTS OF SPECIFIC CONTENT**

Christopher T Sege, David R Herring, Margaret M Bradley, & Peter J Lang
 University of Florida

Descriptors: emotion, picture viewing, fMRI

Activation in medial prefrontal cortex (mPFC) is specifically enhanced when viewing pictures depicting erotica or romance (e.g., Sabatinelli et al., 2007), whereas the amygdala shows enhanced activity for any emotionally arousing scene, pleasant or unpleasant (e.g., Sabatinelli et al., 2005). The present study examined mPFC and amygdala activation when viewing pleasant pictures that are lower in arousal (e.g., babies). Participants ($n = 86$) recruited from the community viewed natural scenes that depicted explicit erotica or scenes of babies or

families; additional contents included unpleasant scenes of violence and contamination, as well as neutral objects and faces. During each 6-second viewing interval, 18 pictures from one of these categories were presented in a rapid serial presentation (3Hz presentation; Junghöfer et al., 2006). BOLD activation was measured in an fMRI scanner using a 3 s TR. Results indicated that amygdala activity was similarly and significantly enhanced when viewing pleasant (erotica or families) or unpleasant (violence or contamination) scenes, relative to neutral contents. In the mPFC, activation in a ventral region was enhanced when viewing either erotica or babies, relative to any unpleasant or neutral content, while activation in dorsal mPFC was particularly enhanced for erotica. Overall, results are consistent with a hypothesis that the mPFC, and particularly its ventral aspect, is engaged when processing pleasant stimuli, whereas regions such as amygdala and perhaps the dorsal MPFC are activated when processing any emotionally engaging scene.

MH094386 & MH098078.

Poster 1-81**CHANGES IN ALPHA POWER DURING NARRATIVE IMAGERY**

Robert R Henderson, David R Herring, Kristina Andrión, Margaret M Bradley, Nate Petro, Andreas Keil, & Peter J Lang
 University of Florida

Descriptors: narrative imagery, alpha oscillations, electroencephalography

Large-scale neural oscillations in the alpha range (8–12 Hz) are enhanced during mental imagery of single words compared to imagining visual geometric shapes (Bartsch et al., 2015). In the present study, we explored fluctuations in alpha activity during narrative mental imagery of emotional scenes. Participants ($n = 104$) first read and then imagined standard and personal scenes that represented a range of affective content. Each script was visually presented for a 9 s read period. Following reading, the participant was instructed to continue to vividly imagine participating in the described scene for an additional 12 s. Following imagery, there was a variable relaxation interval of 18–20 s. In addition to continuous dense array EEG monitoring, we measured startle reflexes, facial EMG, skin conductance, and heart rate throughout the session. Results indicated a significant reduction in alpha power during the read period, compared to relaxation, consistent with previous studies reporting alpha blocking when processing an external visual stimulus. On the other hand, alpha power was significantly enhanced during active narrative imagery, compared to relaxation, as well as, of course, to the read period. These data support the view that enhanced alpha power accompanies internal cognitive processing, and suggest that increases in alpha power may be a measure of degree of engagement in narrative mental imagery tasks.

These data are supported by two NIMH R01s: MH094386 and MH098078.

Poster 1-82**SCENE PERCEPTION AND PUPIL DIAMETER: SPECIFIC CONTENT AND PERCEPTUAL COMPOSITION**

Rosemarie G Sapigao, Margaret M Bradley, & Peter J Lang
 University of Florida

Descriptors: pupillometry

During picture viewing, the amplitude of early pupil constriction in the region of the initial light reflex (e.g. 300–1000 ms post onset) is attenuated when participants view emotional, compared to neutral, pictures, and late pupil diameter (e.g. 1000–6000 ms post onset) is enhanced. In the current study, we assessed pupil diameter while participants viewed pictures of natural scenes that varied in specific hedonic content as well as perceptual composition. Sixty pictures were viewed for 6 s each with scenes depicting erotica, babies, food, nature, loss, threat, mutilation, contamination, threat, or neutral scenes. All pictures were manipulated such that they were identical in brightness and contrast. Overall, results replicated previous findings, with emotional pictures attenuating pupil diameter in the region of the light reflex ($p < .05$) and enhancing late pupil diameter ($p < .05$). Unlike some measures of emotional reactivity, pupil diameter was modulated both when viewing highly arousing contents of erotica and threat, as well as when viewing emotional scenes typically rated lower in arousal, such as babies and food, compared to neutral scenes, particularly for late pupil dilation. Perceptual complexity did not reliably affect pupil diameter during picture viewing. Taken together, the data suggest that pupil diameter during visual scene perception indexes emotional reactions to scenes that vary in rated arousal.

Poster 1-83**ALCOHOL DAMPENS STRESS REACTIVITY BUT NOT PERCEPTION TO VISUALLY UNCERTAIN STRESSORS IN A STIMULUS GENERALIZATION PARADIGM**Daniel E Bradford¹, Susan E Schneck¹, Marion A Cole², & John J Curtin¹
¹University of Wisconsin-Madison, ²University of Kentucky*Descriptors: stimulus generalization, startle, alcohol*

Stress reduction is an important motive for both recreational and problematic alcohol use. However, over three decades of research have yet to specify the precise mechanisms and boundary conditions for alcohol stress response dampening (SRD). Our laboratory has programmatically demonstrated greater alcohol SRD during uncertain relative to certain stressors across multiple dimensions of uncertainty and measures of stress. Here, we explore mechanisms of this effect (e.g., cognitive-attentional and perceptual changes) by testing alcohol SRD in the visual domain using a stimulus generalization procedure. Participants underwent differential shock conditioning during which they viewed small and large rings as conditioned stimuli (CS-, CS+). Next they completed a generalization test in which they viewed seven rings of continuously increasing size consisting of the CS-, CS+, and Generalization Stimuli (GSs). Alcohol intoxication (BAC = .08%) did not dampen stress reactivity assessed via startle potentiation or online perceived shock risk ratings to the CS+ during the acquisition phase when the stressor was relatively certain. Alcohol did dampen startle potentiation but not risk ratings across CS+ and GSs when participants were presented with all stimuli in the generalization test and the stressor was uncertain. Importantly, alcohol did not affect ability to visually discriminate between stimuli as further assessed in a same/different test. This provides evidence that alcohol dampens stress reactivity during uncertain stressors without altering the perception of those stressors.

Poster 1-84**PRESCHOOL CHRONIC IRRITABILITY PREDICTS ENHANCED REWARD REACTIVITY DURING PREADOLESCENCE: EVIDENCE FROM THE REWARD POSITIVITY**Ellen M Kessel¹, Lea R Dougherty², Autumn Kujawa¹, Greg Hajcak¹,
Carlson A Gabrielle³, & Daniel N Klein¹
¹Stony Brook University, ²University of Maryland, ³Stony Brook University School of Medicine*Descriptors: irritability, reward positivity, development*

Irritability plays a prominent role in the current child psychiatric nosology and may be a transdiagnostic phenotype that spans internalizing and externalizing disorders. Yet, relatively little is known about its pathophysiology. Reward-processing abnormalities are a key feature of various psychiatric disorders and may also be characteristic of chronic irritability. In the current study, we used event-related potentials sensitive to monetary reward (i.e. the reward positivity [RewP]) and loss (i.e. the N200) to examine associations between early childhood chronic irritability and later reward processing during preadolescence. To assess symptoms of early emerging chronic irritability in a large community sample (N = 373) of 3-year olds, we administered the Preschool Age Psychiatric Assessment with parents. Six years later, children completed a guessing game in which they could either win or lose money while EEG was recorded. Analyses revealed that early chronic irritability predicted an enhanced RewP to monetary rewards in preadolescence, independent of lifetime symptoms of anxiety, depression, ADHD, and disruptive behavior. Manifestations of chronic irritability in children as young as 3, was associated with enhanced reward processing later in development. These findings suggest that chronic irritability early in life is predictive of disruptions within the positive-valence system. They also underscore the utility of using neural measures like the RewP to better characterize phenotypes and elucidate core neural disruptions that cut across traditional diagnostic boundaries.

Poster 1-85**PSYCHOPHYSIOLOGICAL MEASURES AT ULTRA HIGH FIELD: A 7T FMRI STUDY OF MOTOR PERFORMANCE UNDER PRESSURE**Jennifer L Robinson¹, Matthew W Miller¹, Keith Lohse¹, Kirk Grand¹,
Ashley C Hill¹, Jerry E Murphy¹, Lauren AJ Kirby¹, Anna Kirkland¹, Ken
Graap², & Alan Macy²
¹Auburn University, ²BIOPAC*Descriptors: motor, attention, fMRI*

In this study, we examine the effects of internal and external focus of attention during a hand-grip task under two contexts: social pressure with monetary incentive, and no pressure. This is the first study of its kind to combine measures of peripheral (e.g., psychophysiological measurements) and central nervous system (functional magnetic resonance imaging [fMRI]) activity. Here, we present initial findings of multichannel psychophysiological data collection during submillimeter 7T fMRI. Data were acquired in twelve adults using BIOPAC MRI-compatible modules, leads, and electrodes. fMRI scanning was performed on a 7T Siemens MAGNETOM. Electrocardiograph (ECG), respiration, electrodermal activity (EDA), electromyogram (EMG), and grip force were collected during simultaneous high-resolution fMRI. Respiration, EDA, EMG, and basic cardiovascular measures were filtered after signal processing to remove scanning artifacts. EDA, EMG, and respiration signals were reliably extracted and minimally affected by the simultaneous acquisition. ECG signals were more vulnerable to scanning parameters, and thus more difficult to extract. Data reveal neuropsychophysiological correlates of peripheral autonomic signals, dependent on the context (pressure vs. no pressure). We successfully collected submillimeter fMRI and multichannel psychophysiological data in an ultra-high field MR environment. Such data collection provides insight into the dynamic interactions of the central and autonomic nervous systems.

Poster 1-86**RESTING RSA MODERATES EFFECT OF TRAIT IMPULSIVITY ON YOUTH EXTERNALIZING BEHAVIORS**Jaclyn T Aldrich¹, Joshua J Ahles¹, Madeline D Wielgus¹, Amy H Mezulis¹,
& Sheila Crowell²
¹Seattle Pacific University, ²University of Utah*Descriptors: respiratory sinus arrhythmia, impulsivity, externalizing*

Impulsivity has been associated with externalizing behaviors and disorders. The four factors of impulsivity are negative urgency, lack of premeditation, lack of perseverance, and sensation seeking. Research has suggested that respiratory sinus arrhythmia (RSA) may provide a biological index of emotion regulation capacity, thus high RSA may buffer the negative effects of impulsivity (Beauchaine & Gatzke-Kopp, 2012) on mental health outcomes. This study examined whether high resting RSA would buffer the prospective relationship between trait impulsivity and externalizing behaviors among 124 youth (mean age = 12.85, SD = .84, 46% male). Parents reported on youth impulsivity at baseline and youth reported on their externalizing behaviors at baseline and 6 months. Basal RSA was assessed at baseline during a 4-minute resting period. Moderation analyses were conducted using Hayes PROCESS macro for SPSS 22. Controlling for gender, age, and baseline depression symptoms, basal RSA moderated the effect of parent-reported sensation seeking (b[SE] = -2.34(.71), p = .0014) and parent-reported negative urgency (b[SE] = -.98(.45), p = .0346) on externalizing behaviors 6 months later. Examination of the conditional effects found that high trait sensation-seeking and negative urgency only predicted externalizing behaviors among youth with low to moderate basal RSA; high basal RSA significantly buffered the effect of high impulsivity on externalizing behaviors. Results suggest that temperamental vulnerabilities of externalizing behaviors, like impulsivity, may be influenced by emotion regulation capacity.

National Institute of Mental Health R15MH098294-01A1 (PI: Mezulis).

Poster 1-87**ATTENTION TO NEGATIVE STIMULI INTERACTS WITH STRESS TO PREDICT PRE-EJECTION PERIOD REACTIVITY TO REWARD AND ANHEDONIA SYMPTOMS AMONG YOUNG ADOLESCENTS**

Madeline D Wielgus, Joshua J Ahles, & Amy H Mezulis
Seattle Pacific University

Descriptors: stress, pre-ejection period, anhedonia

Under specific stimulus conditions, reward sensitivity may be indexed by cardiac pre-ejection period (PEP) reactivity (Brenner & Beauchaine, 2011), a measure of sympathetic nervous system arousal, which in turn may be associated with the anhedonic features of depression. Cognitive vulnerability-stress models of depression suggest individual differences in cognitive responses to stressful events interact with stress to confer greater risk for depression. One such vulnerability may be difficulty disengaging from negative stimuli following stress. This study examined the interaction between stressful life events and impaired disengagement from negative stimuli in predicting anhedonia symptoms through their joint effects on PEP reactivity to reward in a community sample of young adolescents (N = 54; 50% male; mean age = 13.24). Participants completed measures of stress exposure and depressive symptoms. Anhedonia symptoms were assessed using items (Wetter & Hankin, 2009) from the Child Depression Inventory-II. PEP reactivity was assessed in response to a modified delayed-matching-to-sample task (Richter & Gendolla, 2009) in which adolescents were able to earn \$10 dollars. Moderated-mediation analyses were conducted using Hayes PROCESS macro (2012). Results indicated adolescents with greater difficulty shifting attention from negative stimuli that were exposed to high levels of stress showed the smallest PEP reactivity to reward ($b = .0073$, $p = .0224$). These individuals in turn showed the greatest level of anhedonia symptoms ($b = .0988$, $p = .0453$).

National Institute of Mental Health R15MH098294-01A1.

Poster 1-88**THE RELATIONSHIP BETWEEN EEG/ERP BASED NEUROMETRICS AND AUTISM SPECTRUM PERSONALITY TRAITS**

Leigh C Gayle, Emily C Cunningham, & Paul D Kieffaber
College of William and Mary

Descriptors: electroencephalography, event-related potentials, Autism spectrum

The NIMH Research Domain Criteria project calls for research that focuses on classifying mental disorders based on behavioral dimensions and neurobiological markers that cut across traditional diagnostic lines. This may be advantageous for complex conditions such as Autism Spectrum Disorder (ASD). Electroencephalography (EEG) recordings of event-related potentials (ERP) and resting-state oscillatory activity may be particularly well-suited for the identification of these markers due to their high temporal resolution, non-invasive nature, low equipment cost and ease of use. Although the time required to collect enough data for reliable analysis can be limiting, the utilization of a nested task design can consolidate the required collection time. The Brief Neurometric Battery (BNB) utilizes a nested task design (based on Kappenman & Luck, 2012) to display an array of auditory and visual stimuli. These stimuli can elicit at least 14 metrics that are designed to evaluate basic sensory perception and integration as well as attention and error detection in a concise twenty-five minutes. Using multiple regression, five metrics were identified that significantly predicted autism spectrum personality traits in a subclinical sample of adults. The five metrics identified were N2pc amplitude, ERN amplitude, delta posterior asymmetry, theta frontal asymmetry and gamma posterior asymmetry. The Adult Autism Spectrum Quotient (AQ) was used to measure autism spectrum personality traits.

Poster 1-89**UNCERTAINTY DURING ANTICIPATION INCREASES LATE POSITIVE POTENTIAL AMPLITUDES ELICITED BY UNPLEASANT EMOTIONAL STIMULI**

Robert J Goodman¹, Kirk Warren Brown², Taylor N West¹, Jordan T Quaglia², & Daniel R Berry²

¹Northern Arizona University, ²Virginia Commonwealth University

Descriptors: uncertainty, late positive potential, emotion

Uncertainty during the anticipation of potentially negative future events can distort perceptual processes and can amplify physiological arousal and the intensity of emotional experiences. When uncertainty elicits expectations for unpleasantness, attempts to resolve it can become a potent source of anxiety. The present study examined the influence of uncertainty on expectations, self-reported appraisals, and a key event-related potential marker of emotional stimulus appraisal - the late positive potential (LPP). Participants (N = 52) were presented with a pre-stimulus cue that conveyed information about the valence of a forthcoming emotional image stimulus (neutral, unpleasant), or that left them uncertain. After the stimulus cue participants reported their expectations about the valence of the upcoming stimulus, and then self-reported their state affect or appraisal of the stimulus in terms of its unpleasantness. As predicted, uncertainty cues led to increased unpleasant stimulus perceptions, and this was corroborated with cortical evidence indicating increased LPP amplitudes elicited by aversive emotional stimuli under conditions of uncertainty. Biased expectations for aversive outcomes during periods of stimulus uncertainty were associated with self-reported unpleasantness. This study contributes to a growing body of evidence linking uncertainty with biased expectancies for aversion, and demonstrates the potent influence uncertainty can exert on emotional stimulus perception and appraisal.

Poster 1-90**IMPLEMENTATION AND VALIDATION OF A PROTOCOL FOR MULTI-MODAL INVESTIGATION OF HUMAN BRAIN FUNCTION**

Alexandru D Jordan¹, Matthew Moore¹, Ryan Larsen¹, Edward L Maclin¹, Andrea T Shafer², Anthony Singhal³, Monica Fabiani¹, Gabriele Gratton¹, & Florin Dolcos¹

¹University of Illinois at Urbana-Champaign, ²Wayne State University, ³University of Alberta

Descriptors: electroencephalography, fMRI, event-related optical signal

Simultaneous electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) recordings is advantageous because it enables comprehensive analyses of brain function by leveraging together high temporal and spatial resolution. Although such combinations have previously been implemented, EEG and fMRI recordings are not perfectly complementary, and hence it is unclear to what degree brain activity recorded at different temporal and spatial scales reflects converging psychophysiological phenomena. This issue can be addressed by introducing an additional methodology that intrinsically combines high temporal and spatial resolution, such as event-related optical signals (EROS). The goal of the project is to illustrate the implementation of a protocol for simultaneous EEG-fMRI recordings and its validation via EROS, and to highlight the methodological challenges posed by the two-by-two integration of all these three imaging methodologies. Noteworthy, pilot EEG-fMRI data based on a visual emotional oddball task showed expected event-related potentials, such as P300, in the EEG data, in conjunction with blood-oxygen-level dependent signal changes in parietal areas, in the fMRI data. These results further illuminate the overlaps across different measures of brain function and point to ways in which distinct methodologies can be used cohesively to study psychophysiological phenomena.

Poster 1-91**SPATIAL AND TEMPORAL CORRELATES OF SOCIAL DECISION MAKING: A COMBINED fMRI-ERP INVESTIGATION**

Matthew Moore, Yuta Katsumi, Alexandru D Jordan, Sanda Dolcos, & Florin Dolcos
University of Illinois at Urbana-Champaign

Descriptors: fMRI, electroencephalography, Ultimatum Game

In social decision making, a single social interaction may take a few seconds, but impressions can be formed within hundreds of milliseconds. Hence, a combination of methods with high spatial resolution (i.e. functional magnetic resonance imaging, fMRI) and high temporal resolution (i.e. electroencephalography, EEG/event-related potentials, ERPs) is necessary for comprehensive investigation of the neuro-behavioral mechanisms underlying social interactions and the associated decisions. In the present study, an adapted ultimatum game was used to examine the influence of observed interactions with animate and inanimate avatars on decisions to accept or reject offers to split an amount of money. Behavioral results from 15 subjects showed similar positive effects of approach and avoidance behaviors displayed by the animated characters, compared to the inanimate control condition, suggesting a facilitating effect of social interaction on financial decisions. Consistent with these behavioral data, analyses of fMRI-EEG data recorded while participants performed the task showed increased response to social interaction compared to the control condition, reflected in greater fMRI signal in the superior temporal and medial prefrontal cortices and similar differences in the ERP signal at midline electrodes. These results expand on previous findings from separate fMRI and EEG investigations of the traditional ultimatum game, and point to detectable spatial and temporal indices of response to social interactions that may predict subsequent financial decisions.

Poster 1-92**EXAMINING THE PSYCHOPHYSIOLOGICAL EFFECTS OF SOCIAL STRESS ON TIME PERCEPTION**

Kathryne Van Hedger, Elizabeth A Necka, Karen E Smith, & Gregory J Norman
University of Chicago

Descriptors: time perception, social stress

Time perception is a fundamental and necessary component of everyday life. Although time can be measured objectively using standard units, the relationship between an individual's experience of perceived time and a standard unit is highly sensitive to context. Stressful or threatening stimuli have been previously shown to produce time distortion effects, such that individuals perceive the stimuli as lasting for different amounts of time than its objective duration. As a social species, we are acutely sensitive to social stress, and demonstrate reliable physiological responses to social stressors. Thus, social stress represents a specific context with known physiological effects in which to study time distortions. We collected questionnaire, physiological (ECG and impedance cardiography), and time perception data before and during a stressful speech task for 42 participants. Based on prior theories of time perception we hypothesized that experiencing a stressful event would result in time distortion. This hypothesis was supported by the data, with individuals on average significantly underestimating the amount of time they spent talking during the stressful speech task. Individual differences in cardiovascular reactivity and psychosocial constructs (e.g. state and trait anxiety, fear of negative evaluation) were explored as mechanisms for how these time distortions might occur.

Poster 1-93**EXERCISE INDUCED MAINTENANCE OF ATTENTIONAL PROCESSES IN PREADOLESCENT CHILDREN**

Andrew C Parks, Natalie I Berger, Samantha R Lamkin, Lydia J Pineault, Brooke R Ingersoll, & Matthew B Pontifex
Michigan State University

Descriptors: event-related potentials, exercise, children

A growing body of research has suggested that acute bouts of aerobic exercise may transiently enhance neuroelectric indices of attention in children. However, this research has primarily utilized the assessment of post-condition (reading or

exercise) measurements. Using a within-subjects design, this study assessed event-related potentials and task performance in response to a modified flanker task in preadolescent children, immediately prior to and following an acute bout of aerobic exercise or reading during two separate, counterbalanced sessions. Consistent with prior research, P3 amplitude was larger following exercise relative to following the reading condition. However, contrary to prior interpretations of exercise induced enhancements, P3 amplitude was maintained from pre-test during the exercise condition; whereas the reading condition was associated with a decrease in P3 amplitude at post-test relative to pre-test. Such findings suggest that attention may be negatively impacted during prolonged periods of sedentary behavior common throughout the school day. Within this context, although aerobic exercise did not result in enhancements in P3 amplitude, inclusion of brief bouts of exercise may serve to sustain optimal performance of neural networks underlying attention.

Support for our research was provided by a Summer Renewable Research Fellowship awarded to A. Parks through the College of Education and the Graduate School at Michigan State University, and a Research Practicum/Research Development Fellowship awarded to A. Parks through the Kinesiology Department at Michigan State University.

Poster 1-94**ACTIVITY-BASED MODULATION OF ERROR-RELATED BRAIN ACTIVITY IN HIGH-ANXIOUS INDIVIDUALS**

David A Henning, Andrew C Parks, Samantha R Lamkin, Hans S Schroder, Jason S Moser, & Matthew B Pontifex
Michigan State University

Descriptors: error-related negativity, worry, exercise

A growing body of research has identified the error-related negativity (ERN) as a robust neurophysiological marker of performance monitoring that is dysregulated in individuals high in anxious apprehension/worry. Although single bouts of exercise have been shown to reduce symptoms of anxiety, the neurophysiological mechanisms for these reductions are not well understood. Accordingly, the present investigation sought to examine the effect of a bout of aerobic exercise on performance monitoring in both high and low anxious apprehension/worry college-aged females. Using a within-participants design, event-related brain potentials and task performance were assessed in response to a letter-based flanker task immediately prior to and following a bout of exercise or seated rest during two separate, counterbalanced sessions. Replicating previous research, high anxious individuals demonstrated larger ERN amplitude than low anxious individuals at baseline. Similarly, consistent with previous research, low-anxious individuals demonstrated no differences in the effect of exercise or seated rest for ERN amplitude. However, high anxious individuals demonstrated activity-induced modulations in ERN amplitude such that exercise increased, and sitting decreased, ERN amplitude. These findings — in association with corresponding modulations of behavioral performance — suggest that single bouts of exercise strengthen cognitive control by enhancing performance-monitoring operations for individuals with high anxiety/worry.

Poster 1-95**AN EVENT-RELATED EXAMINATION OF NEURAL ACTIVITY DURING WITNESSED SOCIAL EXCLUSION**

Jason R Themanson, Kaitlin R Dunn, & Roberto J Romay
Illinois Wesleyan University

Descriptors: social exclusion, N2, P3b

Social exclusion is theorized to activate self-regulatory processes and direct one's attention toward social information that may increase subsequent inclusion. This social information may be self- or other-related, suggesting that previous social experience, like witnessing others' social exclusion, may engage social self-regulation. Accordingly, this enhanced processing of exclusion-related social events should be exhibited during witnessed exclusion. To examine this hypothesis, we utilized the Cyberball paradigm to assess participants' event-related brain potentials (ERPs) to both inclusionary and exclusionary events occurring during a witnessed social interaction. Participants either witnessed an exclusionary Cyberball interaction or a completely inclusive interaction. Results showed participants who witnessed social exclusion exhibited N2 and P3b activation to exclusionary events, similar to patterns of activation revealed during one's own experienced social exclusion. Participants who witnessed inclusion showed no such activation during the witnessed interaction. These findings suggest that during witnessed social exclusion; neural alarm and exclusion-related attentional processes are activated, preparing individuals for the possibility of exclusion in their own subsequent social interactions. More generally, these results provide support for theories indicating that prior experience with exclusionary social information may engage social self-regulatory processes and adaptively sensitize individuals to relevant social information in their subsequent interactions.

This research was funded by grants from the NSF to Jason Themanson (BCS #1147743) and Illinois Wesleyan University (MRI #0722526; PI: Joseph Williams) and a grant from Illinois Wesleyan University to Jason Themanson.

Poster 1-96**THE EFFECT OF NICOTINE DEPRIVATION ON P200 AND P3B AMPLITUDES DURING A LATERALIZED RAPID VISUAL DETECTION TASK**

Ryan P Coppens, Matthew A Ruehle, Audreyana C Jagger, Sarah J Kertz, & David G Gilbert
Southern Illinois University, Carbondale

Descriptors: nicotine, P2, P3b

Nicotine has differential effects on lateralized neural networks that mediate attention (Gilbert, 1995). These lateralized effects may reflect relatively greater densities of cholinergic and dopaminergic receptors in the left hemisphere and greater densities of serotonergic and noradrenergic receptors in the right hemisphere (Gilbert et al., 2005). While smoking deprivation can result in decreased cognitive performance and related brain functioning, little is known about how the effects impact ERPs in response to lateralized targets. Thus, the effects of smoking deprivation on brain activity were assessed in 12 individuals using a detection task. P3b and P200 ERPs to targets were assessed as a function of Treatment (nicotine-deprivation vs. non-deprivation), Visual Field (left VF, right VF, and centralized VF), and stimulus duration. The duration of stimulus presentation decrease during the task from 24ms, to 16ms, and then to 8ms. Nicotine-dependent smokers identified target stimuli that were randomly presented in the left, central, or right visual field and identified the location of the stimuli via different response button presses. Participants had significantly higher P2 and P3b peak amplitudes in the parietal region (P3, P4, & Pz) when not-deprived than when smoking deprived and these effects were moderated by visual field, hemisphere, and stimulus duration, as predicted by the lateralized model of nicotine's effects.

Poster 1-97**DIFFERENCES IN RESPIRATORY SINUS ARRHYTHMIA DURING COGNITIVE LOAD: ALCOHOL USE AND ALTERED SELF-REGULATION**

Samuel E Rutherford, Elizabeth A Skowron, & Daniel J Folk
University of Oregon

Descriptors: respiratory sinus arrhythmia, self-regulation, substance use
Respiratory Sinus Arrhythmia (RSA) is a measure of alterations in heart rate variability that has been linked to the ability to self-regulate attention and emotion;

high levels of cognitive load decrease RSA, representing higher levels of sympathetic activity and increased attentional processing. Although there is a surfeit of literature examining RSA there is scant research exploring how drugs alter RSA. The current study looks at differences in RSA during a solo cognitive challenge (Stroop) and a joint challenge (Duplo), between women reporting alcohol use (AU) to intoxication versus no alcohol use (NAU). The current study is a secondary analysis of data generated from the Parent-Child Processes: Negative Self-Regulatory and Behavioral Outcomes. Electrocardiograph data was collected and analyzed using Mindware Technologies software to generate RSA data for each individual; alcohol use data was collected via self-report using the Addiction Severity Index. Results show no mean differences in RSA between AU and NAU women at resting baseline or on Stroop performance. During both the Stroop and Duplo tasks AU women had significantly higher RSA than NAU women. The dearth of literature on RSA and substance use makes it difficult to interpret results. However, given that RSA normally lowers during cognitive load, the data indicates alcohol may alter psychological or physiological self-regulation when under stress; implications suggest that alcohol used to intoxication may inhibit normal upregulation of attentional processes. More research is called for to replicate the findings.

NIMH 5R01 MH079328. Parent-Child Processes: Negative Self-Regulatory and Behavioral Outcomes.

Poster 1-98**PRELIMINARY EVIDENCE FOR THE HYPERACTIVITY OF THE SYMPATHETIC NETWORK IN DEPRESSION AND ANXIETY**

Tony J Cunningham, & Jessica D Payne
University of Notre Dame

Descriptors: depression, sympathetic response, heart rate reactivity

According to the defense cascade model, heart rate reactivity involves an entire autonomic response, whereby attending to a stimulus leads to a brief deceleration of HR (heart rate deceleration; HRD), followed by a sharp increase in HR (heart rate acceleration; HRA). The distinction of how these parasympathetic and sympathetic responses are related to clinical symptoms remains equivocal. Participants completed numerous clinical measures and then viewed a mix of negative and neutral images while HR was monitored. Results indicated that only state negative affect (PANAS NA scale) correlated with HRD response when viewing negative images [$r(43) = -0.29, p = 0.05$]. HRA response to negative images, however, positively correlated with trait measures of depression [Beck Depression Inventory, $r(43) = 0.43, p < 0.01$] and anxiety [Beck Anxiety Inventory, $r(43) = 0.37, p = 0.01$; Mood/Anxiety Symptom Questionnaire, $r(43) = 0.53, p < 0.001$; STAI-Trait, $r(43) = 0.31, p = 0.04$]. HRA also positively correlated with NA [$r = 0.62, p < 0.001$] and negatively correlated with positive affect [PANAS PA; $r = -0.345, p = 0.024$]. Importantly, most correlations emerged to a lesser extent in response to neutral pictures as well. Thus, while both components of autonomic reactivity may be connected to current affective state (as state negative affect correlated with both HRD and HRA), generalized hyperactivity of the sympathetic system may be a specific trait of those suffering from increased clinical symptoms, as only HRA correlated with trait depression and anxiety measures to the presentation of both negative and neutral images.

Poster 1-99**COHERENCE BETWEEN EMOTIONAL RATINGS AND PHYSIOLOGY IN ALZHEIMER'S DISEASE**

Casey L Brown, & Robert W Levenson
University of California, Berkeley

Descriptors: empathy, Alzheimer's, coherence

Alzheimer's Disease (AD) causes dramatic losses in cognitive domains, but aspects of emotional functioning can be relatively preserved. We examined the coherence between ratings of the emotions of others and physiological responding in 44 AD patients and 26 controls. Participants watched a film of an actress experiencing a range of emotions and used a rating dial to continuously indicate how the actress was feeling. Throughout the film, participants' physiology (heart rate and skin conductance) was also monitored continuously. Coherence was computed as the average cross correlation between second-by-second averages of emotion ratings and each physiological measure. Results indicated that AD patients were less accurate (using expert ratings as the criterion) in rating the emotions of the actress than controls, $F(1,65) = 25.7, p < .001$, but showed greater coherence between their emotion ratings and physiology, $F(1,56) = 9.4, p = .003$. Exploratory analyses were conducted using caregivers' reports of AD patients' empathy and compassion. These revealed that greater coherence between emotion ratings and physiology was related to higher empathy ($b = .54, p = .01$), and compassion ($b = .45, p = .02$) in patients (even after controlling for dementia severity and empathic accuracy). These results indicate that coherence between emotion ratings and physiology is greater in AD patients (perhaps resulting from a weakening of cognitive "distractions") and that greater levels of coherence is associated with patients who appear to be more empathetic and compassionate.

Poster 1-100**AFFECTIVE DISTORTIONS OF TEMPORAL DURATION AND RESOLUTION JUDGMENTS**

Kevin H Roberts, Yi-Yuan Lin, & Rebecca M Todd
University of British Columbia

Descriptors: time perception, visual perception

The emotional relevance of a stimulus is known to affect subjective time estimation in experimental paradigms where participants judge stimulus duration. Yet these paradigms neglect to probe the quality of the moment-to-moment perceptual experience, and whether viewing affectively salient stimuli modulates visual sampling rate is not known. In two experiments we employed neutral, negative, and positive images. First, a temporal bisection paradigm was employed, replicating the often-reported finding of negative stimuli eliciting longer subjective durations. Second, we used encephalography in a novel paradigm to investigate affective distortion of moment-to-moment subjective temporal perceptual experience. In this task, participants viewed a "standard" stimulus fading to black over a 2000 ms period at 24 frames per second (fps), immediately followed by a "target" stimulus fading to black over a 2000 ms period at 16/24/48 fps. Participants then rated the smoothness of the target stimulus fade, as compared to the standard, where judgments of the target as less smooth suggest more ease in distinguishing frames and thus increased visual sampling rate. Negative stimuli were judged as fading less smoothly, while positive stimuli were judged as fading more smoothly than neutral stimuli. Event-related potentials were obtained to identify components relevant to differences in stimulus smoothness judgment. These results suggest that stimulus valence modulates temporal perception, indicating a possible mechanism underlying influence of affective salience on perceived duration.

Poster 1-101**PHYSIOLOGICAL REACTIONS PREDICT PHYSICAL HEALTH WHILE VALENCE PREDICTS MENTAL HEALTH**

Claire I Yee, Brandon G Scott, Irwin N Sandler, Tim S Ayers,
Sharlene A Wolchik, Linda J Luecken, Jenn-Yun Tein & Michelle N Shiota
Arizona State University

Descriptors: heart rate, emotion, physical health, mental health

Research has linked negative emotionality to physical and psychosocial problems. However, it is unclear whether physiological and/or subjective aspects of emotion drive these relationships. This analysis used data from a 15-year follow-up of 175

adults who had participated in an intervention for parentally bereaved children. Participants viewed a set of emotionally disturbing photos, asked not to try to change their emotions in any way. Cardiac reactivity was calculated by regressing mean interbeat interval (IBI) for the slide-viewing epoch on a 30-sec baseline. Participants reported subjective emotional responses to the photos as well. In addition, participants completed self-report measures of overall physical and mental health, and the Achenbach Adult Self Report (ASR) measure of psychosocial functioning. Data were analyzed using full maximum likelihood regression, with IBI reactivity and subjective valence as predictors of health and functioning. Physical health was significantly predicted by IBI reactivity to the photos ($b = -.008, SE = .002, p < .001$), but not by valence. Overall mental health was not significantly predicted by either IBI reactivity or valence; however, total ASR internalizing problems ($b = -1.242, SE = .718, p = .084$), and total ASR problems ($b = -1.233, SE = .720, p = .087$), were each predicted by more negative subjective valence, and not by IBI. Thus, while physiological reactions better predicted physical health, subjective experience better predicted psychosocial functioning. Future directions and broader implications will be discussed.

NIMH Grant R01-MH49155.

Poster 1-102**PSYCHOPHYSIOLOGICAL RESPONSES TO LIKES, SHARES, COMMENTS, AND STATUS UPDATES ON FACEBOOK**

Abdullah Al-Riyami, Nasser Almutairi Morgan Eisele, Elishia Johnson,
Wonkyung Kim, Chen Lou, & Saleem Alhabash
Michigan State University

Descriptors: cognition, emotion, Facebook

With over 1.39 billion active users, Facebook has become a ubiquitous socio-technical system affecting users' lives (Facebook, 2015). Over a third (33.8%) of U.S. Internet users reported using the 'like' button and more than a quarter (26.7%) reported sharing online content on Facebook (Smith, 2015). Likes, shares, and comments have become metrics of online content virality as well as advertising and marketing effectiveness (Alhabash & McAlister, 2014). The current study examined the cognitive and emotional responses to liking, sharing, commenting, and status updating (posting) behaviors on Facebook usage. Participants ($N = 34$) were recruited from a community subject pool in the U.S. Midwest and were compensated with \$20. In addition to browsing Facebook organically for five minutes, participants were instructed to like, share, and comment on a friend's Facebook post as well as update their own status in separate segments each ranging from two to three minutes. Participants' heart rate, respiration, pulse, skin conductance level, corrugator supercillii, orbicularis oculi, zygomaticus major, and levator labii were recorded using the BIOPAC MP150. Using screen capture technique, we extracted physiological data for the 10 seconds preceding and following the performance of each of the four online behaviors on Facebook (like, share, comment, and status update) to explore how online behaviors are affected by psychophysiological responses and establish an understanding of the biological processes surrounding common online behaviors.

Poster 1-103**STOP OR MOVE: DEFENSIVE STRATEGIES
IN HUMANS**

Aline Furtado Bastos¹, Fátima Smith Erthal¹, Maria Fernanda Santos¹, José Magalhães Oliveira¹, Mirtes Pereira², Letícia Oliveira², Ivan Figueira¹, & Eliane Volchan¹

¹Federal University of Rio de Janeiro, ²Federal Fluminense University

Descriptors: defensive responses, posturography, electrocardiography

Particular features of dangerous cues and surrounding contexts trigger specific defensive behaviors enhancing chance of survival. When attacked, non-humans species mobilize to escape in the presence of an available route; immobilize if escape is blocked, and may defensively attack back if threat enhances. Here, we investigate similar defensive strategies in humans. To simulate "attack" we employed pictures of one man carrying a gun. On pictures simulating attack with possible escape, the gun was directed away from observer; whereas on those simulating less chance of escape, the gun was directed toward the observer. Matched control pictures for each condition depicted very similar layouts, but a non-lethal object substituted the gun. Posturographic and electrocardiographic recordings were collected during passive exposure to blocks of pictures followed by ratings of perceived threat. "Gun directed to observer" compared to "gun directed away" was rated as more threatening, nearer, and with less chance of escaping or hide. Physiological recordings showed significant reduction of body sway in anterior-posterior axis and in heart rate when the gun was pointed toward the observer compared to matched control pictures. When the gun was directed away, there was a general increase in amplitude parameters of body sway compared to matched control pictures. The results suggest that in an urban non-clinical sample, realistic pictures portraying simulations of attack evoked escape-like predispositions or immobility depending on the perception of more or less accessibility of escape routes.

CNPq, Faperj, CAPES.

Poster 1-104**CHILD ABUSE AND ALTERED PROCESSING OF
NEGATIVE STIMULI IN ADULTHOOD**

Allison M Letkiewicz¹, Rebecca L Silton², Katherine J Minnaugh¹, Wendy Heller¹, Gregory A Miller³, & Sarah M Sass⁴

¹University of Illinois at Urbana-Champaign, ²Loyola University - Chicago, ³University of California, Los Angeles, ⁴University of Texas at Tyler

Descriptors: child abuse history, emotion processing

Child abuse is associated with a variety of outcomes including altered processing of negative stimuli. Although well established in children, altered processing of emotional stimuli following abuse has been studied to a far lesser extent in adults, so it is not known whether those alterations persist into adulthood. The present study employed ERPs to evaluate whether a history of child abuse is associated with changes in the processing of emotional stimuli in adults. It was hypothesized that child abuse would be characterized by enhanced attentional processing of negative stimuli. Participants were included if they met criteria for abuse or no abuse based on Childhood Trauma Questionnaire scores. Participants completed an emotion-word Stroop task during EEG data collection. Significant differences emerged for P300 and SW components. Over the right hemisphere, P300 amplitude was smaller for the abuse than non-abuse group and was larger for unpleasant than pleasant stimuli in the non-abuse group only. SW amplitude was larger for unpleasant than both pleasant and neutral stimuli in the abuse group only. Results indicate that reduced allocation of attention toward emotional information and toward negative stimuli in particular (P300 amplitude) is followed by increased attention toward and/or elaboration of negative stimuli (SW amplitude) in adults who have experienced child abuse. This pattern of processing may contribute to prolonged engagement with negative information, which may increase risk for psychopathology and thus is an important area of future research.

Poster 1-105**DEPRESSION AND PERSPECTIVE-TAKING PREDICT
EMOTION-MODULATED STARTLE REACTIVITY**

Alyssa M Ames, & Erin C Tully
Georgia State University

Descriptors: startle, depression, perspective taking

Research supports blunted modulation of startle reactivity by emotional context in depressed individuals. Depressed individuals vary in their perspective taking (PT), with some depressed individuals withdrawing and others becoming overly engaged in others' emotions. We hypothesized that blunting of emotion-modulated startle (EMS) among individuals with high levels of depression would be present only in individuals with high depression and low PT, whereas individuals with high depression and high PT would have the typical pattern of increased in startle reactivity with increasing negativity of the emotional context (pleasant to neutral to unpleasant image valences). The EMS paradigm was completed by 167 young adults (77 percent female) between the ages of 18 and 24. A repeated measures ANOVA was used to test the effect of depression (high, low) and image valence (pleasant, neutral, unpleasant) on startle magnitude as moderated by PT (high, low). Individuals with high depression and low PT had a blunted pattern of startle reactivity, partial eta squared = .08. A Linear pattern of startle reactivity was found for people with high depression and high PT (partial eta squared = .52), low depression and low PT (partial eta squared = .46), and low depression and high PT (partial eta squared = .66). These findings indicate blunted EMS is found only in depressed individuals who have deficits in PT and are likely disengaged from the emotional content, thus suggesting heterogeneity among depressed individuals in motivational states that prime or inhibit the startle reflex.

Poster 1-106**EEG CORRELATES OF KINEMATIC MOVEMENTS IN
ERROR-CORRECTION**

Kenneth J Osborne, & Paul D Kieffaber
The College of William and Mary

Descriptors: electroencephalography, kinematics, aging

Movement is one of the most important functions of our nervous system. Recent research has shown that cognitive and perceptual functions ranging from our perception of others' emotions to the planning of goal-directed behaviors depends critically on brain areas once thought to be primarily motor in nature. Given the important role our motor system plays in understanding and interacting with the world around us, it is surprising that the majority of cognitive neuroscience research has focused primarily on sensation and perception irrespective of its relationship(s) to the execution of movement. Combining a novel method for tracking dynamic cursor movement and electroencephalogram (EEG), the current study addressed this limitation in the field via assessment of goal-directed movements during an error-correction task. In contrast to current error-correction paradigms that afford limited assessment of the mechanisms involved in error-correction, we have developed a novel task that assesses the online kinematics of movement (e.g., velocity, acceleration, etc.). Our results demonstrate that ERPs conventionally interpreted with respect to sensation and perception are in fact related to the kinematics of motor responses.

Poster 1-107**NEURAL MECHANISMS OF APPROACH-MOTIVATED TIME PERCEPTION**

Lauren E Browning, Andrew C Reed, & Philip A Gable
University of Alabama

Descriptors: approach motivation, contingent negative variation, time perception

Approach-motivated states cause a hastened time perception while withdrawal-motivated states cause a slowed time perception. Past research has also demonstrated that the Contingent Negative Variation (CNV) is a late ERP component associated with temporal processing. To clarify whether motivational direction is driving the hastening or slowing of time perception, we examined the CNV while participants made temporal decisions in approach- (vs. withdrawal-) motivated states. Specifically, participants completed a temporal bisection task in which they judged the duration of approach (positive) and withdrawal (negative) motivated stimuli compared to standard short and long durations. Approach pictures were rated as more positive and approach motivating than withdrawal pictures, but similar in arousal. Participants judged the approach pictures as being displayed shorter than the withdrawal pictures. Temporal judgments about approach pictures were faster than temporal judgments about withdrawal pictures, suggesting that temporal judgments were less difficult in approach-states. CNV amplitudes were larger (more negative) to approach pictures than withdrawal pictures. Faster reaction times to approach-motivated stimuli for short decisions related to greater CNV amplitudes during short decisions. CNV amplitudes did not relate to reaction times to negative stimuli for long or short judgments. These results suggest that the CNV is a neural correlate of temporal judgments in approach-motivated states.

Poster 1-108**SHIFTING PERSPECTIVES BETWEEN 'SELF' AND 'OTHER' IN HEALTHY ADULTS: A NOVEL FALSE BELIEF TASK WITH BEHAVIOURAL AND EEG MEASURES**

Elisabeth EF Bradford, Juan-Carlos Gomez, & Ines Jentzsch
University of St Andrews

Descriptors: Theory of Mind, social cognition, belief attribution

This research explored how the Theory of Mind (ToM) mechanism functions in healthy adults, specifically looking at the differentiation between 'Self' and 'Other' in belief-attribution abilities, and how we switch between 'Self' and 'Other' perspectives. Adult participants completed a newly established computerized false-belief task in which they attributed beliefs to themselves and other people, in a matched design, to allow direct comparison of behavioral and neural correlates of belief attribution to the 'Self' and 'Other'. Participants responded faster and more accurately to self-oriented than other-oriented questions, which was supported by electroencephalography (EEG) measures, largest across central parietal lobes from 550ms after stimulus onset. Critically, when a 'perspective-shift' was required in a trial, shifting from Self-to-Other was significantly slower and more error prone than shifting from Other-to-Self. In contrast, in 'no perspective-shift' trials, there was no difference between Self-to-Self and Other-to-Other trials. EEG measures revealed an early onset significant interaction between Perspective-Shifting and Perspective-Type (Self/Other), from 300 ms after stimulus onset, further supporting the key role of perspective-shifting in ToM processes. Results indicate that the 'Self' is consistently processed, whilst the 'Other' is only processed when explicitly necessary, and support the notion of a Self/Other differentiation within the ToM mechanism, at both a behavioral and neural level.

This work was supported by the Economic and Social Research Council [grant number ES/J500136/1].

**POSTER SESSION II
THURSDAY, OCTOBER 1, 2015
6:00 P.M. – 8:00 P.M.****AUTHORS PRESENT FOR DISCUSSION AND QUESTIONS****Poster 2-1****EMOTION-RELATED WORKING MEMORY DISRUPTION AND REAL-WORLD FUNCTIONING IN PSYCHOTIC DISORDERS**

Amri Sabharwal, Prerona Mukherjee, Akos Szekely, Roman Kotov, & Aprajita Mohanty
Stony Brook University

Descriptors: psychosis, working memory, emotion

Deficits in working memory (WM) and emotional processing are prominent impairments in schizophrenia, and their biological correlates have been recommended as viable candidates for biomarker development by the cognitive neuroscience treatment research to improve cognition in schizophrenia (CNTRICS) initiative. However, it is unclear whether these deficits and imaging biomarkers are 1) specific to schizophrenia or present generally in psychosis, and 2) predict real-world functioning. In the present study, behavioral and functional magnetic resonance (fMRI) data were recorded while patients with schizophrenia (N = 19), other psychoses (N = 28), and controls (N = 29) performed a modified n-back task, with threatening and neutral distractors. Results indicate that, behaviorally, emotion-related WM deficits are 1) not specific to schizophrenia but worse when compared to other psychoses, and 2) associated with symptoms dimensions and severity, as well as real-world functioning in psychotic disorders. Neurally, increased fear vs. neutral activation in the DLPFC, VLPFC, and amygdala was found to be associated with greater symptoms severity and worse functional outcomes across diagnoses, suggesting continuity along symptoms instead of specificity with respect to diagnostic group. Present findings highlight the value of imaging biomarkers in informing clinical applications in psychotic disorders.

Poster 2-2**HOW DOES PRE-STIMULUS THREAT INFORMATION ENHANCE PERCEPTION? AN MVPA STUDY**

Tamara J Sussman, Jingwen Jin, Akos Szekely, & Aprajita Mohanty
Stony Brook University

Descriptors: threat, perception, multivariate pattern analysis

Threatening stimuli exist in a complex visual environment and require fast, adaptive responses. The perception of threat has been largely studied as a bottom-up phenomenon; however, implicit or explicit cues often suggest when we will encounter threat. According to the predictive coding hypothesis, the brain anticipates forthcoming stimuli, generating a template against which observed sensory evidence is matched. We test the hypothesis that the expectation of an emotional stimulus (looking for a specific stimulus type), rather than a physical encounter with it, is a key factor in improved threat detection. After viewing fear and neutral cues, participants detected perceptually degraded fearful faces and neutral faces presented at pre-determined ideographic thresholds in a two-alternative forced-choice perceptual discrimination task. Measures of behavior and brain activity (fMRI) were recorded. Fear cues enhanced perceptual sensitivity (d-prime; $t = 2.10, p = .05$) and speed ($t = 5.80, p < .001$). Multivariate pattern analysis of fMRI data show pre- and post-stimulus representations of fearful faces are more positively correlated than pre- and post-stimulus representations of neutral faces in both the amygdala ($t = 6.07, p < .001$) and fusiform face area ($t = 7.69, p < .001$), suggesting that pre-stimulus perceptual templates for threatening stimuli are more effective than those for neutral stimuli. These findings establish the importance of endogenous factors in the perceptual prioritization of threat, and support predictive coding theory.

Poster 2-3**EXPERIMENTAL MODULATION OF HYPERACTIVE PERFORMANCE MONITORING IN OBSESSIVE-COMPULSIVE DISORDER**Julia Klawohn¹, Anja Riesel¹, Julia Preuss¹, Tanja Endrass², & Norbert Kathmann¹¹Humboldt-University Berlin, ²Otto-von-Guericke-University Magdeburg*Descriptors: error monitoring, obsessive-compulsive disorder, error-related negativity*

Performance monitoring has robustly been shown to be hyperactive in patients with obsessive-compulsive disorder (OCD), as indexed by an enhancement of the error-related negativity (ERN) in the event-related brain potential (ERP). Evidence suggests that this hyperactivity is a generic risk indicator for OCD independent of current symptom state. It is unclear, however, whether hyperactive error signals can be experimentally reduced in patients with OCD. As an initial approach, we explored whether ERN amplitudes could be reduced in OCD patients by manipulating attentional demands and monitoring capacity. Twenty-two OCD patients and healthy control participants performed a dual-task paradigm, combining a response conflict flanker task and a working memory n-back task. ERP results showed significant decrease of ERN amplitudes under dual task conditions in both groups, resulting in a normalization of ERN amplitudes in OCD patients. This indicates, that hyperactive error monitoring in OCD is an effortful process that depends on availability of cognitive resources and attention allocation. This originated another line of research, investigating whether attentional bias modification training (ABMT) might as well attenuate ERN amplitudes even more persistently beyond task demands. First results indicate that ERN amplitudes are reduced in healthy participants after single-session ABMT. Relation of this intervention to trait and state measures of anxiety and implications for clinical application will be discussed.

Poster 2-4**HYPERACTIVE ATTENTIONAL DEPLOYMENT UNDER UNCERTAINTY IN OBSESSIVE-COMPULSIVE DISORDER (OCD): EVIDENCE FROM TEMPOROSPATIAL PCA**Raoul Dieterich¹, Tanja Endrass², & Norbert Kathmann¹¹Humboldt-University Berlin, ²Otto-von-Guericke-University Magdeburg*Descriptors: uncertainty, obsessive-compulsive disorder, attention*

Uncertainty about potential threat induces negative biases and increased attentional allocation in healthy subjects, indicating enhanced motivational significance. Patients with obsessive-compulsive disorder (OCD) clinically present with abnormally high levels of uncertainty, a state which is evaluated negatively and not well tolerated. To examine cognitive consequences of uncertainty, the current study analyzed attentional processing in OCD under uncertainty. Twenty-four OCD patients and 24 healthy controls performed a task where neutral and aversive pictures were preceded by a cue, either being predictive (certain condition) or non-predictive (uncertain condition) of subsequent picture valence. We obtained subjective estimates of aversive picture frequency under uncertainty and examined attentional allocation by decomposing the picture-locked event-related potential with temporospatial principal component analysis (PCA). PCA identified factors sensitive to uncertainty as well as valence modulations that were partially independent. A frontocentral P3-like factor showed stronger uncertainty-related increases in amplitude for patients. Patients overestimated the frequency of aversive pictures after uncertain cues, retrospectively. Increased frontocentral P3 in combination with overestimation of threat might indicate that uncertainty holds prominent motivational significance and induces hyperactive attentional allocation in OCD. Additionally, our results show that uncertainty- and valence-related increases in attention may be driven by partially distinct neural systems.

Poster 2-5**DIMORPHIC SEX DIFFERENCES IN CONFLICT MONITORING AND THE FLEXIBLE MODULATION OF COGNITIVE CONTROL IN YOUNG CHILDREN: AN ERP INVESTIGATION**Eric S Drollette¹, Lauren B Raine¹, Mark R Scudder¹, Matthew B Pontifex², Robert D Moore¹, Shih-Chun Kao¹, Dominika M Pindus¹, Naiman A Khan¹, Arthur F Kramer¹, & Charles H Hillman¹¹University of Illinois at Urbana-Champaign, ²Michigan State University*Descriptors: gender, development, error-related negativity*

With the growing interest encompassing dimorphic sex differences across various cognitive domains in adult populations, further understanding of such differences in developing populations is of increasing importance. The aim of the present investigation was to examine sex differences in the flexible modulation of cognitive control in 215 preadolescent children (age range = 8–10 years, 105 females). Event-related brain potentials (ERPs) were collected while participants performed compatible and incompatible stimulus-response conditions of a modified flanker task. Although behavior results in the compatible condition revealed no sex differences, the findings for incompatible behavior revealed that females, compared to males, had longer reaction time (RT), lower accuracy (selective for incongruent trial types), longer post-error RT, lower post-error accuracy, increased rate of omission errors, and increased omission error runs (2 or more errors in a sequence). In addition, ERP analyses revealed larger ERN and Pe amplitude for males compared to females regardless of compatibility. Together, these findings suggest unique sex differences in behavioral and ERP indices of cognitive control such that males and females engage in differential cognitive control strategies in response to changes in stimulus-response mapping in order to optimize behavior.

Poster 2-6**THE INFLUENCE OF SOCIOECONOMIC FACTORS ON NEUROELECTRIC, COGNITIVE, AND ACADEMIC ACHIEVEMENT IN PREADOLESCENT CHILDREN**Mark R Scudder¹, Eric S Drollette¹, Lauren B Raine¹, Matt B Pontifex², R. Davis Moore³, Shih-Chun Kao¹, Naiman A Khan¹, Arthur F Kramer¹, & Charles H Hillman¹¹University of Illinois at Urbana-Champaign, ²Michigan State University, ³Université de Montréal*Descriptors: educational attainment, event-related potentials, flanker*

A child's environment and experiences are critical for aspects of brain health and development. Research has demonstrated that socioeconomic disparities are associated with poor cognitive and brain health in adults. Gaining a greater understanding of this relationship in developing populations is of increasing importance as it may afford interventions early in the lifespan. The aim of the present investigation was to examine the relation of parental socioeconomic factors (i.e., educational attainment) with event-related brain potentials (ERPs), cognitive control performance, and academic achievement in 303 children (age range = 8–10 years, 149 females). ERPs were collected while participants performed a modified flanker task. Cross-sectional regression analyses demonstrated a relation between higher maternal education level and larger incongruent P3 amplitude, higher incongruent accuracy, and higher achievement scores (in reading, spelling, and math). Interestingly, these relations remained while controlling for other influential socioeconomic and demographic factors including household income, age, cardiorespiratory fitness, and body mass index. Together, these findings add to the growing literature demonstrating that environmental factors may influence brain function and cognitive development during preadolescence. Thus, by continuing to elucidate these associations, future efforts may be better able to orchestrate and implement interventions aimed at reducing such disparities and facilitate overall brain health and scholastic achievement in younger generations.

Poster 2-7**SECOND LANGUAGE LEARNING AND MUSICAL ABILITY:
AN ERP STUDY**

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University of Pittsburgh

Descriptors: musical ability, second language learning, grammaticality judgments

Individual differences such as working memory and musical ability are associated with L2 learning (e.g., Slevc & Miyake, 2006). We explored the extent to which musical ability/experience and L1-L2 similarity related to L2 learning using event-related brain potentials (ERPs). Sessions 1 and 2 included L2 grammar and vocabulary training, Sessions 2 and 3 included grammaticality assessments with ERP recording. Goldsmith's Musical Sophistication Index (a measure of subjective musical ability on which higher scores suggest higher musical sophistication) correlated positively with grammaticality judgment test performance. ERP data revealed that scores on the Musical Ear Test (MET) for Melody (a test in which participants judged whether or not two similar melodies were the same or different) were related to a reversed N400 ERP component, but only in the first post-test. The N400 is implicated in the processing of meaning, with greater mean amplitudes suggesting greater difficulty with processing and more interference from L1 (Kutas & Federmeier, 2011). These data suggest that, initially, individuals who are more musically talented melodically have an advantage in L2 learning. Finally, there is a large early difference between individuals as a function of MET-Melody scores. Individuals with higher MET-Melody scores show a more positive going waveform peaking at 100 ms, suggesting that individuals who are more musically talented process stimuli differently than individuals who are not musically talented, perhaps indicating an attempt to convert visual stimuli into sounds.

Poster 2-8**DIRECTIONAL CONNECTIVITY OF HEMISPHERIC
RAPID FUNCTIONAL IMAGING IN EMOTIONAL
PERCEPTION**

David W Frank, Keng C Moua, & Dean Sabatinelli
University of Georgia

Descriptors: emotion, connectivity, perception

Rapid functional imaging and directional connectivity analyses support a model of emotional scene perception in which amygdala and fusiform gyrus initiate the initial discrimination of arousing from neutral content and foster emotionally-enhanced activity in occipital and dorsal frontoparietal cortex. However, past image collection protocols did not allow for connectivity analyses between ventral prefrontal cortex and amygdala. Here we collect averaged in-out spiral functional images over 6 sagittal slices every 500 ms during two 48-trial pleasant, neutral, and unpleasant natural scene presentations, balanced for luminosity and complexity, thus providing simultaneous rapid sampling of amygdala and ventral prefrontal cortex in each hemisphere. If the human amygdala and fusiform gyrus function in concert with ventral prefrontal cortex in the discrimination of emotional from neutral scenes, we expect to find the timing of enhanced blood oxygen level dependent (BOLD) signal change to be coincident across these structures. Moreover we would expect significant bidirectional causal connectivity to be demonstrable in the rapid BOLD time series. Initial statistical analyses of 12 participants yield reliably enhanced BOLD signal during emotional, relative to neutral scene perception in fusiform gyrus, amygdala, and ventral prefrontal cortex. The timing and directional connectivity of BOLD signal time series in these structures will be assessed in the final sample.

Poster 2-9**STIMULUS PROBABILITY EFFECTS IN
EMOTIONAL SCENE PERCEPTION**

Timothy J Wanger, Keng C Moua, & Dean Sabatinelli
University of Georgia

Descriptors: event-related potentials, emotional perception

Psychophysiological studies of emotional perception often use stimulus sets containing a greater proportion of emotionally arousing, relative to non-arousing stimuli. There is evidence suggesting that participants may learn to anticipate

more common stimuli, perhaps biasing reactivity at presentation. Here we manipulate emotional and neutral stimulus set proportions across two studies to investigate the potential role of emotional stimulus probability. In study 1, a gender-balanced group of 72 participants viewed a set of 168 scenes including an equal number of emotional and neutral stimuli. In study 2, a gender-balanced group of 52 participants viewed a set of 126 scenes including twice as many emotional relative to neutral stimuli. Recordings of the picture-onset evoked potential, heart rate, and skin conductance were collected, as well as self-reported stimulus ratings. Analyses of the onset-evoked potential did not yield a significant interaction with emotional stimulus probability across studies 1 and 2. Comparisons across blocks between balanced and biased stimulus sets in evoked potential and peripheral measures will be examined across gender in the final sample. The impact of subject learning and expectation effects on physiological reactivity during emotional perception will be discussed.

Poster 2-10**RACING MINDS, RACING HEARTS: THE INTERACTION OF
STATE AND TRAIT ANXIETY ON RESPIRATORY SINUS
ARRHYTHMIA (RSA)**

Samantha J Reznik, Laura Zambrano-Vazquez, Michael Medrano, & John
JB Allen
University of Arizona

Descriptors: respiratory sinus arrhythmia, worry, state anxiety, trait anxiety

Respiratory Sinus Arrhythmia (RSA) is a measure of cardiac vagal control that has been linked to emotion regulation and positive coping with stressful life events (Horsten et. al, 1999; Porges, 2007). Lower RSA has been associated with anxiety disorders (Licht, de Geus, van Dyck, & Pennix, 2009) as well as state and trait anxiety (Hofmann, Moscovitch, Litz, Kim, Davis, & Pizzagalli, 2005; Watkins, Grossman, Krishnan, Sherwood, 1998). The impact of the relationship between trait and state worry on RSA, however, has yet to be investigated. The aim of the present study was to examine the interaction of state and trait anxiety as a predictor of RSA both at rest and during a worry induction. RSA data were collected from 72 participants at rest and during a worry induction; self-reported state worry was assessed before and after ten minutes of worrying. Larger increases in state worry from pre to post worry manipulation were significantly associated with lower RSA. Additionally, there was a significant interaction of trait and change in state worry. For low trait worriers, there is a larger increase in state worry associated with lower RSA level, whereas for high worriers larger increases in state worry are associated with higher RSA level. Results identified an expected concordance between RSA and state emotion in response to worry among individuals with low trait worry, and suggest the possibility that individuals who experience high chronic worry may have dysregulated correspondence between autonomic physiology and subjective experience.

Poster 2-11**NEUROPSYCHOPHYSIOLOGICAL MAPPING FOLLOWING SLEEP RESTRICTION AND EXTENSION: A 7T fMRI AND PERIPHERAL PSYCHOPHYSIOLOGY STUDY**

Jennifer L Robinson¹, Jerry E Murphy¹, Ashley C Hill¹, Lauren AJ Kirby¹, Anna Kirkland¹, Cade Loftin¹, Alan Macy², Ken Graap², Stephen Erath¹, & Mona El-Sheikh¹

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Descriptors: sleep, fMRI, adolescents

Sleep deprivation has been demonstrated to have a tremendous impact on peripheral and central nervous system function. However, our understanding of this interaction has been severely limited because of the lack of concomitant collection of peripheral physiological measures during functional magnetic resonance imaging (fMRI). Here, we present initial attempts at multichannel psychophysiological data collection during submillimeter 7T fMRI during cognitive performance following sleep restriction and extension. Data were acquired in fifteen adolescents using BIOPAC MRI-compatible modules, leads, and electrodes. Electrocardiograph (ECG), respiration, and electrodermal activity (EDA) were collected during simultaneous high-resolution fMRI. Respiration, EDA, and basic cardiovascular measures were derived after signal processing to remove scanning artifacts. EDA and respiration signals were reliably extracted and minimally affected by the simultaneous acquisition. ECG signals were more vulnerable to scanning parameters, and thus more difficult to extract. Data reveal neuropsychophysiological correlates of peripheral autonomic signals, dependent on the context (sleep restriction versus sleep extension). We successfully collected submillimeter fMRI and multichannel psychophysiological data in an ultra-high field MR environment in adolescents under two conditions. Such data collection may allow for investigations that better characterize the neural and physiological processes underlying psychological constructs.

This project was supported by the Internal Grant Program at Auburn University.

Poster 2-12**THE RELATIONSHIP BETWEEN TRAIT EMOTION REGULATION AND STIMULUS CUE AMBIGUITY REFLECTED THROUGH THE EMOTION MODULATED STARTLE**

Andrew D Wiese¹, Jessica L Hamilton², Bryan D Fox¹, Tamera B Murdock¹, & Diane L Filion¹

¹University of Missouri-Kansas City, ²University of Kansas Medical Center

Descriptors: emotion regulation, startle, habituation

This study examines the effect of trait reappraisal and trait suppression on the emotional modulation of startle (EMS) assessed in a protocol in which emotional pictures were preceded by a cue that was either informative or uninformative as to each upcoming picture's valence. Participants (N = 47) were divided into four groups based on scores on the Emotion Regulation Questionnaire: (high-reappraisal/high-suppression, high-reappraisal/low-suppression, low-reappraisal/high-suppression, and low-reappraisal/low-suppression). We then investigated group differences in the extent to which startle potentiation during negative picture viewing varied as a function of cue condition. Paired samples t-tests revealed that the groups did not differ in EMS for initial picture presentations for either cue condition. For the negative pictures preceded by informative cues, all groups but one exhibited a significant habituation from the first to last trials, all $t(12) > 2.4$, $p < .05$, with the exception being the high-reappraisal/low-suppression group, which showed no change in EMS across trials. For the negative pictures preceded by uninformative cues, the low-reappraisal/high-suppression group was the only group that showed any significant change in EMS across trials, showing a significant increase in EMS amplitude from the first trials to the last. These results suggest that different emotion regulation tendencies, as measured by the ERQ, are associated with significant differences in the ability to use informational cues about impending emotional stimuli to facilitate emotion regulation.

Poster 2-13**ATTENTION TO STIMULUS CUE MODERATES THE EFFECT OF VALENCE ON HABITUATION OF THE STARTLE EYEBLINK RESPONSE IN AN AFFECTIVE PICTURE PARADIGM**

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Descriptors: affect, habituation, attention

Acoustic startle stimuli were presented to participants (N = 48) during blocks of affective picture viewing. A cue informing the participant of the upcoming picture's valence preceded the picture in half of the trials, the other cue type was uninformative. Modulated startle eyeblink scores (SEM) compared response magnitudes across trials to baseline startle responses. As expected, SEM by picture valence revealed significant differences, with negative images producing a greater change in blink magnitude over baseline: $t(47) = -3.41$, $p = .001$. Examination of each trial block revealed that this significant difference diminished over the course of the study, as did overall SEM for each condition within all trial blocks. SEM change scores, grouped by picture valence, indicated that these habituation rates were not related [$r(46) = -.02$, ns], and were significantly different: $t(47) = -2.06$, $p = .05$. Regression analyses examining this differential habituation, showed that for trials without an attentional cue, only trial block and picture valence predicted SEM: $F(2,189) = 5.96$, $p = .003$; $R = .24$, $R\text{-sq} = .06$. For trials in which an attentional cue preceded picture viewing, the effect was stronger [$F(3,188) = 9.92$, $p < .001$; $R = .34$, $R\text{-sq} = .11$], and the interaction between trial block and picture valence was significant: $t(188) = -2.22$, $p = .03$. Taken together, these findings suggest that differential habituation to the startle stimulus due to valence is enhanced by cueing attention toward that valence. Personality correlates and implications for these findings in emotion regulation research will be discussed.

Poster 2-14**INFLUENCE OF PERCEIVED CARDIAC RISK AND INFORMATION VALENCE ON AROUSAL AND INFORMATION PROCESSING IN OLDER ADULTS**

Mark W Poirier¹, Joan M McDowd¹, Susan Kemper², William G Murphy¹, Cassandra L Marshall¹, & Diane Filion¹

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Descriptors: aging, health literacy

Lower levels of health literacy among older adults are related to negative health outcomes and significant health care costs. A number of factors affect health literacy besides health-related knowledge, including behaviors such as information seeking, and person variables such as self-efficacy, motivation, risk perception, emotional response to risk, and locus of control. The present study examined the impact of a cardiac risk assessment along with positive and negative health information on physiological arousal and health information processing in a reading task. Following a cardiac risk assessment, community-dwelling older adults read a brochure that describes heart medications, medication side effects, and lifestyle changes for heart health. Brochure text was categorized as neutral or threatening, and eye movements were tracked and physiological arousal (SCR, pulse rate) was measured while reading to assess processing differences as a function of information valence. Preliminary findings indicate that autonomic arousal was greater to negative than to neutral information. Eye-tracking data also indicated that participants had longer first fixation durations to the negative than to the neutral information. Relationships between this heightened response to threat and locus of control, performance-based health literacy assessments, and health anxiety will also be discussed.

Poster 2-15**DIFFERENCES BETWEEN SUBJECTIVE AND PHYSIOLOGICAL AFFECTIVE RESPONSES: DO COPING STRATEGIES INFLUENCE HOW WE RESPOND TO EMOTION?**

Chrysanthi Leonidou, Michaela Paraskeva-Siamata, Klavdia Neophytou, Marios Theodorou, Dora Georgiou, & Georgia Panayiotou
University of Cyprus

Descriptors: coping style, arousal, emotional imagery

Subjective and physiological responses to emotion sometimes show a decoupling, even among typical populations. This study aims to investigate this dissociation between emotion response systems and its relation to dispositional coping styles (assessed by the Brief-COPE). Autonomic responses (heart rate reactivity (HR) and skin conductance response (SCR)) were assessed during a tone-cued emotional imagery experiment while 85 community participants (47 females; 18–67 years old) had to imagine for 8-second periods normative scenarios describing joy, fear, sadness and relaxation. Scenarios elicited the expected subjective and physiological arousal, with fear, sadness and joy scenarios linked to increased HR compared to the more neutral relaxation scenarios; whereas there were no differences in SCR. A difference index between the centered mean scores of self-reported arousal minus physiological arousal (HR) indicated overall greater subjective than physiological arousal. Additional analyses were conducted on a sub-sample of 20 participants who took the Brief-COPE. More subjective than physiological arousal was significantly predicted by the increased use of planning, a problem-focused coping strategy, while it was also predicted by the decreased use of denial, an emotion-focused strategy. Findings provide preliminary evidence about the utilization of coping strategies as a way to regulate emotion elicited by mental imagery. Different coping styles seem to be reflected by the opposite direction of this dissociation in emotional experience.

Poster 2-16**LOW FEAR STARTLE POTENTIATION PREDICTS HARMFUL ALCOHOL USE IN A COMMUNITY SAMPLE**

Dora Georgiou, Christiana Theodorou, Elena Charalambous, Maria Koushiou, Elena Constantinou, Marios Theodorou, & Georgia Panayiotou
University of Cyprus

Descriptors: alcohol use, fear reactivity, startle

Recent research conceptualizes alcohol use as bidirectionally associated with the same spectrum of fearfulness, on the one hand, and fearlessness, on the other. This study, conducted in Cyprus, measures negative affect, including fearfulness and sadness, on indices of startle amplitude, potentiation and latency, as well as heart rate and skin conductance to Fear, Sadness, Relaxation and Joy conditions during a tone-cued imagery task (N = 70, 55.7% Female, Mage = 29), in order to examine the relationship between physiological fear reactivity, subjective fear ratings, alcohol use, Big Five personality dimensions and anxiety symptoms. The NEO-FFI and Psychiatric Disorders Screening Questionnaire were administered to assess the five personality factors and anxiety symptoms, respectively. The Alcohol Use Disorders Identification Test was used to measure alcohol use. Results indicate that of the indices of negative affect, only Fear startle potentiation consistently predicts alcohol use, in a negative direction ($b = -.22$, $p = .037$) so that, less startle potentiation predicts greater alcohol use. Discussion focuses on characteristics of negative affectivity in relation to alcohol use, and potential explanations of this association.

Poster 2-17**INTER-DEPENDENT EFFECTS OF BIS AND BAS: PSYCHOPHYSIOLOGICAL AND SELF-REPORT ASSESSMENT**

Thekla Constantinou, Marios Theodorou, Dora Georgiou, & Georgia Panayiotou
University of Cyprus

Descriptors: behavioral inhibition, behavioral activation

Reinforcement Sensitivity Theory (Gray, 1970, 1982) has altered the conceptualization of BIS/BAS systems. The present study focuses on the Joint Subsystem Hypothesis (JSH) and the idea that BIS and BAS jointly influence behavior and emotions under certain situations (Corr, 2002) and attempted to replicate prior

evidence of physiological reactivity during an emotion-eliciting task. Sixty-seven individuals participated in the experiment (59.7% females), completing a tone-cued emotional imagery task during which they imagined 4 types of scripts: fearful, sad, joyful and relaxing. During this procedure physiological measurements (Heart Rate/HR, Skin Conductance Response/SCR and facial EMG at the corrugator and zygomatic muscles) were collected during 8 sec imagery periods and relaxing ITIs. Participants completed the Greek version of the Sensitivity to Reward (SR) and Sensitivity to Punishment (SP) Questionnaire/SPSRQ (Torrubia, Avila, Molto, & Caseras, 2001; Panayiotou & Theodorou, 2013). Multiple regression models examined the relationship between SP/SR and the physiological indices in the four types of scripts. Results showed that higher SR predicted elevated HR levels during joyful scripts with this relationship depending on the levels of SP. A similar relationship with SR predicting the corrugator responses was revealed during sad scripts. Results may support previous findings of the JSH. The potential role of interaction between BIS/BAS on behavior and emotional responses is discussed.

Poster 2-18**PRE-EJECTION PERIOD REACTIVITY TO REWARD PREDICTS ANHEDONIA SYMPTOMS AMONG YOUNG ADOLESCENTS**

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Descriptors: pre-ejection period, anhedonia, reward

Anhedonia is a hallmark sign of depression and is marked by reduced pleasure, motivation, and reward sensitivity. Pre-ejection period (PEP) reactivity is a cardiac measure of sympathetic nervous system arousal and under specific stimulus conditions can index reward/approach motivation. Individuals who endorse greater levels of anhedonia may show disturbances in peripheral physiological sensitivity/arousal to situations of reward. This study examined PEP reactivity to a reward task and its association with anhedonia and depressive symptoms in a community sample of young adolescents (N = 58; 50% female; mean age = 13.24). Participants completed measures of puberty, stress exposure, and depressive symptoms. PEP reactivity was assessed in response to a modified delayed-matching-to-sample task (Richter & Gendolla, 2009) in which adolescents were able to earn \$10 dollars. Analyses were conducted using linear regression in SPSS 22.0. Anhedonia symptoms were assessed using items consistent with the construct (Wetter & Hankin, 2009) from the Child Depression Inventory-II (CDI-II; Kovacs, 2010). The remaining depressive symptoms from the CDI-II, age, sex, puberty, stress exposure, and PEP baseline were controlled for. Results indicated that diminished PEP reactivity to reward predicted concurrent anhedonia symptoms ($B = .21$, $p = .048$). In contrast, PEP reactivity did not predict global depressive symptoms ($B = .01$, $p = .94$). These results suggest that PEP reactivity to reward may be a useful physiological measure specific to the anhedonic symptoms of depression in early adolescents.

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Poster 2-19

PREDICTING POSTTRAUMATIC STRESS DISORDER SYMPTOMS DURING ADOLESCENCE: A LONGITUDINAL STUDY OF THE ROLE OF HYPOTHALAMIC-PITUITARY-ADRENAL (HPA) AXIS DYSFUNCTION

Keke Liu¹, Camilo Ruggero¹, Greg Perlman², Daniel Klein², Brandon Goldstein², & Roman Kotov²

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Descriptors: cortisol awakening response, PTSD, adolescents

Dysfunction of the HPA axis has long been implicated in posttraumatic stress disorder (PTSD) both cross-sectionally and longitudinally. However, most of this work has been done with adult samples. We are aware of no prospective longitudinal studies in adolescent samples that have considered whether differences in HPA-axis functioning, as indexed by individual differences in cortisol awakening response (CAR), predict the onset of PTSD symptoms. The present study (part of a larger, ongoing 3 year study of adolescent health) prospectively examined CAR in a large community-recruited sample of adolescent females (N = 550) prior to the occurrence of stressful life events (baseline). Nine months later, participants were interviewed about intervening stressful life events and completed PTSD symptoms assessment. Initial results indicated a significant association between adolescents' age and CAR before the stressful life events. However, after controlling for baseline PTSD symptoms, CAR per se was not significantly associated with PTSD symptoms nine months later, controlled for baseline PTSD symptoms. This finding is consistent with previous observations in adult samples. Subsequent analyses will assess whether CAR interacted with stressful life events to predict symptoms. Discussion focuses on the different roles HPA-axis may play with respect to PTSD.

Poster 2-20

MOTOR POTENTIAL IS MODULATED BY PERCEIVED CORRECTNESS IN A TARGET FORCE PRODUCTION TASK

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Descriptors: performance monitoring, motor potential, target-force production

We investigated the performance monitoring associated with correct responses in a target-force production task. Initially, participants (N = 20) performed simple key presses with their preferred force level but with time-to-peak force ranging from 50 to 200 ms (2 blocks of 32 trials). Mean force value was used to determine each individual's target range for the target force production task (correct range: $\pm 12.5\%$ of mean force value). Participants were then required to exert their target force (M = 13.6 N) in reaction to the imperative stimulus (10 blocks of 32 trials). Before visual-feedback presentation, participants verbally reported their perceived performance outcome (undershoot/correct/overshoot) and confidence (not sure/somewhat sure/sure). Mean correct rate through 10 blocks was 56% whereas mean precision of perceived correctness was 67%. We compared the motor potentials (MPs) elicited by the force exertion between perceived correct trials with higher confidence and lower confidence. The MP peaking about 120 ms after EMG onset showed a contralateral preponderance of negativity to responding hand (the right index finger) over frontocentral regions. The MP was significantly larger when participants perceived correct-exertion with higher than with lower confidence. The present results suggest that the MP might represent the performance monitoring associated with confident perception of the exerted force.

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Poster 2-21

EFFECTS OF SIMULTANEOUS EXERCISE AND ENCODING ON BRAIN ACTIVITY DURING MEMORY RETRIEVAL

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Descriptors: acute exercise, memory, encode

Recent research has indicated that a single bout of exercise can improve memory performance. However, empirical evidence is scarce on how simultaneous exer-

cise and encoding affect memory function. This experiment examined the effect of simultaneous exercise and encoding on memory retrieval processes using a within-participants design. In the encoding block, young adult participants encoded 160 pictures either during cycling exercise or seated rest (counterbalanced). After a 5-minute break, participants were shown 240 pictures (160 old, 80 new) and asked whether each picture was present during the encoding block. We compared memory performance and event-related potentials (ERP) between the exercise and rest conditions. Analyses revealed no significant differences in memory performance between the exercise and rest conditions. ERP results (mean amplitude from 500–1600 ms post stimulus) indicated a significant interaction among condition, response and region such that successful retrieval (i.e., hit) elicited more positive waveforms compared to miss over frontal regions for the exercise condition, whereas no such difference was observed for the rest condition. It has been reported that the positive waveform during this time window is associated with retrieval monitoring or decision processes, which are largely mediated by the prefrontal cortex (PFC). Thus, this study suggests that simultaneous exercise and encoding might result in an increased PFC activation during memory retrieval.

This study was supported by a Grant-in-Aid for Scientific Research (C)24530925 from the Japan Society for the Promotion of Science.

Poster 2-22

AN EVENT-RELATED POTENTIAL STUDY OF IMPLICIT LEARNING USING THE MONTY HALL DILEMMA TASK

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Descriptors: Monty Hall Dilemma, stimulus-preceding negativity

The Monty Hall Dilemma (MHD) is a counterintuitive probabilistic problem. In the MHD task, a participant must choose one of three options where only one contains a reward. After the initial selection, one of the unchosen options, always a no reward option is disclosed to the participant. Then, the participant is asked to make a final decision; either change to the other option or stick with their first choice. Although the probability of winning if they change is higher (2/3) compared to sticking with their first choice (1/3), most people stick with their original selection and often lose. Research has shown that repetitive exposure to the MHD task increases the percentage of trials where the participant changes to the other option without any obvious understanding of the mathematical reasons why changing increases their chance of being rewarded. This suggests that participants learn the advantageous choice without understanding the mechanism. We investigated if participants learn to change their selection while recording EEG to examine the stimulus-preceding negativity (SPN), which reflects motivational and informative value of feedback. Because feedback becomes less informative with learning, we hypothesized that the SPN amplitude would decrease over time. As hypothesized, later in the task participants changed their selection more often, and the SPN amplitude decreased over the right frontal region. Also, the SPN amplitude was larger for change than for stick trials. These results indicate that the SPN may reflect anticipation associated with implicit learning.

This study was supported by a Grant-in-Aid for Scientific Research (C)24530925 from the Japan Society for the Promotion of Science.

Poster 2-23**AUTONOMIC AND NEURAL MECHANISMS SUPPORTING INHIBITORY CONTROL IN A STOP-SIGNAL TASK**

Christina M Karns, Ryan J Giuliano, Eric Pakulak, Theodore Bell, Seth Petersen, Elizabeth Skowron, & Helen J Neville
University of Oregon

Descriptors: event-related potentials, inhibitory control, autonomic

Stress regulation involves the dynamic interaction between the heart and brain in response to changing environmental demands (Thayer & Lane, 2009), but little is known about how this is associated with cognition. Based on previous evidence (El-Sheikh, 2009), we posited that parasympathetic nervous system (PNS) activation and sympathetic nervous system (SNS) inhibition would be associated with better performance and neural markers of attention to cues for inhibitory control. As proxies of the PNS and SNS systems respectively, we assessed respiratory sinus arrhythmia (RSA) and pre-ejection period (PEP) in adults during an event-related potential (ERP) paradigm measuring inhibitory control (stop-signal task; Berkman et al. 2014) following a baseline recording of RSA/PEP. In this pilot study we found that reduced baseline SNS activation (i.e., longer PEP) was associated with better inhibitory control as indexed by shorter intervals between cue and stop-signal in an adaptive task, highlighting the interplay of SNS arousal at baseline and subsequent performance ($R(11) = -.69, p = .02$), but no relationship with PNS. Preliminary results suggest that reduced sympathetic nervous system activation during the task is associated with greater attention-related differentiation between successful and unsuccessful stop-signal ERPs at early stages of processing (<100 ms, $p < .05$; 150 – 200 ms, $p < .1$). Together, these results suggest that SNS arousal may relate to poorer inhibitory control and reduced attention-related neural reactivity to cues intended to elicit inhibitory control.

Poster 2-24**INTERACTION BETWEEN NEURAL MECHANISMS OF SELECTIVE ATTENTION AND A BEHAVIORAL MEASURE OF INHIBITORY CONTROL IN PRESCHOOL CHILDREN**

Eric Pakulak, Keira Leneman, Christina Karns, Ryan Giuliano, Theodore Bell, Seth Petersen, & Helen Neville
University of Oregon

Descriptors: event-related potentials, selective attention

Self-regulation is a key aspect of cognition that predicts academic and health outcomes (Moffitt et al., 2011) and that is vulnerable to adversity (Hackman et al., 2010; Noble, McCandliss, & Farah, 2007; Stevens, Lauinger, & Neville, 2009). Here we elucidate the interplay between two critical components of this construct, selective attention and executive function (EF; Blair and Raver, 2012), by employing a widely studied event-related potential (ERP) measure of attention and a behavioral measure of inhibitory control. In a sample of 3–5 year-old children, ERP data were acquired during an auditory selective attention task (Sanders, Stevens, Coch, & Neville, 2006) and behavioral measures of inhibitory control were acquired via a Snack Delay task (Kochanska et al., 1996). Results showed that children with a greater neural response to attended compared to unattended stimuli during the attention task were better able to inhibit movements while delaying gratification during the Snack Delay task, ($r(12) = -.63, p = .028$). These results provide a more precise and multimodal understanding of the interaction between selective attention and EF at a key point in the development of an aspect of cognition vulnerable to adversity. Such an understanding has important implications for the development and refinement of interventions with the potential to ameliorate the effects of adversity on self-regulation.

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Poster 2-25**THE SEQUENCE MATTERS – BLINK STARTLE POTENTIATION REVERSES DURING BACKWARD FEAR CONDITIONING**

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Curtin University

Descriptors: backward conditioning, startle, fear

Blink startle potentiation is traditionally considered a measure of fear learning, being larger during a conditional stimulus (CS+) which predicts an aversive

unconditional stimulus (US), compared to a conditional stimulus (CS-) presented alone. Startle potentiation is also larger during a CS+ which predicts a non-aversive US, making it unclear whether it reflects on emotional or anticipatory processes. We aimed to separate these processes by assessing blink startle potentiation and rated conditional stimulus valence during forward (CS+ precedes the US) and backward conditioning (US precedes the CS+). Emotional processes are not dependent on the sequence of stimulus presentation, but as anticipatory processes are, startle potentiation during backward conditioning cannot reflect anticipation. Startle potentiation was larger during CS+ throughout forward conditioning, but smaller during CS+ throughout backward conditioning. As reduced startle potentiation is typically indicative of positive emotion, this reversed pattern of responding during backward conditioning could indicate that the CS+ became pleasant, as it acted as a safety signal indicating the US was over. During both forward and backward conditioning, the CS+ was rated as less pleasant than the CS-, suggesting a possible dissociation between startle modulation and conditional stimulus valence ratings.

This work was supported by grant numbers DP120100750 and SR120300015 from the Australian Research Council.

Poster 2-26**EVENT-RELATED POTENTIAL (ERP) INDICES OF CONTROL-DRIVEN CONGRUENCY SEQUENCE EFFECTS**

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Descriptors: cognitive control, conflict adaptation, congruency sequence effect

The congruency effect (i.e., longer response times [RTs] and increased errors on incongruent relative to congruent trials) in Stroop-like tasks is often smaller after incongruent than after congruent trials. This congruency sequence effect (CSE) - also known as conflict adaptation - is typically attributed to control processes that minimize distraction after incongruent trials. However, the CSE is often confounded with repetition priming, feature integration, and/or contingency learning processes. We, therefore, combined a Stroop-like task that lacks these confounds with ERPs to identify, for the first time, the neural time course of purely "control-driven" CSEs. ERPs were acquired while 56 healthy participants (29 female) performed a Stroop-like task in which the distracter preceded the target. Consistent with recent behavioral findings from this task, we observed strong CSEs. Further, in line with previous ERP studies of confounded tasks, we observed both a CSE and a congruency effect in the parietal conflict slow potential (conflict SP), which also exhibited more positive amplitude on congruent-incongruent (cI) trials than on incongruent-incongruent (iI) trials. Unlike prior ERP studies, we also observed a CSE (without a corresponding congruency effect) in the fronto-medial N450. These findings reveal a novel relationship between N450 amplitude and control processes that minimize distraction. They also provide a novel task protocol that future ERP researchers can employ to investigate "control-driven" CSEs.

Poster 2-27**EMOTION SUPPRESSION MODERATES THE QUADRATIC ASSOCIATION BETWEEN RSA AND EXECUTIVE FUNCTION**

Derek P Spangler, Martha Ann Bell, Kirby Deater-Deckard, & Bruce H Friedman

Virginia Polytechnic Institute and State University

Descriptors: respiratory sinus arrhythmia, emotion, performance

Respiratory sinus arrhythmia (RSA) is an index of emotion regulation that has been positively associated with executive function (EF) (Thayer et al., 2009). Other studies have shown that emotion regulation, as reflected by RSA, uses limited executive resources and thus worsens EF (Pu et al., 2010). Both negative and positive EF-RSA relations may exist in a quadratic association; i.e. higher RSA may predict better EF up to a point, after which higher RSA predicts relatively worse EF. The aims of the present study were to identify a quadratic relation between EF and RSA, and to investigate whether this trend was moderated by individual differences in emotion regulation. To address these aims, 151 women self-reported reappraisal and suppression on the Emotion Regulation Questionnaire. After a two-minute resting baseline, subjects completed EF tasks (Stroop, Tower of Hanoi, Backward Digit Span, Wisconsin Card Sorting Test) while ECG was measured. Multiple regression was used to examine quadratic by linear interactions between RSA and emotion regulation. As anticipated, there was a significant interaction between suppression and the quadratic term for resting RSA, $\beta = -.499$, $p < .001$. Simple slope analysis indicated that resting RSA was quadratically related to EF for high suppression, $\beta = -.311$, $p = .005$, but not for low suppression. Similar interactions were not found for task RSA or reappraisal. These results suggest that relatively high resting RSA may predict poor EF ability when emotion regulation consumes executive resources needed for cognition (Ortner et al., 2013).

This research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development grants HD57319 and HD60110.

Poster 2-28**ATYPICAL PRE-EJECTION PERIOD RESPONSES IN GENERALIZED ANXIETY DISORDER**Emma E Condy, Derek P Spangler, & Bruce H Friedman
Virginia Polytechnic Institute and State University*Descriptors: anxiety, pre-ejection period*

Generalized anxiety disorder (GAD) is characterized by excessive and persistent worry, causing difficulties in multiple domains of functioning. People with GAD have shown different autonomic profiles at baseline compared to controls, such as elevated pre-ejection period (PEP); however, few studies have examined differences in PEP during a stressor and recovery. Due to the persistent nature of GAD, it was expected that physiological recovery from stress might be impaired in this disorder. Electrocardiography (ECG) and impedance cardiography (ICG) were measured in each subject during three 3-minute epochs: baseline, task (speech preparation, a common lab stressor), and recovery. Subjects also completed a general health history form which included an item asking whether they had a GAD diagnosis. PEP was derived from ECG and ICG signals for each epoch. A MANOVA indicated PEP differences across epochs ($p = 0.011$) between subjects with GAD ($n = 5$) and those without ($n = 79$), such that the GAD group showed aberrant progressive lengthening in PEP from baseline to task to recovery. Univariate ANOVAs for each epoch revealed a trend toward a between-group difference in PEP during the task ($p = 0.06$) and a between-group difference in PEP during recovery ($p < 0.01$). By examining PEP changes across baseline, task, and recovery in individuals with and without GAD, a more specific physiological endophenotype may be identified. Incorporating other autonomic measures, such as HRV, may further elucidate differential autonomic patterning associated with the disorder.

Poster 2-29**CONTROLLING FOR CAFFEINE IN CARDIOVASCULAR REACTIVITY RESEARCH: HEART RATE AND BLOOD PRESSURE RESPONSES FOLLOWING A SIX HOUR ABSTENTION**Shara S Grant¹, Bruce F Friedman¹, Jared J McGinley¹, Emma Condy¹, Xiao E Yang¹, Madeline E Banister¹, Justin White², & Kye Y Kim³
¹Virginia Polytechnic Institute and State University, ²Carilion Clinic, ³Carilion School of Medicine, Virginia Polytechnic Institute and State University*Descriptors: caffeine, methodology*

Caffeine, the world's most widely used drug, exerts effects on cardiovascular reactivity (CVR). CVR research requires control of caffeine's acute intake and withdrawal effects, yet there exists wide variability in such control across studies. The aim of this study was to identify a minimal abstinence time in regular coffee drinkers whereby CVR is unconfounded by caffeine; Six hours was hypothesized (average half-life of caffeine). Ten subjects (mean age = 21.1) completed a repeated measures study involving a series of tasks (cold pressor and a Sternberg memory task), ingestion of caffeinated coffee (230 mg caffeine) on one day and decaffeinated coffee (5 mg) on a second day. Heart rate (HR) and systolic/diastolic blood pressure (SBP, DBP) was acquired during baseline, task, and recovery epochs prior to coffee intake, 30 minutes-, and six hours post-intake. A 4-factor (coffee type, epoch, time after intake, task) repeated measures MANOVA revealed a marginally significant effect of caffeine ($ps < .10$) and a significant effect of tasks ($ps < .05$) on SBP and HR. Significant interactions for HR were time \times epoch, coffee type \times time, and task \times time \times epoch ($ps < .05$). HR reactivity was greater on the caffeine day ($p < .05$). Pairwise comparisons revealed a significant difference in SBP and HR on the caffeine day between times 1 and 2, and 2 and 3 ($ps < .05$) but no significant difference between times 1 and 3. These results support time-based effects of caffeine on CVR and suggest the adequacy of a 6-hour abstinence in controlling for caffeine-elicited changes in BP and HR.

Poster 2-30**IMPAIRED NOVELTY DETECTION IN SCHIZOPHRENIA**Sarah M Haigh, Brian A Coffman, Timothy K Murphy, Christiana D Butera, & Dean F Salisbury
University of Pittsburgh*Descriptors: schizophrenia, novelty detection, complex pattern*

The neural mechanisms that generate mismatch negativity (MMN) are debated, yet MMN is being assessed as a possible biomarker for schizophrenia (SZ). In SZ, MMN is smaller to stimulus deviants that differ in simple physical characteristics such as pitch or intensity. This suggests that primary auditory cortex is affected in SZ, but it is unclear whether it reflects deficits in stimulus adaptation, novelty detection, or both. MMN is also elicited by complex-pattern deviants, a finding that cannot be due to non-adapted cells. We measured MMN to complex-pattern deviants to assess novelty detection MMN in SZ and healthy controls (HC). Eight tones differing in 0.5 kHz steps were used in a standard zigzag ascending pitch pattern (1, 2, 1.5, 2.5, 2, 3, 2.5, 3.5 kHz tones), with two final tone deviants: 2.5 kHz (repeat), or 4 kHz (jump). Subjects watched a silent video, and were presented with 80% standard patterns, 10% repeat- and 10% jump-deviants. HC ($N = 23$) produced a late MMN-like negativity (400–500 ms after stimulus-onset) that was significantly larger than patients with chronic SZ ($N = 23$) to both the repeat ($p = .038$) and jump-deviant ($p = .014$). The topography and source of the activity was consistent with a typical MMN response. The MMN from a complex deviant cannot be argued to be due to adaptation because there was no repeated single tone to drive adaptation, and the MMN was too late to be contaminated by a larger N1 response to novelty. Patients with schizophrenia did not produce a late-MMN to the repeat- or the jump-deviant suggesting deficits in novelty detection.

NIH MH094328.

Poster 2-31**INTACT AUDITORY REPETITION SUPPRESSION IN SCHIZOPHRENIA?**

Christian Andreaggi, Brian A Coffman, Sarah M Haigh, Tim K Murphy, Kayla L Ward, & Dean F Salisbury
University of Pittsburgh

Descriptors: auditory repetition suppression, schizophrenia, electroencephalography

Schizophrenia is associated with smaller auditory evoked potentials, reduced detection of auditory novelty (smaller mismatch negativity), and less sensory-gating (reduced P50 suppression). Here we examined repetition suppression, the reduction of sensory responses with repeated presentations, in schizophrenia. Auditory activity was recorded from 15 chronic schizophrenics and 24 matched healthy controls. Participants heard groups of 5 repeating tones played at the same pitch, intensity and duration (1 kHz, 75 dB, 50 ms). Tones were separated by 330 ms with an inter-trial interval of 800 ms. Deviant groups of 6 repeating tones were also presented, but only the responses to standard groups will be discussed here. Tones were presented while the participants watched a silent movie. For the first tone alone, N1 and P2 were not different between groups ($p > 0.1$). For repeated tones, N1 was reduced by repetition ($p = 0.06$), but this effect did not differ between groups ($p > 0.1$). N1 suppression was immediate; only tone 1 differed from the other tones ($p = 0.05-0.08$). P2 showed linear decreases with repetition ($p < 0.001$), which, again, did not differ between groups ($p > 0.1$). These data suggest that local inhibition of sensory responses may be intact in schizophrenia, and does not contribute to other deficits in early auditory processing.

NIH MH094328 (PI: Dean Salisbury, PhD).

Poster 2-32**REDUCED N2PC DURING ATTENTION SELECTION IN FIRST EPISODE PSYCHOSIS**

Cyrus Basseri, Brian A Coffman, Sarah M Haigh, Tim K Murphy, Kayla L Ward, & Dean F Salisbury
University of Pittsburgh

Descriptors: N2pc, psychosis, attention selection

The N2pc is an event-related potential that reflects attention to a target during visual search, appearing over lateral visual cortex contralateral to the attended visual field. Schizophrenia involves deficits in selective attention. Here we examined N2pc amplitude during covert visual search in first episode psychosis patients vs. healthy controls to assess neurophysiological signs of selective attention early in disease course. Seven psychiatrically healthy and eight first episode psychosis participants performed an attention selection task during concurrent EEG/MEG. Subjects initially fixated a central cross (500 ms), then were presented a central colored circle cue (200 ms). After a short delay (500 ms), subjects continued to fixate a central cross as an array of six different colored annuli (attention set) were presented peripherally. Each stimulus subtended 0.65° visual angle, and was presented 1.5° from fixation. Subjects were instructed to covertly attend the location of the target color annulus. After 500 ms, each annulus opened on the right or left side, and subjects responded with a button press to the target side (left or right). The N2pc was measured as the difference between contralateral and ipsilateral electrodes over lateral visual cortex (PO7 and PO8) within 230–280 ms after onset of the attention set. The N2pc was marginally smaller in first episode psychosis patients than in healthy controls ($p = 0.057$). N2pc deficits in first episode psychosis suggest attention may be unable to modulate sensory processing adequately even early during the disease process.

NIMH P50 MH103204 (Dean F. Salisbury project Co-PI).

Poster 2-33**THE IMPACT OF ALCOHOL EXPOSURE ON FRONTAL BETA EEG: A MONOZYGOTIC CO-TWIN CONTROL INVESTIGATION**

Scott J Burwell, Stephen M Malone, & William G Iacono
University of Minnesota

Descriptors: alcoholism, beta, electroencephalography

Alcoholism and related psychopathology have been linked to elevated power in beta range frequencies (13–30 Hz) of the resting-state electroencephalogram (EEG). Still, it is not clear to what extent such effects are due to familial risk for

alcoholism or alcohol exposure (AE) itself. We used a monozygotic co-twin control (CTC) design, which allows one to estimate effects of cumulative AE that are unconfounded by all shared genetic and environmental factors that might predispose one to use in the first place. Resting-state EEGs were collected from 51 monozygotic twin pairs (mean age = 24.5) and spatially filtered with independent components analysis to isolate frontal cortical EEG from which we extracted log absolute beta power. A measure of cumulative AE was computed from self-report of lifetime alcohol use incorporating drinking frequency, quantity, density (maximum drinks consumed within 24 hours), and misuse and contrasted with EEG power using linear mixed model regressions to account for twin resemblance. Consistent with prior studies, AE was positively associated with frontal beta power ($p < .05$). Subsequent CTC analyses indicated that frontal beta power was elevated as a function of within-pair differences in AE ($p < .05$) rather than between-pair differences, such that within a given pair, the twin with higher levels of AE had greater beta power. These findings suggest that elevated frontal beta power may be in part caused by prior AE.

DA036216.

Poster 2-34**DOES THE POST-AURICULAR REFLEX HABITUATE AT ALL? AN INVESTIGATION ON THE FASTEST EXTEROCEPTIVE REFLEX**

Amy L Underwood¹, Fernando Valle-Inclán², & Steven A Hackley¹
¹University of Missouri-Columbia, ²University of La Coruña

Descriptors: habituation, postauricular reflex, startle

Some studies of the post-auricular reflex (PAR) have involved thousands of acoustic probes per experimental session. Stable responses are reliably obtained throughout experiment entirety, which begs the question, "Does the PAR habituate at all?" Habituation is important because it is one of the most elementary forms of neuroplasticity. To address this issue, we re-analyzed the results of a prepulse inhibition study, focusing on the no-prepulse control trials. Each of these trials comprised a train of six white-noise bursts (30 ms, 105 dB SPL, 170 ms ISI). Thirty young adults received 200 such trains during the experiment. Short-term ("refractory-like") habituation was evaluated in terms of changes in reflex amplitude across the six presentations of the startle probe within each trial. As in previous studies at this lab, the decline in amplitude was non-monotonic, in that amplitude of the second response was smaller than that of both the first and third. Such a pattern could be caused by the summed effects of sensitization and habituation, as the Groves and Thompson (1970) dual-process theory would predict. Long-term habituation was evaluated by comparing the first and last 10% of experimental trials. Average PAR amplitudes in the last 10% of the experiment were slightly lower than in the first 10%. The PAR has a short onset latency (~10 ms), and its rodent homolog is known to be mediated by an oligosynaptic reflex arc. This may explain the PAR's resistance to habituation.

Poster 2-35**ISOLATING REINFORCEMENT LEARNING EFFECTS ON THE STIMULUS-PRECEDING NEGATIVITY**

Xi Ren¹, Fernando Valle-Inclán², Sergii Tukaiev³, & Steven A Hackley¹
¹University of Missouri-Columbia, ²University of La Coruña, ³University of Kiev

Descriptors: stimulus preceding negativity, reinforcement learning, memory
 Both declarative (hippocampal) and procedural (striatal) memory systems contribute to motor skill learning. A recent study of the Feedback Negativity (FN) suggested that the striatal system contributes little to reinforcement learning if a substantial delay (6 s) intervenes between action and outcome (Weinberg, Luhmann, Bress & Hajcak, 2012, *Cognitive, Affective, & Behavioral Neuroscience*, 12, 671–677). We tested whether similar feedback-delay effects might be observed for the Stimulus-Preceding Negativity (SPN), an event-related potential that reflects reward-expectancy during reinforcement learning. On each trial, 60 young adult subjects were required to make four precisely timed key-press responses with a designated hand. Instructions for this timing were indicated by a pattern composed by four dots and lines shown on the computer screen. After a brief (2.5 s) or long (8 s) delay, feedback was given. The temporal pattern and delay were constant within blocks of 30 trials. Congruent with the FN results of Weinberg et al. (2012), SPN amplitudes were smaller during long pre-feedback delays, and varied little as a function of learning. When a long, empty interval intervenes between action and outcome, the striatal memory system may be unable to bridge the gap. Our participants were nonetheless able to learn key-press patterns during long-delay blocks. This may have involved the hippocampus-based memory system, in a manner analogous to trace conditioning.

Poster 2-36**BRAIN REGIONS WITH BLOOD FLOW ACTIVATIONS DURING A WORKING MEMORY TASK: COMMON AND SPECIFIC REGIONS FOR TASK PERFORMANCE AND BLOOD PRESSURE REACTIVITY**

J. Richard Jennings, Alicia Heim, Lei Sheu, & Peter G Gianaros
 University of Pittsburgh

Descriptors: working memory, cerebral blood flow, blood pressure reactivity
 Engagement with a cognitive task activates a network of brain regions that together generate processes that, e.g., motivate performance, determine accuracy of performance, and coordinate autonomic support. Certain regions may be integral to more than one aspect of task engagement while others may be relatively specific to a single aspect of task engagement. We examined such common and differential activation with 207 middle-aged participants, 115 female, performing a working memory task (2-back). Statistical parametric mapping (SPM) software was applied to brain images derived from pseudo-continuous arterial spin label (pCASL) magnetic resonance imaging. Overall task images at a .001 threshold were applied as inclusive and exclusive masks to images derived by regressing performance and systolic blood pressure reactivity upon the memory contrast. Primary areas common to overall task engagement and reactivity were in parietal, cerebellar, and premotor areas; a primary somatosensory area was specific to blood pressure reactivity. Primary areas shown as common to performance level and overall task engagement were prefrontal, parietal, and mid temporal cortex; specific areas were similar but more punctate. Substantial commonality between overall task engagement and autonomic control and performance areas was evident with heightened performance specifically associated with a broader range of areas than the specific somatosensory area related to blood pressure reactivity.

We acknowledge the support of NHLBI grant HL101959.

Poster 2-37**GOALS MAKE REWARDS SWEETER: THE REWARD POSITIVITY IN APPROACH-MOTIVATED STATES**

Hunter Threadgill, Kaci B Davis, Mary M Titus, & Philip A Gable
 University of Alabama

Descriptors: reward positivity, approach motivation, performance monitoring
 Past research has shown that the reward positivity (RewP) is a neural indicator of reward processing responsive to positive outcomes. Presumably, this neural com-

ponent reflects a performance monitoring system where feedback indicating a reward produces a larger RewP than non-reward (neutral) or negative feedback. However, past studies have not investigated whether individuals' motivational states prior to feedback influences the RewP. If the RewP reflects an active performance monitoring system to motivated goal pursuit, then the RewP should be larger to goal-related reward feedback than reward feedback unrelated to a goal. Specifically, approach-motivated pre-goal states should enhance the RewP to reward feedback relative to reward feedback occurring in a neutral state. Using a monetary incentive delay paradigm, participants received reward or no-reward feedback after responding to a reaction time task in an approach-motivated or neutral state. Results revealed that reward feedback in an approach-motivated pre-goal state evoked a larger RewP than no-reward feedback in an approach-motivated or neutral state. Furthermore, reward feedback in an approach-motivated pre-goal state evoked a larger RewP than reward feedback in a neutral state. These results suggest that reward feedback is enhanced in approach-motivated states compared to neutral states. Goal striving appears to enhance performance monitoring of reward feedback. Accordingly, the RewP seems to reflect an active performance monitoring system sensitive to approach motivation during goal pursuit.

Poster 2-38**MANIPULATED ATTENTIONAL FOCUS ALTERS PHYSIOLOGICAL RESPONSES TO ALCOHOL CUES**

Nicole C Mechin, Allison F Bouslog, & Philip A Gable
 University of Alabama

Descriptors: attentional scope, alcohol myopia, N1
 Past work has demonstrated that alcohol cues cause a narrowing of attentional scope called "virtual myopia". This work suggests a strong relationship between alcohol cues and attentional narrowing. The current study sought to investigate whether this relationship was bi-directional. That is, we investigated whether a manipulated narrowing (vs. broadening) of attentional scope would increase appetitive attentional processing of alcohol cues as measured by early neural processing. A narrowed (broadened) attentional scope was manipulated by having participants identify the local (global) elements of hierarchical stimuli. Then, participants viewed pictures of alcohol and neutral objects. As compared to a broadened attentional scope, a narrowed attentional scope caused larger N1 amplitudes to alcohol pictures. In contrast, N1 amplitudes to neutral pictures did not differ between conditions. This study suggests that a narrowed attentional scope enhances motivated attentional processing for alcohol cues, as early as 100ms after cue presentation. The influence of narrowed attentional scope appears to be bi-directional; such that, viewing alcohol cues causes greater attentional narrowing, and attentional narrowing causes greater motivated processing of alcohol cues.

Poster 2-39**EEG-SOURCE COHERENCE ANALYSIS OF CUED ANTICIPATORY ATTENTION IN VISUAL AND AUDITORY VERSIONS OF THE TEMPORAL ORDER JUDGMENT TASK**Ilya V Talalay¹, Andrey V Kurgansky², & Regina I Machinskaya²¹Moscow State Linguistic University, ²Institute of Developmental Physiology, Russian Academy of Education*Descriptors: anticipatory attention, sensory task, EEG-source alpha coherence*

Preparation for the processing of forthcoming information plays a major role in human cognition. This makes it highly relevant to study brain mechanisms of cued anticipatory attention. We assume that alpha oscillations mediate the prestimulus coupling of cortical areas thus making them prepared for target stimulus processing. In the present study, EEG-source coherence analysis was applied to assess a cue-related shift in cortical functional connectivity. Healthy right-handers aged 23 ± 5.7 years ($N = 20$) performed visual and auditory versions of the temporal order judgment task. HD EEG was recorded during periods of sustained attention (before cueing) and modality-specific anticipatory prestimulus attention (after cueing). Alpha coherence (COH) was computed for pairs of 12 ROI's taken from 6 symmetrical cortical areas (V1, A1, LPFC, FEF, LIP, IPC). It was shown that comparing to sustained attention, COH significantly increased during anticipatory attention for the long-range fronto-parietal and fronto-occipital links. Modality-related COH changes were observed for the short-range cortical connections in occipito-parietal links (for both modalities) and in temporo-parietal and temporo-frontal connections (for auditory modality). These results suggest that the alpha oscillatory system is involved in modulation of both fronto-parietal attention network and cortical sensory processing areas.

The study was supported by Russian Science Foundation (Project No. 14-18-03737).

Poster 2-40**WEAK RESPONSE INHIBITION AND THE BRAIN: VALIDATING A SCALE MEASURE OF TRAIT DISINHIBITION IN A LARGE NEUROIMAGING DATA SET**Christopher J Patrick¹, Jens Foell¹, Angela Heinrich², Darrell A Worthy³, William G Iacono⁴, & Herta Flor²¹Florida State University, ²CIMH-Mannheim, ³Texas A&M University, ⁴University of Minnesota*Descriptors: neuroimaging, externalizing, disinhibition*

The IMAGEN project is a multi-national consortium that has collected behavioral, self-report, neuroimaging, and genetic data on more than 2,000 teenagers in Germany, France, and the UK. The primary project focus is on brain and genetic factors that affect impulsivity and emotional reactivity as related to clinical problems over the lifespan (Schumann et al., 2010). We used data from this large-N project to construct and validate an item-based scale measure of trait disinhibition (cf. Patrick et al., 2013), for use in ongoing research with this data set and as a basis for linking to other data sets. A construct-based scale development approach (e.g., Drislane et al., 2015) was applied to item data from questionnaire-trait and interview-diagnostic domains, and the resultant scale measure of disinhibition was validated in relation to (a) behavioral performance on cognitive-executive tasks, and (b) brain activation in inhibitory control tasks as assessed by functional MRI. Results of this work shed light on a complex biobehavioral network that underlies individual differences in inhibitory control capacity and affiliated proneness to externalizing psychopathology. Along with presenting key findings, we discuss statistical strategies pertaining to the analysis of data from this extraordinary large multi-site, multi-domain data set.

Poster 2-41**REDUCED HIPPOCAMPAL GRAY MATTER VOLUME AS AN INDICATOR OF TRAIT DISINHIBITION**Jens Foell, James R Yancey, Isabella M Palumbo, & Christopher J Patrick
Florida State University*Descriptors: gray matter volume, disinhibition, hippocampus*

Trait disinhibition describes a heritable tendency toward impulse control problems (Yancey et al., 2013) that relates to differing externalizing disorders including antisocial personality and substance use. It has been shown that subjects at high risk for alcohol dependence exhibit reduced gray matter volume in certain

subcortical regions, including the hippocampus (Benegal et al., 2006). The current study examined whether reduced hippocampal volume relates to substance abuse more broadly, and whether trait disinhibition might mediate this association. Voxel-based morphometry was applied to structural MRI data from 44 twin subjects assessed for substance use history and trait disinhibition. Analyses revealed that hippocampal gray matter volume (GMV) was negatively correlated at a trend-level with substance use severity, and to a significant level with disinhibition—whether assessed via self-report, or via report+physiology (cf. Patrick et al., 2013). Further, a mediation analysis demonstrated that trait disinhibition fully accounted for the trend-level association of substance use with hippocampal GMV. These results suggest that decreased hippocampal GMV may represent a neuro-structural indicator of high trait disinhibition and affiliated externalizing conditions.

Poster 2-42**SOCIAL ANXIOUSNESS, TRAIT FEAR, AND AMYGDALA VOLUME**Olivia K Tumulty, Jens Foell, James R Yancey, & Christopher J Patrick
Florida State University*Descriptors: brain volume, amygdala, fear*

Differential amygdala volume has been reported in socially anxious individuals compared to controls, but the direction of the difference has varied—i.e., increased in some studies (Machado-de-Sousa et al., 2014), reduced in others (Irlé et al., 2010). The current study re-examined this issue in a mixed-gender adult sample, with the following innovations: (1) subjects were Mz twins (22 pairs), allowing for etiologic inferences; (2) social anxiety was assessed through both interview and self-report; and (3) subjects were also assessed for general fear/fearlessness, using self-report and report+physiology (cf. Patrick et al., 2013). Voxel-based morphometry was used to quantify gray matter volume (GMV) in brain regions including the amygdala. Right and left amygdala GMV correlated negatively with (a) a composite of clinical symptoms (social phobia, avoidant personality) plus scale-assessed social anxiety, and (b) trait fear level—whether assessed via report alone, or report+physiology. A mediation analysis revealed that trait fear accounted for the social anxiety/amygdala association. Further, twin concordance results indicated some heritable basis to relations among social anxiety, trait fear, and amygdala volume. Findings suggest that social anxiety reflecting high dispositional fear is associated with reduced volume of the subcortical amygdala, and that this association is partly constitutional. Keywords: brain volume, amygdala, fear

Poster 2-43**PREPARING FOR CONFLICT DURING DISTRACTION: AN ERP STUDY**Caitlin M Girouard, Evan G Ames, & Aminda J O'Hare
University of Massachusetts Dartmouth*Descriptors: flanker, emotion, cognition*

Preparation for conflict in the flanker task is possible if congruency cues precede stimulus presentation. How distraction between the cue and stimulus stages influences conflict processing is unknown. In this study, participants ($n = 30$) completed a cued flanker task with emotional and non-emotional distraction or no distraction while electroencephalogram (EEG) was recorded. When no distraction was present, a main effect of congruency for the N2 event-related potential (ERP) was found (congruent trials < incongruent trials, $p = .05$). When distraction was present, two interactions for the N2 were found: cue type X trial congruency, such that incongruent trials following informative cues evoked larger responses than congruent trials, $p < .05$, and incongruent trials following uninformative cues, $p < .01$; and emotional content of the distraction X trial congruency, such that incongruent trials evoked larger responses following negative distractions compared to congruent trials following negative distraction, $p < .05$, or incongruent trials following non-emotional distraction, $p = .07$. Interestingly, an inverse relationship for cue type was found for the cue-locked N2 response, such that informative cues for incongruent trials evoked smaller responses than informative cues for congruent trials, $p < .01$, and uninformative cues, $p < .01$. These data suggest that more neural resources are engaged while preparing for non-conflict or unknown conflict trials at the cue stage, while more resources are engaged while processing conflict during the response stage.

Poster 2-44**MINDFULNESS TRAINING AND THE EMOTIONAL COLOR-WORD FLANKER TASK: AN ERP STUDY**

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University of Massachusetts Dartmouth

Descriptors: mindfulness meditation, emotion, cognition

Neuroimaging research on the effects of mindfulness meditation (MM) has evidenced structural changes in the brain following short (8-week) and long (10-year) experiences with MM practice. These structural changes suggest that MM impacts both emotional and cognitive processing; however, the specific mechanisms that are affected by these changes are only beginning to be understood. Participants for this study were one of three groups: an 8-week MM training group (n = 18), an 8-week deep reading active-control group (n = 19), or a non-active control group (n = 14). All participants completed pre- and post-training lab sessions. In each session the emotional color-word flanker task was completed, as well as self-report measures of anxiety and depression, while high-density electroencephalography (EEG) was recorded. There was no effect of training group on behavioral performance. A significant group-by-time-by-congruency interaction was found for the P1 event-related potential (ERP), $p < .05$, suggesting that early stimulus-driven attentional processing was impacted by the different training groups. Further, the MM training group reported a significant reduction in anxious apprehension in the post-training measures, $p < .001$. The deep reading and non-active control groups did not report any significant changes in individual difference variables. Our data suggests that self-perception and allocation of neural resources may be impacted earlier in MM training than more top-down, controlled attentional processes that may have a more significant impact on behavior.

Poster 2-45**HOW MANY BLINKS DO YOU NEED FOR AN INTERNALLY CONSISTENT STARTLE RESPONSE?**

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University of Illinois at Chicago

Descriptors: startle, defensive responding

Heightened defensive responding to threat has been identified as a potential risk marker for the development of anxiety disorders, and is commonly indexed by electromyography (EMG) of the eyeblink startle response. EMG recordings of startle responses are frequently contaminated by movement artifact, spontaneous/voluntary blinks, or habituation. This can result in the need to exclude multiple startle responses from analyses, raising the question of how many startle responses are necessary to obtain an internally consistent index of an individual's defensive responding to threat. Participants (n = 242) completed a threat of shock task that assesses defensive responding to both unpredictable and predictable threats. Eight acoustic startle probes were presented during each NPU condition. Preliminary analyses indicate that defensive responding exhibits strong internal consistency (Cronbach's alphas $> .80$) across all conditions, at just three blinks per condition. At eight blinks per condition, Cronbach's alphas were above .92. Additional analyses will be conducted to examine whether consistency varies by diagnosis or which blinks were selected (e.g., first blinks or randomly selected blinks). Results indicated that an internally consistent measure of defensive responding to threat can be obtained with as few as three valid startle responses. Thus, having to reject even a majority of startle responses elicited during a within-subjects threat task may not warrant exclusion of that participant from analyses.

Poster 2-46**EMPATHY AND ERROR MONITORING IN SCHOOL-AGE CHILDREN: AN ELECTROPHYSIOLOGICAL STUDY**

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¹Michigan State University, ²University of Louisville

Descriptors: empathy, error-related negativity, development

Empathy, or the capacity to understand the emotional experiences of others, is crucial for normative social development. Numerous studies have found that increases in empathy are associated with enhanced amplitude of the error-related negativity (ERN), an event-related potential (ERP) associated with cognitive con-

trol. However, the developmental origin of this relationship is unclear, as no studies have evaluated how empathy and error monitoring are related among children. The current study aimed to fill this gap. Error-related ERPs were elicited using a developmentally appropriate go/no-go task in 23 school-aged children (12 female, 11 male, M age = 8.33 years, SD = 0.73, range = 7.04-9.69). Individual differences in empathy were assessed using Bryant's Empathy Index (Bryant, 1982), a well-validated measure for children in this age range. Consistent with the previous studies in adults, empathy was associated with increased ERN amplitude ($r = -.60$, $p = .002$) and reduced amplitude of the error positivity (Pe), a later component of error processing associated with attention ($r = -.45$, $p = .03$). These findings suggest relations between empathy and cognitive control emerge relatively early in development, and that empathy may be linked with processes related to attentional resources during this period.

National Science Foundation Graduate Research Fellowship Program (HSS) and Fuller Theological Seminary/Thrive Center in concert with the John Templeton Foundation (JHD and JSM).

Poster 2-47**VARIANCE OF ELECTROCORTICAL ACTIVITY IN EMOTION REGULATION RESEARCH: USING "NEUTRAL" STIMULI WITH AND WITHOUT PEOPLE**

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Descriptors: emotion regulation, neutral stimuli, event-related potentials

As research on emotion regulation increasingly incorporates event-related potentials (ERPs), a common practice in the two areas warrants further investigation. Stimulus sets often include, but differentiate between, emotional and neutral stimuli. Specifically, neutral images are often treated as a baseline; in ERP research, these "neutral baseline" image activations are frequently subtracted from emotional image activations to create difference wave scores. However, neutral images including human faces have been shown to significantly and uniquely impact ERP activity, thereby confounding the baseline. Extant literature has shown that threatening images and neutral images may elicit comparable ERP response. Healthy undergraduates (n = 25) passively viewed emotional images and neutral images (with and without faces) while the electroencephalogram (EEG) was recorded. Stimulus-locked ERPs were extracted from the raw EEG data. Responses to Positive Affect, a self-report measure of trait PER was used to examine how the degree of PER may impact late positive potential (LPP; 400ms-1000ms post-stimulus onset) responding. For people high on trait PER (but not low on trait PER), ERP activation to neutral images with faces was significantly different from activation to neutral images without faces. These results suggest that PER may differentially modulate ERP response to neutral images with and without faces, thus allowing for a more fine-grained interpretation of ERP results. Modulation of neutral images by negative emotion regulation is also under investigation in this sample.

Emmanuel Garcia and Laura Fonseca are funded by the NIH MBRS-RISE Program at Hunter College Grant# GM060665.

Poster 2-48**THE RELATIONSHIP BETWEEN ADOLESCENTS' ACADEMIC-RELATED HOPELESSNESS AND BLOOD PRESSURE**

Liu Yangyang
Nanjing University

Descriptors: blood pressure, academic-related hopelessness, adolescents

In previous research, little research has examined the relationship between students' academic-related emotions and their physiological outcomes. Therefore, the present study aimed to examine the relationship between students' academic-related hopelessness and their blood pressure. In a sample of 358 Chinese high school students, we measured their academic-related hopelessness in the subjects of Chinese, mathematics and English. In addition, we collected their blood pressure. The results revealed that students' academic-related hopelessness positively predicted their systolic blood pressure and diastolic blood pressure, when controlling their body mass index. Our findings suggested that students' academic-related hopelessness could contribute to their blood pressure.

National Natural Science Fund of China (31301027).

Poster 2-49**THE NEURAL CORRELATES OF AFFECTIVE STARTLE MODULATION - RESULTS FROM PARALLEL EMG-fMRI**

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Descriptors: startle, combined EMG-fMRI, fMRI

The startle reflex is a widely used measure of affective states in both rodents and humans. Administration of a brief burst of white noise ("startle probe") elicits a defensive reflex cascade, which can be measured in humans by facial electromyography (EMG) of the orbicularis oculi muscle as a blink reflex. Thereby, response magnitude is modulated by the affective state which manifests as response inhibition in positive and a potentiation in negative states. This presents a great advantage of the startle reflex compared to the commonly measured skin conductance response (SCR), as the startle reflex dissociates between affective state valences whereas SCR, as a measure of arousal, does not. The neural pathway of affective startle modulation which has been extensively delineated in rodents, critically involves the nucleus reticularis pontis caudalis and the amygdala. In humans, similar work has been hampered by technical restrictions on parallel EMG-fMRI acquisition. We fill this gap by providing a proof of concept for the feasibility of simultaneously acquired facial EMG and fMRI in 31 healthy male volunteers showing a dissociation between positive and negative valences in facial EMG and standard SCR. In addition, we investigated the neural pathway underlying affective startle modulation in humans using high-resolution brain stem/amygdala fMRI in combination with parallel facial EMG recordings in order to establish whether the same neural network underlies this effect in both rodents and humans.

This work was supported by the German research association (Collaborative research center "Fear, Anxiety, Anxiety disorders" SFB/TRR 58)

Poster 2-50**SCRIPT-DRIVEN IMAGERY AS A TRANSDIAGNOSTIC APPROACH TO INVESTIGATING EMOTIONAL REACTIVITY**

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Descriptors: imagery, anxiety and depressive disorders, emotional reactivity
 Consistent with the aims of the Research Domain Criteria (RDoC) project McTeague and Lang (2012) assessed psychophysiological reactivity to fear cues over the whole spectrum of anxiety disorder patients using a script-driven imagery paradigm. Following up on this work we investigated emotional reactivity in patients with principal anxiety disorder and in extension of previous studies with principal depressive disorder. Beyond the original paradigm participants were instructed to read out loud the first part of the presented script prior imagining to ensure an active processing and to impede avoidance strategies. During script processing and imagery of personal unpleasant and pleasant, as well as standard unpleasant, pleasant, and neutral scenes, startle responses and autonomic measures were assessed. Imagery after the described brief speaking period resulted in a clear emotional modulation of psychophysiological responses. Compared to neutral scenes startle responses and autonomic arousal were more pronounced during imagery of personal and most standard scenes of both valence, unpleasant and pleasant. Our data clearly confirm and extend previous findings of an increased psychophysiological reactivity to emotionally relevant imagery. Patients showed typical patterns of emotional modulation after active processing of personal and standard scenes with unpleasant and even pleasant contents.

Funding provided by the German Research Foundation (DFG; HA 1593/18-1).

Poster 2-51**ELECTROPHYSIOLOGICAL CORRELATES OF EMOTION PROCESSING AND MEMORY IN BREAST CANCER SURVIVORS**

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Descriptors: emotion, memory, event-related potentials

Chemotherapy and endocrine therapy of breast cancer is accompanied by side effects, including a decline of cognitive functions. However, empirical findings of impairments in cognitive functioning and the underlying neuronal mechanisms in breast cancer survivors (BCS) are inconsistent so far. Here, we examined emotion processing and long-term memory in BCS using event-related potentials. Moreover, neuropsychological functioning and hair cortisol were assessed. Twenty female BCS and 31 healthy matched controls viewed a series of 90 pictures (30 unpleasant, 30 neutral, 30 pleasant) and recognition memory was tested one week later. BCS were characterized by higher hair cortisol levels and impairments in verbal memory testing. During encoding, no group differences were observed between BCS and controls in emotional processing in the EPN (250–320 ms) and LPP (400–800 ms). However, BCS compared to controls showed decreased LPPs in response to unpleasant scenes after 800 ms post-stimulus. At test, hit rates did not differ between groups, but BCS showed impaired memory accuracy for emotional scenes. In ERPs, memory for emotional pictures was associated with a centro-parietal (500–800ms) ERP old/new difference. Interestingly, BCS showed significantly smaller ERP old/new differences for unpleasant pictures over frontal sensors (800–1200 ms). Taken together, the results indicate reduced processing of unpleasant information that may lead to memory impairments in BCS.

Poster 2-52**SELF-DISTANCING IS ADAPTIVE WHEN ANALYZING, BUT NOT SIMPLY RECALLING, NEGATIVE AUTOBIOGRAPHICAL EXPERIENCES: A COMBINED SELF-REPORT AND NEUROPHYSIOLOGICAL INVESTIGATION**

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¹Michigan State University, ²University of Michigan

Descriptors: self-distancing, late positive potential, anxiety

There is disagreement in the literature regarding the effects of self-distancing on emotional experiences. The current study aimed to investigate the possibility that the adaptiveness of self-distancing depends on context; self-distancing while recalling a negative past event may be less adaptive than self-distancing while deeply analyzing the emotions surrounding it. To test this possibility, we conducted a multi-method study in which 26 participants were instructed to recall and then analyze several negative autobiographical memories. Self-distancing was measured by way of self-report and the LPP during both recall and analyze phases. We examined associations between these indices of self-distancing and measures of anxiety symptoms and perceptions of ability to handle negative situations in the future to probe the adaptiveness of distancing during recall versus distancing during analyze. As predicted, results revealed that both self-reported and ERP-measured distancing during the analyze phase were associated with greater perceived ability to handle negative situations well in the future. The ERP measure of distancing, but not the self-reported measure of distancing, during analyze also related to fewer anxiety symptoms. Together, the current findings provide multi-modal support for the prediction that self-distancing during analysis of negative emotions is more adaptive than is self-distancing during simply recalling negative experiences. Future studies should utilize the current paradigm in that it makes use of more ecologically valid stimuli.

Poster 2-53**INDIVIDUAL DIFFERENCES IN DELTA-BETA COUPLING ARE LINKED TO EARLY PARENTING**

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Descriptors: delta-beta coupling, parenting, psychopathology

Delta-beta coupling is believed to denote neural efforts at regulation and is enhanced in anxious individuals (Miskovic et al., 2010). Little work has examined delta-beta coupling in early life, including the extent to which coupling may be associated with early experience. Given evidence that early parenting may alter neural circuitry, including that associated with anxiety risk (Brooker & Buss, 2014), we examined whether early parenting was associated with coupling during preschool. Preschoolers ($N = 55$) and their parents visited the lab at 3 years of age. EEG was recorded during baseline. Delta (0–3 Hz) and beta (8–12 Hz) power were derived from the EEG at parietal (P3/4), central (C3/4), and frontal electrodes (F3/4). Coupling was defined at each site as the correlation between delta and beta power. Mothers and fathers self-reported their own parenting practices. Fisher's r -to- z transform showed that coupling at frontal electrodes was greater for children whose mothers ($z = 2.63$, $p < 0.01$) and fathers ($z = 2.19$, $p < 0.01$) reported greater levels of harsh parenting. In contrast, sensitive parenting was not linked to coupling for mothers or fathers. Analyses suggest that negative experience in early life may be more robust predictors of the development of regulatory circuitry relative to positive experiences. Additional analyses suggested that greater coupling was associated with a global measure of insensitive parenting in mothers ($z = 2.70$, $p < 0.01$) but not fathers. This may reflect a greater sensitivity to maternal behaviors in early life.

Poster 2-54**MANIPULATION OF EMOTIONAL ATTRIBUTION INFLUENCES ERROR-RELATED EEG AND COGNITIVE CONTROL**

Anthony I Jang¹, James F Cavanagh², & Michael J Frank¹
¹Brown University, ²University of New Mexico

Descriptors: electroencephalography, cognitive control, anxiety

The error related negativity (ERN) is known to be generated by activity in the midcingulate cortex (MCC), which is sensitive to both negative affect and the need for cognitive control. In line with this, previous work has shown that variance in ERN amplitude is associated with both affective experience and behavioral control. However, it's unknown whether these emotional and cognitive processes contribute shared variance to the ERN (e.g., a domain general process), or whether they are functionally segregated. We tested whether manipulating state affect through a misattribution of arousal would influence error-related EEG measures as well as cognitive control behavior. 40 subjects (20 manipulation (MAN), 20 control (CON)) were given a placebo drink prior to performing a Simon task while EEG was recorded. Subjects in the MAN group were told that the drink has side effects associated with anxiety (e.g. increased heart rate, racing mind), whereas the CON group was told that the drink has no side effects. Self reported anxiety was significantly greater in the CON group compared to the MAN group, in line with the theory of emotional misattribution. According to this, subjects in the MAN group misattributed their physiological arousal from doing a difficult task to the side effects, which led to lower anxiety. The MAN group also had larger ERN amplitudes and significantly greater post-error response time adjustments. These findings suggest that affective and control-related variance in the ERN may be differentiable and possibly inversely related.

Poster 2-55**TIMING VARIANT OF POPULAR COGNITIVE CONTROL TASK ELICITS DISTINCT NEURO-COGNITIVE INSTANTIATIONS OF PROACTIVE AND REACTIVE CONTROL: A DOUBLE DISSOCIATION IN EEG**

Jacqueline R Janowich, & James F Cavanagh
University of New Mexico

Descriptors: cognitive control, task switching, electroencephalography

AX-CPT (AX) is a standard task used to assess expectancy in cognitive control, but task timing varies between studies and correlates with system-

atic differences in performance. This timing- behavior interaction suggests that task timing may instantiate distinct control processes. Here, we investigate how control is initiated based on known timing delays between an informative cue and its paired test probe. We recorded EEG ($n = 32$) in AX with separate blocks of short and long cue-probe delays. Behavioral Shift Index (BSI), indexing use of proactive vs. reactive control, was compared between short and long delay. Supporting the significant delay—cue likelihood interaction in accuracy, we found a double dissociation in EEG markers of control. In Short delay, mid-frontal (FCz) P2 amplitude, a marker of task switching, was significantly elevated for rare cues. Further, P2 amplitude was significantly (positively) correlated with BSI for Short delay, suggesting elevated proactive control with greater P2. Posterior parietal sites (P3/4) also showed elevation of task-switching P1 amplitude for rare cues only during Short delay. In Long but not Short delay, delta power was dynamically suppressed for rare cues, and delta suppression significantly correlated with BSI only in Long delay, indicating a selective link between delta suppression and increase in reactive control. EEG double dissociation suggests that delay latency guides instantiation of distinct control processes, and prompts consideration that AX no longer be conceived as a unitary task across timing parameters

Poster 2-56**NEGATIVE AFFECT ENHANCES COGNITIVE CONTROL**

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Descriptors: emotion, cognitive control, N2

Pavlovian biases affect learning and behavior due to an innate pairing of reward seeking with action invigoration and punishment avoidance with action suppression. We sought to explain how emotional events affect Pavlovian biases as well as the application of cognitive control used to overcome them. Our task presented negative and positive emotion-inducing pictures prior to imperative cues with orthogonalized action/outcome pairings (e.g.: go-to-win, nogo-to-win, go-to-avoid punishment, nogo-to-avoid punishment). The Pavlovian bias of reward invigoration was measured as the percent of 'go' responses in the context of reward (go-to-win and nogo-to-win), and the bias of punishment suppression was calculated as the percent of 'nogo' responses in instances of punishment (nogo-to-avoid, go-to-avoid). Behavioral results indicated that reward invigoration and punishment suppression were higher in participants when they were primed with positive emotion-evoking images as opposed to negative ones. EEG activities time-locked to the imperative cue suggest that this affect-related phenomenon was due to an enhancement of cognitive control by negative emotions. The N2 component locked to imperative cues was larger when preceded by negative images as compared to positive images, a finding previously interpreted as enhanced cognitive control on this task. These findings suggest that negative emotions may incidentally induce top-down control to reduce overall bias. Innate associations may exist between negative emotionality and cognitive control.

Poster 2-57**TEMPORAL STABILITY OF STARTLE MODULATION DURING THREAT-OF-SHOCK VERSUS AFFECTIVE PICTURE VIEWING TASKS**

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Descriptors: startle, test-retest reliability, stress reactivity

The current study examined the temporal stability (test-retest reliability) of acoustic startle response modulation during threat-of-shock and affective picture viewing. Participants completed two study visits one week apart in which they completed the No Shock, Predictable Shock, Unpredictable Shock (NPU) Task and International Affective Picture System (IAPS) Picture Viewing Task. Startle response modulation was calculated separately in each task (IAPS; NPU) as the difference between the threat/valence (predictable and unpredictable shock; pleasant and unpleasant picture) and control (no shock; neutral picture) condition. Startle modulation was examined as both raw microvolt and standardized t-score units. General startle reactivity (baseline) demonstrated high one-week temporal stability. Temporal stability of startle potentiation in the NPU task was high in both predictable and unpredictable shock conditions. Temporal stability of startle modulation in the IAPS task was low-moderate for unpleasant potentiation and low for pleasant attenuation. Split-half reliability of startle modulation within study visits was higher in the NPU than IAPS task. The magnitude of startle modulation across conditions was significantly larger in the NPU than IAPS task. The temporal stability and split-half reliability of startle modulation across nearly all measures was improved when quantified as raw startle versus t-scores. The strong temporal stability, internal consistency, and robust magnitude of startle potentiation in the NPU task demonstrate its sound psychometric properties.

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Poster 2-58**EFFECTS OF STIMULUS-RESPONSE-COMPATIBILITY ON THE CARDIAC MODULATION OF REACTIONS TO STARTLE STIMULI**

Mauro F Larra, Thomas M Schilling, & Hartmut Schächinger
University of Trier

Descriptors: cardiac cycle time, startle, stimulus-response compatibility

Baro-afferent feedback has been shown to impact on reflexive as well as controlled responses to startling stimuli; however, sensorimotor and cognitive components of controlled responses seem to be differentially affected. Here, we employed a cardiac cycle time paradigm to study the effects of natural baroreceptor activation on choice reactions to spatially compatible and incompatible startling stimuli. 80 participants received a total of noise bursts (50 ms, 105 dB) to either the right, left or both ears during cardiac systole or diastole (230 ms vs. 530 ms after peak of R-wave) and bilateral M. orbicularis oculi EMG responses were recorded. All participants had to respond to the stimuli with left, right or bilateral button pushes. Cognitive and sensorimotor stimulus-response-compatibility was orthogonally varied between subjects: responses had to be made with either the contra- (N = 40) or ipsilateral (N = 40) hand (sensorimotor compatibility) on either the contra- (N = 40) or ipsilateral (N = 40) button (cognitive compatibility). Startle magnitudes were decreased for stimuli presented in the systolic vs. diastolic phase independent of laterality. Conversely, manual reactions were accelerated in the systolic vs. diastolic phase for the ipsilateral hand but decelerated for the contralateral hand irrespective of cognitive stimulus-response compatibility. These results point to a facilitation of innerhemispheric and inhibition of transhemispheric sensorimotor processing by natural baroreceptor activation in controlled reactions to auditory startling stimuli.

Poster 2-59**THE PUPIL OLD/NEW EFFECT REFLECTS FAMILIARITY**

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University of Cologne

Descriptors: pupillometry, memory

ERP amplitudes are more positive for words that have previously been studied, i.e. old items, than for words that have not been studied, i.e. new items. This ERP old/new effect has two distinct markers: A look-up of the familiarity of a presented item and recollection of item-specific information. Importantly, recollection but not familiarity reflects the distinction of word vs. pseudoword and low- vs. high-frequency word (Curran, 1999; Rugg et al., 1994). Pupil old/new effects have recently also been reported (Vo et al., 2008). During recall, the pupil dilates more for previously studied, old words than for non-studied, new words. The relationship between the ERP old/new and the pupil old/new effect is poorly understood, however. In three experiments, participants (N = 16) studied 40 items in a study phase and indicated in a recall phase, with 40 old and 40 new items, whether they had seen the presented item before. LMMs were fitted for the data. Using legal words (Expt. 1), pupils dilated more for old than new words. Pupil old/new effects were also found with non-words (Expt. 2), and effects were not predicted by a stimulus' word-likeness. When using low- vs. high-frequency words (Expt. 3), pupil old/new effects were again observed. However, they were not modulated by word frequency. The observation that frequency did affect pupil sizes in the study phase rules out the possibility that pupil sizes are not sensitive to word frequency per se. In sum, our data suggest that the pupil old/new effect is more related to familiarity than recollection processes reported for ERPs.

Poster 2-60**MISATTRIBUTION OF ANXIOUS AROUSAL REDUCES THE EFFECT OF TRAIT-ANXIETY ON THE ERN**

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¹University of Bonn, ²University of Kiel

Descriptors: error-related negativity, anxiety, misattribution

The Error Related Negativity (ERN) is an event-related potential that represents a neural correlate of performance monitoring and has a negative peak about 50 ms after an error. Several studies have shown that more anxious participants display a more negative ERN. Inzlicht and Al-Khindi (2012) have reported that the opportunity to misattribute anxious arousal, a form of task-related anxiety, results in a smaller ERN amplitude. As an extension to these findings, we aimed at investigating the modulating role of individual differences in trait-anxiety on the ERN in the context of misattribution. Presuming that errors are aversive, especially to individuals with more pronounced trait-anxiety, we expected a more pronounced ERN in more trait-anxious individuals (measured by BIS/BAS scales) in a control condition. This effect should be less pronounced in a condition allowing for misattribution of anxious arousal. As in Inzlicht and Al-Khindi (2012), prior to a go-nogo task, all participants drank a substance that was introduced to increase performance. Half of the participants (n = 44) were informed about side effects (e.g., increased state anxiety), which could influence their performance; the other half (n = 51) was informed that the substance had no side effects. We observed a more pronounced ERN (i.e., more intense performance monitoring) in higher vs. lower trait-anxious participants, exclusively in the control condition, which did not allow for a misattribution of anxious arousal, whereas misattribution decreased effects of trait-anxiety on ERN during performance monitoring.

Poster 2-61**FEEDBACK NEGATIVITY IN A GO/NOGO TASK: OUTCOME PROBABILITY AND PERFORMANCE EVALUATIONS DETERMINE OUTCOME EXPECTATIONS!**Anja Leue¹, Carmen Cano Rodilla², & André Beauducel²
¹University of Kiel, ²University of Bonn*Descriptors: feedback negativity, expectation intensity, unfairness*

Individuals typically evaluate whether their expectations, their performance, and the obtained feedback match. Previous research has shown that the feedback negativity (FN) depends on external signals of outcome expectation like outcome probability and feedback valence. It is, however, less clear to what extent the FN reflects expectation mismatch based on internal outcome signals like performance evaluations. Based on results obtained in a probability learning task (Holroyd & Coles, Psychological Review, 2002) we expected the FN to be more negative when expectations are more intense. Trials with performance-compatible feedback (without expectation mismatch) and high outcome probability were thought to induce intense outcome expectations. Performance-incompatible feedback was expected to result in a more negative FN than performance-compatible feedback. To elucidate the relevance of expectation intensity and expectation mismatch during outcome processing, we investigated variations of the FN amplitude (N = 22) by means of outcome probability pre-cues and feedback valence in a go/nogo task allowing for self-evaluations of response correctness. We found that the 100% outcome probability condition induced a more negative FN than the 50% outcome probability condition and that the FN was more negative when outcome was contrary to performance-based expectations. These findings suggest that outcome probability is an indicator of expectation intensity and performance evaluations that do not match one's expectations are a determinant of unfairness.

This study was funded by the German Research Foundation to the first and the last author.

Poster 2-62**NEURAL EVIDENCE FOR AN ASSOCIATION BETWEEN MEDITATION EXPERIENCE AND LOWER IMPLICIT PREJUDICE**Chad Danyluck, Elizabeth Page-Gould, & Michael Inzlicht
University of Toronto*Descriptors: meditation, event-related potentials, prejudice*

There is a preponderance of research examining the benefits of meditation for the individual, but not for society more broadly. The current study examined the association between meditation experience and implicit prejudice by examining how experience with meditation predicted brain-based performance monitoring during both a generic cognitive control task as well as a task assessing implicit anti-Black prejudice. Meditators and non-meditators completed a general executive control task (Go/No-Go), followed by two counter-balanced tasks that measured participants' implicit prejudice and stereotyping (Implicit Association Task). During the performance of these tasks, we measured event-related potentials (ERP) using electroencephalography (EEG), time-locked to participants' task responses. Specifically, we measured the error-related negativity (ERN)—a negative amplitude ERP occurring within 100 ms of task errors. A structural equation model (SEM) confirmed that greater meditation experience was associated with greater executive control, as a function of larger ERNs. Multigroup SEMs further confirmed these associations with respect to implicit prejudice and stereotyping. The results imply that meditation training may undermine prejudice via changes in neurophysiological processes and suggest that prejudice interventions might benefit from the inclusion of some form of meditation training. Yet, it is unclear whether these benefits extend directly from meditation training per se or because such training typically occurs within a culture of compassion and acceptance.

Poster 2-63**“US VERSUS “THEM” AND OUR PERFORMANCE OUTCOMES: GROUP MEMBERSHIP SELECTIVELY MODULATES NEURAL FEEDBACK-MONITORING**Nicholas M Hobson, & Michael Inzlicht
University of Toronto*Descriptors: feedback-monitoring, social neuroscience, intergroup*

Recent research has begun to show that social context matters greatly for how the brain processes performance and feedback information (de Bruijn et al., 2011)

and rewards (Fliessbach et al., 2007), and that neural representations of self-oriented action agency integrate with interpersonal interaction (Koban et al., 2013). Leveraging work from cognitive neuroscience and classical social psychology, we posit that group membership – perhaps one of the most salient features of the social environment – can influence the manner in which we track our own performance and feedback. Here, we used an EEG paradigm (N = 25) to show that even minimal grouping assignments, the separating of people into novel groups based on some arbitrary categorization (Tajfel et al., 1974), is enough to selectively modulate the feedback-related negativity (FRN) and f-P3. Results revealed a differentiated pattern on the two feedback components, with participants showing early sensitivity to punishment (i.e., heightened FRN to monetary losses and heightened ΔFRN activity) and later attenuation to reward (i.e., dampened f-P3 activity to monetary gains and reduced Δf-P3 activity), but only in the presence of an ingroup member. A separate comparison sample was run (N = 30) where people performed the task alone. Indeed, this confirmed that participants feedback and reward monitoring was modulated at the level of the ingroup; outgroup patterns were similar to self-generated patterns. These findings suggest that neural feedback monitoring is sensitive to even the subtlest cues of group membership.

Poster 2-64**FEELINGS THAT ARISE DURING COGNITIVE CONTROL PREDICT PERFORMANCE BUT NOT NEURAL MONITORING**Blair Saunders¹, Marina Milyavskaya², & Michael Inzlicht¹
¹University of Toronto, ²McGill University*Descriptors: cognitive control, emotion, error-related negativity*

Cognitive control is accompanied by observable negative affect. In this investigation, we explored the subjective experience of this affect, and its potential relation to both performance monitoring and cognitive control. In our study, 42 participants performed a punished inhibitory control task while regularly reporting their subjective experience. Interestingly, intra-individual fluctuations in subjective experience predicted control implementation, but not the amplitude of an event-related potential related to error monitoring (i.e., the error-related negativity; ERN). Specifically, increased anxiety and frustration predicted elevated and reduced behavioral caution, respectively. In contrast, hopelessness was associated with reduced inhibitory control, and feelings of effort were positively associated with the ability to override pre-potent responses. Further elucidating the nature of these phenomenological results, frustration, effort, and hopelessness—but not anxiety—still predicted inhibitory performance when controlling for the punishment manipulation. In contrast, the ERN was increased in punished (vs. unpunished) blocks, but was not associated with any particular feeling state, suggesting that this early signal might precede the development of the subjective experience of control. Overall, our findings suggest that heterogeneous feelings during cognitively demanding tasks are related to different aspects of performance, critically proposing that the association between emotion and cognitive control extends beyond the dimension of valence.

Poster 2-65**CORTISOL REACTIVITY AND PATERNAL POSITIVE AFFECT MODERATES THE RELATION BETWEEN DYSREGULATED FEAR AND SOCIAL WITHDRAWAL**

Xiaoxue Fu, & Kristin A Buss
The Pennsylvania State University

Descriptors: dysregulated fear, cortisol, social withdrawal

Dysregulated fear (DF), a temperament profile characterized by high fear in low-threat context, predicts social withdrawal during kindergarten (Buss et al., 2013). Fearful temperament is associated with cortisol reactivity to potential threat (Schmidt et al., 1997), and elevated cortisol reactivity potentiates the risk for social withdrawal (SW; Pérez-Edgar et al., 2008). Positive parenting ameliorates anxiety vulnerability in children with fearful temperament (Buss & Kiel, 2013), and exerts dampening effects on cortisol reactivity to stress (Hostinar et al., 2013). In the current study, we examined whether cortisol reactivity and parental positive affect (PA) moderate the link between DF and SW. Participants were 168 children drawn from a 2-cohort study. At age 2, children were categorized into a DF or non-DF profile. Mothers and Fathers reported on their own PA. During kindergarten, saliva samples were collected in a laboratory visit involving interaction with unfamiliar age- and sex-matched peers. Mothers reported children's SW. A significant interaction emerged between DF profile, PA in fathers, and total cortisol production in predicting SW ($\beta = .32$, $t = 2.22$, $p < .05$). Among DF children, high PA in fathers related to low levels of SW (negative trend, $\beta = -.26$, $t = -1.42$, $p = .16$) in those with high but not low levels of cortisol reactivity ($\beta = .12$, $p = .38$). The same interaction was not significant for mothers. We provide preliminary evidence that caregivers' PA might buffer the risk to SW in high-reactive DF children, and the impacts of PA might differ between parents.

This study was supported by a grant from NIH (MH075750) to Kristin A. Buss.

Poster 2-66**REWARD-RELATED FRONTAL BETA OSCILLATIONS ARE SENSITIVE TO SEQUENCE LENGTH**

Azadeh HajiHosseini, & Clay B Holroyd
University of Victoria

Descriptors: beta oscillations, reward, working memory

Reward feedback elicits beta oscillations in the human EEG recorded over frontal areas of the scalp but the source and functional significance of this neural signal is unknown. We have recently suggested that reward-related beta reflects activation of a neurocognitive process mediated by dorsolateral prefrontal cortex (DLPFC) underlying the maintenance and updating of successful stimulus-response rules in working memory (WM). We tested this proposal by recording the EEG from subjects as they completed two reinforcement learning (RL) tasks that either required a single choice or three consecutive choices on each trial before feedback presentation. We found a frontal-central component of beta power that was sensitive to feedback valence, a frontal-lateral component that was sensitive to feedback valence and sequence length, and a posterior component that was sensitive to sequence length. In addition, we found that for both frontal components, beta power at 25 Hz was coupled with theta phase at 6 Hz during a 1 s interval following presentation of reward feedback in the task with the longer sequence. Source localization suggested a DLPFC generator for the valence contrast and an anterior cingulate cortex (ACC) generator for the sequence length contrast. Based on the oscillatory model of WM (Lisman & Idiart, 1995) and the hierarchical RL theory of ACC (Holroyd & Yeung, 2012), we propose that reward-related beta oscillations reflect the updating and transfer of successful action sequences to brain areas that are responsible for task execution.

Poster 2-67**AN EVENT-RELATED POTENTIAL STUDY OF COGNITIVE LOAD AND CONFLICT RESOLUTION IN NUMERICAL STROOP TASK**

Chih-Mao Huang¹, Ya-Yi Wang², Pei-Shan Huang², & Hsu-Wen Huang³
¹National Chiao Tung University, ²Academia Sinica, ³National Taiwan Normal University

Descriptors: executive function, P300

In this event-related brain potentials (ERPs) study, we investigated the electrophysiological correlates of resolution of conflict by using the modified version of size-congruity comparison, a Stroop-like task in which numerical value and physical size were varied independently under task-relevant and -irrelevant conditions. We further manipulated the levels of cognitive load in order to probe the degree of conflict between dimensions of magnitude system. The behavioral results showed that the effects of congruity were modulated by the tasks and the cognitive load, with greater effect as cognitive load increased in the numerical comparison task whereas reduced effect as cognitive load increased in the physical comparison task. The electrophysiological results demonstrated that the congruent condition elicited greater parietal-distributed P300 than the incongruent condition for both numerical and physical comparison tasks. Moreover, the high cognitive load condition elicited smaller P300 amplitude than low cognitive load condition in congruent condition, while no difference of the effect of cognitive load was observed in incongruent condition. These findings suggest that the cognitive load modulated the processing of conflict resolution between the irrelevant and relevant dimensions of magnitude systems differently.

Poster 2-68**SENSITIVITY OF ANTERIOR CINGULATE CORTEX TO REWARD PREDICTION ERRORS AT TWO LEVELS OF HIERARCHY**

Danesh Shahnazian, & Clay B Holroyd
University of Victoria

Descriptors: reinforcement learning, electroencephalography

The reward positivity (Rew-P) is an ERP component generated in ACC about 240–340 milliseconds post-feedback that is sensitive to reward prediction error signals. The hierarchical reinforcement learning (HRL) theory of the anterior cingulate cortex (ACC) holds that this brain region is responsible for selecting and sustaining hierarchically structured behavior (Holroyd & Yeung, 2012). The HRL theory of ACC thus raises the possibility that this brain region is sensitive to reward prediction errors at multiple levels of hierarchy. To investigate this question, we recorded EEG from subjects engaged in a casino gambling task modified from Diuk et al (2013). 25 undergraduate students played 152 trials split into 4 blocks of equal duration. On each trial, participants chose between two doors, each of which represented a virtual casino, and were then presented with images of four different slot machines "inside" the casino. They were instructed to pick two of the machines consecutively to earn points, which were compared at the end of each trial with a threshold that indicated whether they earned 10 or lost 10 cents. Reward probabilities were constructed to dissociate reward-prediction errors at the casino-level vs. slot level. We found that the reward positivity was elicited by reward prediction errors at both levels, indicating that the ACC is sensitive to hierarchically organized reward structure.

Poster 2-69**PARASYMPATHETIC ACTIVITY, COGNITIVE-BEHAVIORAL SELF-REGULATION, AND STRESS: HIGH FREQUENCY HEART RATE VARIABILITY PREDICTS PRE-STRESS PERFORMANCE ON THE STOP SIGNAL TASK**

Leslie Roos, Erik L Knight, Kathryn S Gilliam-Beauchamp, Elliot T Berkman, & Philip A Fisher
University of Oregon

Descriptors: heart rate variability, self-regulation, stress

Parasympathetic nervous system (PNS) activity has been theorized to relate positively to executive function and self-regulation. But measures of PNS functioning like heart rate variability have not been directly linked to cognitive-behavioral indices of self-regulation, like performance on the stop signal task (SST). Additionally, stress is known to disrupt self-regulation and alter physiological functioning, but these components have not been experimentally studied together. We investigated baseline and reactive PNS activity in its relation to performance on the SST. Undergraduate participants' (n = 89) baseline cardiovascular physiology was recorded prior to completing two blocks of the SST. Participants then were exposed to a well-validated laboratory stressor, the Trier Social Stress Task, before completing two additional blocks of the SST. Results indicate that high baseline vagal tone as indexed by high frequency heart rate variability predicts increased performance on pre-stress SST, suggesting that parasympathetic functioning directly predicts cognitive-behavioral self-control performance. PNS reactivity to the stressor did not predict change in the SST from pre- to post-stress. This work suggests the PNS directly corresponds to cognitive-behavioral self-regulation as measured by a laboratory task, lending further support to theorized relationships between vagal tone and executive function. Future work may utilize this simple paradigm to explore further psychophysiological aspects of self-regulation.

Poster 2-70**PHYSIOLOGICAL LINKAGE IN DEMENTIA PATIENT-CAREGIVER DYADS**

Alice Verstaen, Sandy J Lwi, James J Casey, Marcela C Otero, & Robert W Levenson
University of California, Berkeley

Descriptors: dementia, physiological linkage

Physiological linkage, defined as moments of high covariation in physiological responses across two people, occurs during empathic social interactions (e.g., Marci et al., 2007). We examined differences in physiological linkage in patient-caregiver and control couples (patients either had behavioral variant frontotemporal dementia [bvFTD] or Alzheimer's Disease [AD]). We hypothesized that bvFTD couples would show the lowest levels of linkage due to impairments in empathy. We expected AD couples to show levels of linkage comparable to control couples because AD relatively spares social and emotional skills. 29 AD, 20 bvFTD, and 15 control couples discussed a marital disagreement for ten minutes while their physiological responses were recorded. Physiological linkage was measured by computing correlations between patients' and caregivers' cardiac interbeat intervals and skin conductance responses for successive 25-second moving time windows. Correlations for each physiological measure in each time window were averaged and the number of windows with at least moderate correlations ($r > +/- .3$) was determined. Supporting our hypothesis, bvFTD couples show significantly less physiological linkage than AD couples, $F(2, 62) = 3.531, p = .035$; AD couples did not differ from control couples. This finding is consistent with bvFTD patients having difficulty making and maintaining social connections, an impairment that is reflected in the lessened physiological linkage with interaction partners during an emotional interaction.

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Poster 2-71**GREATER EMOTIONAL REACTIVITY IS ASSOCIATED WITH WORSE SLEEP EFFICIENCY IN DEMENTIA CAREGIVERS**

James J Casey¹, Chien-Ming Yang², Jennifer Merrillees³, & Robert W Levenson¹

¹University of California, Berkeley, ²National Cheng Chi University, ³University of California, San Francisco

Descriptors: emotion, sleep, caregivers

In previous studies of healthy populations, high levels of emotion (assessed using self-report measures of emotional state or induced using films and music) when people go to bed have been associated with poor sleep. We explored this relationship using a different methodology in which emotional reactivity was assessed in the laboratory and related to an objective measure of sleep in a sample of 25 spousal caregivers of individuals with dementia (primarily Alzheimer's disease and frontotemporal dementia). Caregivers watched short films in the laboratory that elicited amusement and fear. Throughout the films, physiological activation was measured (using a composite of cardiovascular, somatic, and electrodermal measures) and facial behavior was recorded. Emotional facial expressions were subsequently rated by trained coders. During the week following the laboratory session, caregivers wore sleep actigraphy watches to measure sleep efficiency (the percent of time in bed that they were asleep). Results indicated that greater physiological activation during the amusement and fear films was associated with lower sleep efficiency (amusement $\beta = -.41, p < .05$; fear $\beta = -.56, p < .01$). More facial expressions of happiness during the amusement film was also associated with lower sleep efficiency ($\beta = -.47, p < .05$). These results indicate that caregivers who are more emotionally reactive are most vulnerable to sleep problems. These sleep difficulties may contribute to health problems and reduced well-being, both of which are prevalent among dementia caregivers.

Poster 2-72**EVALUATING RELIABILITY AND TEMPORAL STABILITY IN PSYCHOPHYSIOLOGICAL MEASURES AND QUANTIFICATION METHODS**

Sandy J Lwi¹, Michael D Edge², Scott L Newton¹, Deepak Paul¹, & Robert W Levenson¹

¹University of California, Berkeley, ²Stanford University

Descriptors: reliability, temporal stability, physiological reactivity

Researchers using physiological measures can choose among many measures and quantification methods, but the psychometric properties of these approaches are largely unexplored. We examined the reliability and temporal stability of several physiological measures and quantification methods in 121 middle-aged and older married couples (N = 242). Couples came to the laboratory twice over a five-year period and engaged in three 15-minute conversations on neutral, negative, and positive topics. During the conversations cardiac interbeat interval, finger pulse transmission time, finger pulse amplitude, pulse transmission time to the ear, skin conductance, temperature, and somatic activity were measured on a second-by-second basis and reactivity scores were computed as: (a) difference scores between conversation means and pre-conversation means, and (b) residual scores obtained by regressing conversation means on pre-conversation means. Overall reliability was computed as the average of 100 random split-half reliabilities for each measure. Temporal stability was computed by disattenuating the correlation between time points, adjusting for reliability at each time point. Reliabilities for all physiological measures were in excess of 0.98 for all conversation topics, time points, spouses, and computation methods. Temporal stabilities for different physiological measures ranged from low to moderate with cardiac interbeat interval and skin conductance showing moderate stability (0.27- 0.48), and finger pulse amplitude and finger pulse transmission time showing low stability (0 - .011).

Poster 2-73**COGNITIVE CONTROL IS IN THE EYE OF THE BEHOLDER:
SPECTRAL EEG ANALYSIS OF A CUED PRO-SACCADE/
ANTI-SACCADE TASK**

Cody E Gogo, Stefon J van Noordt, James A Desjardins, Sidney J Segalowitz, & Ayda Tekok-Kilic
Brock University

Descriptors: anti-saccade, ICA, frontal theta

In this study, eye-tracking was used to monitor behavior while participants were presented with a central cue that signaled whether the current trial would require a pro-saccade or anti-saccade to subsequently presented peripheral probes. We compared the activation of Independent Components (ICs) representing medial frontal and occipital alpha generators over the period of the trial, for pro-saccade and anti-saccade trials. We performed bootstrapped re-sampling to assess differences against the 99% confidence interval in event-related spectral power. During the 800 ms delay period, we observed more theta power and less alpha power in medial frontal and occipital generators, respectively, following cues signaling an upcoming anti-saccade compared to pro-saccade probes. The timing of these differences was similar for medial frontal theta and posterior alpha ICs, peaking during the latter portion of the delay period (550 to 630 ms following the cue onset), just before the onset of the peripheral probe. Thus, increases in frontal theta activity occurred in tandem with reduced alpha power during the preparation for the anti-saccade responses that place greater demands on controlling prepotent eye movements. These findings are consistent with a body of literature focused on medial frontal theta and alpha suppression in the context of cognitive control. Overall, these results indicate that medial frontal theta and posterior alpha power are modulated by the relative need for attentional control when regulating behavioral responses.

Poster 2-74**CALM DOWN! EMOTION REGULATION ABILITY
PREDICTS RELATIONSHIP RESILIENCE FOLLOWING
INTERPERSONAL BETRAYAL**

Erin N Burdwood, & Robert F Simons
University of Delaware

Descriptors: emotion regulation, romantic relationships, P300

Interpersonal betrayals are exceedingly common in romantic relationships and are a primary reason that couples seek counseling. A better understanding of factors that contribute to an individual's ability to cope with and move forward from these incidents is needed in order to improve case conceptualization and treatment planning in couples therapy. Studies thus far have taken a hypothetical or retrospective approach to examining relationship resilience following such betrayals. The present study examined emotion regulation ability among females whose romantic partners had recently committed an act of serious betrayal against them. Electroencephalography (EEG) data were recorded from each participant while she increased, decreased, or did not regulate her emotional response to negatively-valenced stimuli. The results of a path model analysis revealed that the ability to decrease one's emotional response to a negative stimulus, indexed by mean P300 amplitude, was associated with enhanced forgiveness towards the betrayer and a greater likelihood of continuing the relationship three months post-experiment. Conversely, a greater ability to increase emotional responses to negatively-valenced stimuli was associated with lower levels of forgiveness and a greater likelihood of relationship termination. Results highlight the key role that emotion regulation ability plays in the aftermath of interpersonal betrayal and the importance of considering this trait in couples counseling and research.

Poster 2-75**FRN MODULATION IN INDIVIDUALS WITH A HISTORY OF
MILD TRAUMATIC BRAIN INJURY**

Kelly N Farrell, Erin N Burdwood, & Robert F Simons
University of Delaware

Descriptors: traumatic brain injury, feedback-related negativity

Recent studies have shown that traumatic brain injury (TBI) can cause disruptions in cognitive processing and emotion regulation for weeks or longer after the initial accident. Most of this work has focused on severe injuries, which are less common but can produce more pronounced post-concussion symptoms. In comparison, very little research has been done on mild TBI (mTBI) – which makes up more than three-fourths of total head injuries – resulting in a clinical profile that is unclear. The current study sought to expand on past research demonstrating

disrupted error monitoring in individuals with mTBI in order to determine whether external, as well as internal, feedback processing systems are influenced by mild head injury. A group of participants with a history of one or more mild concussions, as defined by the Department of Defense's concussion severity scale, and a group of healthy control participants were recruited to participate in a 5 Doors task in order to compare mean feedback-related negativity (FRN) amplitudes. Results revealed that participants with a history of mTBI had significantly smaller feedback-related negativity (FRN) amplitudes than did control participants, which indicates that external feedback processing may be altered as a result of even mild head injury. These results can help to explain some of the emotional and behavioral symptoms that are described as a "post-concussive syndrome"; an area with implications for concussion research and rehabilitation.

Poster 2-76**ELECTROPHYSIOLOGICAL ENCODING-RELATED
DIFFERENCES DURING FEAR LEARNING PREDICT
REMEMBERED AND FORGOTTEN FEAR**

Julian Wiemer, Annika Drumm, Matthias J Wieser, & Paul Pauli
University of Würzburg

Descriptors: memory, fear, electroencephalography

Previous studies have shown that subsequently remembered stimuli evoke different event-related brain potentials compared to subsequently forgotten stimuli already during encoding. Such subsequent memory effects reflect potential processes of memory encoding. In the present study, we investigated the subsequent memory effects of associative fear learning. In a learning phase, participants were repeatedly presented forty pictures of different neutral faces while high-density EEG was recorded. A picture of a fearful face combined with a loud aversive scream followed half of the neutral pictures. In a surprise recognition task immediately after this learning phase, participants were shown each neutral face again and asked to indicate whether a scream had been previously associated with the neutral face or not. In addition, confidence ratings were assessed in order to classify correct high confidence ratings as remembered. Those faces that were subsequently remembered to be associated with the aversive scream evoked a more positive slow wave potential during the learning phase than those faces that were forgotten to be associated with the scream. This positivity specifically emerged over frontal electrode sites. These results are in accordance with subsequent memory effects for other stimulus material (such as words) reported in the literature. This suggests that similar neural processes might be involved in the encoding of explicit fear memory traces, which might reflect prefrontal cortex activity subserving memory encoding processes.

Poster 2-77**EXAMINING THE PHYSIOLOGICAL AND EMOTIONAL
IMPACT OF SMILING AS A POSITIVE MOOD INDUCTION
FOR TRAUMA SURVIVORS**

Ashley Doukas, Vivian Khedari, Andria Schmidt, Kellie Lee, & Wendy D'Andrea
The New School

Descriptors: emotion, trauma, respiratory sinus arrhythmia

Positive stimuli (e.g. images, videos, and music) are often used to induce pleasant mood and study the psychophysiology of emotion. However, research on individuals with trauma histories suggests that negative evaluations may interfere with the ability to enjoy pleasant stimuli. As a result, mood induction techniques dependent upon positive appraisal may be less effective for such populations. Clinicians working with trauma survivors experiencing poor emotional awareness and depersonalization have begun to incorporate body-based techniques to help patients generate and regulate emotions. One such intervention uses smiling to induce mood changes (e.g. Levenson et al., 1990). The present study examines response to mood induction with an emphasis on: 1) psychophysiological and emotional response to smiling vs. picture viewing and 2) the role of trauma and self-reported dissociation. Participants were 25 women (Mean age = 34.69, SD = 13.57; 10 = trauma, 15 = no trauma) who completed a smile mood induction, viewed positive images with concurrent psychophysiological monitoring, and reported on task-specific dissociation. Results indicate that heart rate increases while viewing positive images were positively correlated with increase in positive mood in the control group ($r = .87, p < .05$) but not the trauma group ($r = .22, p = ns$). In the trauma group, lower state dissociation correlated with increased respiratory sinus arrhythmia when smiling ($r = -.53, p < .05$). These data support the utility of body-based inductions for populations who may ascribe negative evaluations to positive stimuli.

Poster 2-78**BRAIN DIMORPHISM REVEALED BY QEEG ANALYSIS IN PSYCHOPATHIC OFFENDERS**Ana Agustina Calzada Reyes¹, Alfredo Alvarez Amador², & Lídice Galán García²¹Legal Medicine Institute ²Cuban Center of Neuroscience*Descriptors: QEEG, LORETA, brain dimorphism*

Psychopathy is a clinical condition composed of emotional deficits, social dysfunction, deviant lifestyle, and antisocial behavior. This complex personality disorder differs in both incidence and nature between sexes. The study objective was to find electrophysiological differences specifically related to the psychopathy construct between men and women offenders. The current investigation compares the quantitative electroencephalography (qEEG) and low-resolution electromagnetic tomography (LORETA) source imaging of psychopathic male offenders to a psychopathic female group. The resting EEG activity and LORETA for the EEG spectral fast bands were evaluated in two groups of violent psychopathic offenders, 33 men and 12 women according to the Hare Psychopathy Checklist-Revised. All subjects were assessed using the DSM IV-R criteria. EEG visual inspection characteristics and the use of frequency domain quantitative analysis techniques (Narrow band spectral parameters) will be described. QEEG analysis showed a pattern of excess of beta activity in bilateral frontal regions and parieto-central areas in the male psychopath group. LORETA revealed an increase of beta activity in the male psychopathy group relative to the female psychopathy group within fronto-temporal regions and associative occipital areas. These findings indicate that QEEG analysis and techniques of source localization may reveal differences in brain electrical activity related with gender among offenders with psychopathy, which was not obvious to visual inspection.

Poster 2-79**PREDICTING MELODIC CHANGES OF THE VOICE: INSIGHTS FROM ERP AND NEURAL OSCILLATIONS**Ana P Pinheiro¹, João Pedrosa¹, Margarida Vasconcelos¹, Carla Barros¹, & Sonja A Kotz^{2,3}¹University of Minho, ²University of Manchester, ³Max Planck Institute for Human Cognitive and Brain Sciences*Descriptors: emotion, voice, electroencephalography*

The capacity to predict what should happen next is a central aspect in perception. In the context of social communication, the effective prediction of auditory inputs that may include emotional information conveyed through the speaker's voice is critical. However, it is still unclear how the perceived salience of vocal stimuli affects sensory prediction and the detection of sensory deviance representing a prediction error. This question was probed using a combined event-related potential (ERP) and time-frequency approach. Short neutral, angry and happy vocalizations were presented both as standard and deviant stimuli to 20 healthy college students in a passive listening oddball paradigm. Participants were instructed to watch a silent movie and to ignore the sounds. The Mismatch Negativity (MMN) was analyzed. Furthermore, wavelet analysis of single trial data was performed to estimate phase synchrony (phase-locking factor-PLF) of the early auditory-evoked gamma-band response to each type of vocalization. MMN amplitude was reduced and PLF was increased for angry compared to neutral and happy vocalizations. These findings confirm that the brain is tuned to detect vocal changes and that deviance detection is modulated by stimulus salience. A reduced prediction error response to angry vocalizations may diminish the need to adjust an internal model and represent an economy of processing resources in the absence of any negative consequences following stimuli with aversive content.

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Poster 2-80**A NOVEL AND OBJECTIVE BOOTSTRAPPING METHOD FOR QUALITY CONTROL IN ERP STUDIES**Matthew A Gannon, & Nathan A Parks
University of Arkansas*Descriptors: event-related potentials, signal-to-noise ration, quality control*

Processing of ERP data involves several steps to ensure that ERPs meet an appropriate level of signal quality. Included in this process is the step of subject exclusion, where each participant's ERP waveforms are visually inspected for quality. Participants are excluded from statistical analyses if it is determined that their waveforms are deemed excessively "noisy". This step of ERP quality control is problematic for a number of reasons: visual inspection of ERP waveforms is qualitative and subjective, there are no standardized criteria as to what constitutes an ERP of appropriate signal quality, and there are considerable individual differences between ERP waveforms of individual subjects. Here, we describe an objective criterion to mitigate issues inherent to ERP subject exclusion. The method quantifies ERP signal quality as the lower bound of a signal-to-noise ratio confidence interval (SNR CI) computed through bootstrap resampling of ERP waveforms from a pool of all available EEG segments. SNR CI lower bound yields a metric reflecting an SNR value that has been significantly exceeded by a subject's waveform, as well as providing an objective measure of ERP signal quality that can be compared against a desired SNR criterion to determine if a subject's data should be excluded. This technique eliminates subjectivity and further conveys important information of the quality of individual subject ERPs. Here, we describe the bootstrap SNR CI method in detail and demonstrate the utility of this technique on visual evoked potential and oddball P3 datasets.

Poster 2-81**ERP CORRELATES OF VISUAL OBJECT CATEGORY FORMATION IN A PROTOTYPE-DISTORTION TASK**Stephanie M Long, Matthew A Gannon, & Nathan A Parks
University of Arkansas*Descriptors: object categorization, perceptual learning, electroencephalography*

Extensive literature in the cognitive neurosciences has been dedicated to understanding the neural processes involved in object category learning. However, much remains to be learned regarding the mechanisms by which high-level visual patterns are extracted from a crowded visual scene, segregated into discrete object categories, and represented in the cortical visual hierarchy. Here, we used event-related potentials (ERPs) to investigate the neural underpinnings of visual object category extraction in a cluttered visual environment. EEG was continuously recorded while subjects were given a hybrid of an object category learning and visual search task. In this hybrid task, a peripheral array of four dot patterns was flashed for 200 ms. In 50% of trials, one position of the array contained a distortion of a prototype dot pattern. The remaining trials consisted entirely of randomly generated dot patterns. After hundreds of trials, observers learned to detect the dot pattern object category via correct or incorrect feedback given on each trial. We assessed improvements in dot pattern detection (d') in conjunction with visual ERPs to examine the neural mechanisms of visual object category formation. Preliminary results indicate that improvements in pattern detection were associated with robust modulations of the N1 and N2 components of the visual evoked potential. These results illuminate the neural mechanisms underlying the formation of cortical representations for novel visual object categories and their extraction from a complex visual array.

Poster 2-82**IMAGINING AGAIN: THE STABILITY OF EMOTIONAL REACTIONS**

Charlesynquette M Duncan, David R Herring,
Margaret M Bradley, & Peter J Lang
University of Florida

Descriptors: imagery, heart rate, skin conductance

Autonomic psychophysiological indices such as heart rate and skin conductance have long been used to investigate stimulus significance. In this study, we assessed whether prior exposure to imagery of specific emotional and neutral scripts modulates heart rate and skin conductance reactions. Thirty participants performed a script-driven emotional imagery procedure while skin conductance and heart rate were recorded. In this protocol, pleasant, neutral or unpleasant scenes were imagined for 12 s each, following a 9 s period in which each script was visually presented on a computer screen. Half of the participants had previously imagined the identical scenes using the same protocol 1–2 weeks prior to the psychophysiological assessment; for the other half of the participants, the first imaginal exposure was during the psychophysiology assessment. Across groups, both heart rate change and skin conductance responses were significantly heightened during emotional compared to neutral imagery. Importantly, there was no effect of prior exposure on emotional imagery for either heart rate or skin conductance reactivity. These data support the use of a psychophysiological imagery assessment that could be administered pre- and post-therapeutic intervention to detect changes in emotional reactivity due to successful treatment.

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Poster 2-83**GETTING READY TO ESCAPE: BLINK STARTLE MODULATION AND AUTONOMIC REACTIVITY**

Christopher T Sege, Margaret M Bradley, & Peter J Lang
University of Florida

Descriptors: anticipation, escape, startle

When people anticipate an upcoming aversive picture, blink startle reflexes are potentiated due to increased defensive engagement. On the other hand, some studies suggest that defensive engagement in anticipation might be reduced if the anticipated aversive stimulus can be escaped after it occurs. The present study examined blink startle modulation during anticipation of aversive scenes that either could be escaped or were inescapable. Aversive disgusting pictures were preceded by a 6 s cue that signaled whether or not the picture could be terminated by pressing a button. In the escape condition, a rapid button press after picture onset replaced the disgusting scene with a pleasant nature scene. In the no-escape condition, the disgusting content was signaled, but there was no opportunity for escape. In addition to eliciting blink startle reflexes during each anticipatory interval, heart rate and skin conductance were also measured. Analyses indicated that blinks elicited in the context of cues that signaled the possibility of escape were attenuated compared to blinks elicited during cues indicating no possibility of escape ($t[34] = 2.56, p < .05$). At the same time, heart rate deceleration was more prominent during cues signaling possible escape ($t[34] = 4.06, p < .001$), and skin conductance responses were larger during escape relative to no-escape cues ($t[34] = 2.83, p < .01$). These findings suggest that preparing to escape an aversive scene increases task-related vigilance for picture onset, reducing the startle potentiation that is otherwise found when anticipating an aversive event.

Poster 2-84**FUNCTIONAL BRAIN ACTIVITY DURING PERSONALLY-RELEVANT EMOTIONAL IMAGERY**

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Charlesynquette M Duncan, & Peter J Lang
University of Florida

Descriptors: imagery, fMRI, emotion

Prior script-driven emotional imagery studies have reported functional activity in motor, memory, and reward processing regions when imagining threatening and rewarding normative scripts. The present aim was to extend prior research by examining functional activity during imagery of normative emotional events and imagery of events tailored to describe the participant's most pleasant and unpleasant experiences (i.e., personal scripts). Twenty-nine healthy college students underwent functional magnetic resonance imaging with a 3T Phillips scanner

while imagining normative scripts describing pleasant, neutral, and unpleasant events, as well as personal scripts describing the most unpleasant and pleasant events experienced by the participants. Personal scripts were developed using interview, questionnaire, and written descriptions for each participant. Consistent with prior research, enhanced BOLD activity when imagining emotional, compared to neutral scripts, was found in the medial prefrontal and supplementary motor cortices, medial temporal lobe (e.g., hippocampus), and cerebellum. Notably, significant differences between emotional and neutral scripts were also found in posteromedial parietal cortex (e.g., precuneus). In a number of regions, including precuneus and posterior cingulate, functional activity when imagining personally relevant scenes was enhanced compared to imagining standard scenes. These data support the future use of fMRI to investigate the neural networks activated when imagining idiosyncratic fearful events in clinically anxious patients.

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Poster 2-85**PROBING THE NEUROPHYSIOLOGY OF EXPERIENCE DEPENDENT PERCEPTUAL BIASES USING SIMULTANEOUS EEG-FMRI**

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University of Florida

Descriptors: electroencephalography, BOLD, perception

Sensory systems display measurable biases, prioritizing behaviorally relevant stimuli. Neurophysiologically, biases have been demonstrated at the level of single neurons and neural mass activity in humans. One hypothesis states that the modulation of sensory neurons by experience is driven by re-entrant feedback from anterior cortical and subcortical structures, but the empirical evidence for this hypothesis is scarce. In healthy human observers, neuroimaging techniques with high temporal and spatial resolution are ideally suited to test the re-entry hypothesis. Here, blood-oxygen level dependent (BOLD) data and EEG data were collected simultaneously during a classical conditioning paradigm in which the orientation of grating stimuli (the conditioned stimuli, CS) predicted the presence/absence of a cutaneous electric shock (the unconditioned stimulus). Gratings were phase-reversed for 5 seconds, at a fixed rate (10/sec), evoking steady-state visual evoked brain potentials (ssVEP). Single trial estimates of ssVEP power provided a measure of visual cortical engagement, and were used to create a parametrically modulated regressor to predict fluctuations in BOLD. Power at the ssVEP frequency was positively related to BOLD along extended visual cortical areas and hippocampus bilaterally as well as the left anterior insula and medial orbitofrontal cortex. Negative relationships were found with areas previously as task-negative. The data provide converging evidence consistent with the notion of selective top-down projections into visual areas.

Poster 2-86**EFFECT OF THE IMMINENT POSSIBILITY OF SMOKING ON BRAIN RESPONSES TO CIGARETTE-RELATED CUES**Jeffrey M Engelmann¹, Francesco Versace¹, Edward F Jackson², & Paul M Cinciripini¹¹University of Texas MD Anderson Cancer Center, ²University of Wisconsin*Descriptors: nicotine addiction, cue reactivity, smoking availability*

Smoking relapse is often precipitated by exposure to smoking cues. Functional magnetic resonance imaging (fMRI) studies have demonstrated that smokers have larger brain responses to smoking cues than to neutral cues, suggesting that smoking cues are motivationally significant. Prior fMRI research has only addressed smokers' responses to cues when smoking was not imminently possible. The goal of this study was to determine the extent to which brain responses to smoking cues change when smoking is imminently possible inside the scanner, a condition that more closely resembles relapse. Smokers (n = 12) completed a single fMRI session during which they viewed a series of cigarette-related and neutral pictures, each surrounded by a colored frame indicating whether or not smoking was possible on each trial. Whole-brain, within-subjects ANOVA with picture category (cigarette, neutral) and smoking possibility (possible, not possible) as factors found significant main effects of picture category (cigarette > neutral) in the precuneus, the insula, and the dorsal anterior cingulate cortex (ps < .005). In the precuneus, this cue reactivity effect was moderated by smoking possibility: brain responses to neutral cues increased when smoking was possible (p < .05). Based on the involvement of precuneus in the perception of highly arousing stimuli, our results suggest that cues that signal the availability of cigarettes are motivationally significant.

This research was supported by a career development award from the National Institute on Drug Abuse to Jeffrey M. Engelmann (K01-DA034752) and through the National Cancer Institute through MD Anderson's Cancer Center Support Grant (CA-016672).

Poster 2-87**THE GENERALIZATION OF CONDITIONED FEAR IN ADULTS AND CHILDREN**Miriam A Schiele¹, Julia Reinhard², Andreas Reif³, Katharina Domschke², Marcel Romanos², Jürgen Deckert², & Paul Pauli¹¹University of Würzburg, ²University Hospital of Würzburg, ³University of Frankfurt*Descriptors: fear generalization*

Fear generalization is assumed to be a major characteristic of anxiety disorders. Most research on human fear conditioning and its generalization has focused on adults. However, a direct comparison between child and adult populations is needed to determine generalization as a developmental risk for fear and anxiety. Therefore, we compared 285 healthy adults and 267 healthy children in a fear conditioning and generalization task. Neutral facial expressions of two females served as conditioned stimuli (CS), one of which (CS+) was paired with an aversive stimulus (UCS) while the other one was not (CS-). Four generalization stimuli (GS) were presented during the generalization phase, depicting gradual morphs of the CS+ and CS-. Skin conductance response (SCR) and ratings of valence, arousal and contingency awareness were obtained. Both groups displayed robust differential conditioning to the CS+ on both subjective and physiological levels. Children showed greater fear generalization than adults, indexed by enhanced arousal ratings and SCRs to three of four GS, while adults exhibited enhanced responses to the GS most similar to the CS+ only. Contingency awareness affected valence and arousal ratings with stronger conditioning effects in aware participants irrespective of group. Our findings suggest maturational effects on the ability to distinguish between aversive and non-aversive conditioned stimuli, and early inefficient discrimination might be a vulnerability marker for later-life anxiety disorders.

This work was supported by a grant from the Deutsche Forschungsgemeinschaft (SFB-TRR-58 Z02).

Poster 2-88**DIFFERENCE IN REACTIONS OF THE HEART RATE VARIABILITY IN RESPONSE ON COGNITIVE LOAD IN CHILDREN WITH HIGH AND LOW ACADEMIC ACHIEVERS**Vladimir V Trubachev¹, Andrei Gorbunov¹, Vera S Trubacheva¹, & Evgeny G Vaschillo²¹Mari State University ²Rutgers, The State University of New Jersey*Descriptors: children, heart rate variability, human adaptability*

Previous studies have found that human level of adaptability, i.e., the capacity to successfully meet internal and environmental challenges, can be assessed by power redistribution in the frequency spectrum of heart beat-to-beat intervals (RRI) towards low frequency in response to challenge. The goal of this study was to determine whether changes in heart rate variability (HRV) in response to a cognitive load can be used to differentiate children who are high and low academic achievers. RRI data were collected in 142 children 9–10 years old when they performed seven, 90-s tasks with 30-s break between them: baseline (BL) task, a test of attention task (ATT), 4 paced breathing tasks at rates of 12, 8, 7, 6 breathes/min, and a repeated ATT task. Children were coded as high or low academic achievers based on their grade point average (high achievers = 1, low achievers = 2). The index of adaptability as power of redistribution in the RRI spectrum in response to ATT task was calculated as (LF/HF in ATT - LF/HF in BL) where LF and HF were power of the RRI spectra in low frequency 0.05–0.15 Hz and in high frequency 0.15–0.4 Hz ranges. We found that this index was significantly higher in group 1 than in group 2 $F(2,140) = 4.6, p < 0.03$ for the first ATT task. At BL, mean HR was lower, while RRI standard deviation was higher in group 1 compared to group 2. Although paced breathing procedures influenced HRV, the repeated ATT task elicited similar analogical redistribution in RRI spectra as in the first ATT task. Results suggest HRV reactivity may reflect adaptability in children.

Poster 2-89**THE INFLUENCE OF DISCRIMINATION AND IDENTITY ON BLOOD PRESSURE IN AOTEAROA/NEW ZEALAND**Nik S Wilson¹, Jordan GN Pearce¹, LaBarron K Hill², & John J Sollers III¹¹University of Auckland, ²Duke University Medical Center*Descriptors: health disparities, blood pressure, Māori*

Hypertension is a silent killer that is associated with high morbidity and mortality rates throughout the modern world. In Aotearoa/New Zealand a hypertension disparity exists between Māori and New Zealand Europeans (Pākehā), with Māori individuals nearly three times as likely to have high blood pressure. The mechanisms of this disparity are not clearly understood; however, previous research in other cultural groups indicates that psychosocial determinants play a pivotal role. The present study investigated the impact of three such factors, perceived discrimination, social exclusion and ethnic identity, on blood pressure responses to an evocative mental stressor and a standard physical stressor in n = 39 rural Northland Māori. Analyses were performed on dichotomized groups, created based on total scores for each of the psychosocial measures. Intriguingly, we found evidence of blunted cardiovascular responding to the mental challenge – particularly among individuals who were higher in perceived discrimination and social exclusion, as well as among those holding more rigid beliefs about ethnic authenticity (p's < .05). These are some of the first data to consider the role of psychosocial factors on cardiovascular responses to stress among Māori. Further work is needed to determine if this pattern of blunted cardiovascular responding is a Māori-wide phenomenon, as well as to further examine the role of psychosocial factors in the well-documented hypertension disparities between Māori and Pākehā.

L.K.H was supported by National Institute of Aging grant (5T32AG000029-38).

Poster 2-90**ANTICIPATION OF FOOD GREATLY ENHANCES BRAIN RESPONSES TO FOOD CUES IN A LABORATORY SETTING**

Francesco Versace, Jennifer Ng, Kimberly N Claiborne, Menton M Deweese, & Susan M Schembre
University of Texas MD Anderson Cancer Center

Descriptors: emotion, food, anticipation

Enhanced reactivity to food cues is an implied characteristic of obesity, but laboratory-based, empirical findings do not consistently support this assumption. In natural settings, food cues are relevant because they are typically associated with food availability, whereas in the laboratory food cues are not often paired with food delivery. Removing food cues' predictive value might reduce their motivational relevance, limiting ecological validity. In this pilot study, we tested the hypothesis that manipulating food availability on a trial-by-trial basis modulates brain responses to food cues. We recorded EEG during the presentation of pleasant, neutral, unpleasant, and two categories of food images (sweet and fatty foods). At the beginning of the study, we told participants that one category of food cues (sweet or fat, counterbalanced across participants) would be paired with the delivery of M&M's candies. We used the amplitude of the late positive potential (LPP) as index of motivational relevance. Results from 13 participants show that the LPP evoked by food cues not paired with M&M's delivery was similar to the LPP evoked by neutral images ($p > .20$). On the other hand, the LPP evoked by food cues paired with M&M's delivery was significantly larger than the LPP evoked by neutral images ($p < .0001$) and as large as the LPP evoked by high arousing pleasant images ($p > .45$). It is important to improve the ecological validity of laboratory-based paradigms aimed at assessing reactivity to food cues. Food cues have higher motivational relevance when they predict food availability.

This project was supported by funds provided by The University of Texas MD Anderson Cancer Center to Francesco Versace.

Poster 2-91**CONDITIONED CORTICAL RESPONSES TO CUES PREDICTING CIGARETTE-RELATED OR PLEASANT IMAGES**

Menton M Deweese, Kristin M Cortese, Aurelija Slapin, Jennifer Ng, Kimberly N Claiborne, Jason D Robinson, Paul M Cinciripini, & Francesco Versace
University of Texas MD Anderson Cancer Center

Descriptors: conditioning, event-related potentials, nicotine addiction

Through conditioning, reward-associated stimuli can acquire incentive salience and motivate behaviors. For example, smokers report that cigarette-associated stimuli trigger cravings and compulsive smoking. To investigate the brain mechanisms underlying conditioned responses to salient stimuli, we measured brain responses to geometric patterns (conditioned stimuli, CS) predicting cigarette-related, erotic, and neutral images (unconditioned stimuli, US) using event-related potentials (ERPs). 30 non-smokers, 21 nicotine-deprived smokers and 22 non-deprived smokers participated in the study. During US presentation, both cigarette-related ($p = 0.001$) and erotic ($p < 0.0000001$) images prompted higher cortical positivity than neutral images over centro-parietal sensors between 300 and 600 ms post-US onset (late positive potential, LPP). The LPP evoked by erotic images was significantly larger ($p < 0.0000001$) than the LPP evoked by cigarette images. During CS presentation, the ERP amplitudes elicited by geometric patterns predicting erotic and cigarette-related images were similar and significantly larger (all $p < 0.0001$) than the amplitude evoked by CS predicting neutral images. These effects were maximal over occipital and frontal sites between 316 and 344 ms post-CS onset and over parietal sites between 220–232 ms post-CS onset. Smoking status did not modulate these effects. Our results show that once imbued with incentive salience, stimuli with no intrinsic reward value (e.g., cigarette-related cues) may act as secondary reinforcers and contribute to the maintenance of smoking.

Poster 2-92**TIME DYNAMICS OF CEREBRAL BLOOD FLOW RESPONSES TO PAIN STIMULATION IN FIBROMYALGIA: A TRANSCRANIAL DOPPLER SONOGRAPHY STUDY**

Casandra I Montoro¹, Cristina Muñoz Ladrón de Guevara¹, Stefan Duschek², & Gustavo A Reyes del Paso¹

¹University of Jaén, ²University for Health Sciences, Medical Informatics and Technology

Descriptors: fibromyalgia, pain processing, functional transcranial Doppler sonography

The temporal dynamics of cerebral blood flow (CBF) during painful stimulation in fibromyalgia syndrome (FMS) was analyzed via functional transcranial Doppler sonography. Blood flow velocities were recorded bilaterally in the anterior (ACA) and middle (MCA) cerebral arteries of 24 FMS patients and 20 healthy subjects during exposure to painful pressure stimulation. Participants underwent two stimulation blocks: a) fixed pressure (2.4 kg) and b) stimulation pressure individually calibrated to produce equal subjective-moderate pain intensity. A complex pattern of CBF modulations with four components was observed: an anticipatory increase before stimulation onset, an early increase, a transient decrease to baseline or below and a final increase. Group differences were observed in all components. The anticipatory component only appeared in FMS, specifically in the ACA. Patients exhibited a greater early CBF increase under the fixed pressure condition in the right ACA. A stronger CBF decrease after the early component was observed in patients during the equal pain condition in the ACA and MCA. Significant associations were found between clinical pain and CBF responses in the MCA. Results showed that pain processing is associated with a complex pattern of CBF modulation, where FMS patients exhibited alterations in all phases of the response. The aberrances may be ascribed to psychophysiological phenomena, like central nervous nociceptive sensitization and protective-defensive reflex mechanisms. The anticipatory CBF response in FMS may relate to the process of pain chronification.

This research was supported by a grant from the Spanish Ministry of Science and Innovation co-financed by FEDER funds (Project PSI2012-33509).

Poster 2-93**TEMPORAL SUMMATION OF PAIN IN FIBROMYALGIA: RELATION TO CLINICAL AND CARDIOVASCULAR PARAMETERS**

Pablo de la Coba, Germán Puerma-Galvéz, & Gustavo A Reyes del Paso
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Descriptors: fibromyalgia, temporal summation of pain, cardiovascular variables

Central sensitization to pain is hypothesized to play a relevant role in the development of fibromyalgia (FM). Temporal Summation of Pain (TSP) is an index of central pain sensitization. In this study TSP and its relation to clinical pain, psychological factors and cardiovascular parameters were evaluated in FM and healthy control. Fourteen women with FM and 10 healthy women completed the McGill Pain Questionnaire, the State-Trait Anxiety Inventory, and the Coping Strategies Questionnaire. Heart Rate, Systolic (SBP) and Diastolic (DBP) Blood Pressure, Baroreceptor Reflex Sensitivity (BRS), and variability of these measures were continuously recorded. Pain was evoked by pressure algometry in the left index finger during 9 equal low intensity pain stimuli of 5 s duration. Pressure of painful stimuli was calculated individually for each participant. Subjective pain intensity was assessed with a Visual Analog Scale. TSP was calculated as the difference between the last minus the first subjective pain intensity evaluations. TSP was clearly observed in FM patients but not in healthy controls. Levels of TSP in FM patients were positively associated with clinical pain and state-anxiety levels, and negatively associated with the distracting behaviors coping strategy, DBP variability, BRS, and SBP. TSP is proposed as an objective marker of FM and a sensitive tool for assessing clinical state and treatment efficacy. Our results also suggest that TSP is partially related to antinociceptive baroreceptor-mediated mechanisms.

This research was supported by a grant from the Spanish Ministry of Science and Innovation co-financed by FEDER funds (Project PSI2012-33509).

Poster 2-94**RELATIONSHIP BETWEEN ACADEMIC ACHIEVEMENT AND RESPONSE INHIBITION WITH BACKGROUND EMOTIONAL CONTEXTS**Orlando Reynoso Orozco, & Julieta Ramos Loyo
University of Guadalajara*Descriptors: academic achievement, inhibition, event-related potentials*

The relationship between academic achievement and event-related potentials in a Go/NoGo task with and without emotional contexts was assessed in undergraduate students. Twenty-one male students performed a Go/NoGo response inhibition task without context and with neutral, pleasant and unpleasant emotional background contexts. They had to press a key when an arrow located in the middle of the screen, coincided both in direction and color with a bar presented in the left or right edges (Go) and to withhold the response when it did not match (NoGo). Pearson's correlation values were calculated between four official measures of academic performance and, the amplitude and latency of N2 and P3 components. Emotional contexts showed higher inhibition errors and longer reaction times, as well as higher amplitudes and longer latencies of N2 and P3. Poor academic achievement correlated with increased amplitude of N2Go in the neutral and N2 NoGo in pleasant context whereas, increased P3Go amplitude and latency in the neutral and P3NoGo pleasant context was associated with higher academic achievement. These results suggest that sustain inhibitory control under emotional contexts is more difficult, and requires recruiting more attentional and inhibitory resources, and there exists a relationship between the inhibitory processing when emotional stimuli are present and the academic achievement in undergraduate students.

Poster 2-95**NEURAL SUBSTRATES OF EARLY AND LATE STIMULUS-PRECEDING NEGATIVITY: fMRI-CONSTRAINED ERP SOURCE ANALYSIS**Yasunori Kotani¹, Yoshimi Ohgami¹, Jun-ichiro Arai², Shigeru Kiryu³, & Yusuke Inoue⁴¹Tokyo Institute of Technology, ²Daikin Industries, ³The University of Tokyo, ⁴Kitasato University*Descriptors: stimulus-preceding negativity, source analysis, fMRI*

A previous study on stimulus-preceding negativity (SPN) revealed that anticipation for face stimuli evokes early SPN especially at the occipital area, and anticipation for word and symbol stimuli activates late SPN at the right frontotemporal area and parietal area (Ohgami et al., 2014). In the present study, we performed two separate fMRI (N = 31) and ERP (N = 30) experiments and conducted an fMRI-constrained ERP source analysis to reveal the neural substrates of the early and late SPN. We employed a time estimation task where participants had to press a button four seconds after an instruction stimulus, and a feedback stimulus about task performance was presented two seconds after the button press. There were four experimental conditions based on the contents of the feedback stimulus: Face (smiling face for correct, or sad face for incorrect response), Word (Japanese word "ATARI" meaning correct, or "HAZURE" meaning incorrect), (c) Symbol ("|" for correct, or "||" for incorrect), and (d) No Feedback where the feedback stimulus was omitted. The fMRI-constrained ERP source analysis revealed that the bilateral middle occipital gyri could be sources of the early SPN that responds to face stimuli, and the right anterior insula could be a physiological source of the late SPN. Temporal activities of these regions indicated that the bilateral occipital gyri activated earlier than the right anterior insula. This result supports the notion that anticipation process of facial stimulus is faster than word and symbolic stimuli.

Poster 2-96**EFFECT OF UNILATERAL STIMULUS PRESENTATION ON COMPONENTS OF STIMULUS-PRECEDING NEGATIVITY**Yoshimi Ohgami¹, Yasunori Kotani¹, Jun-ichiro Arai², Shigeru Kiryu³, & Yusuke Inoue⁴¹Tokyo Institute of Technology, ²Daikin Industries, ³The University of Tokyo, ⁴Kitasato University*Descriptors: stimulus-preceding negativity, perception, laterality*

A well-known phenomenon is that the left hemisphere shifts attention predominantly to the right hemisphere whereas the right hemisphere distributes attention

to both hemispheres. In the present study, we recorded stimulus-preceding negativity (SPN) that relates to anticipation, and performed a principal component analysis (PCA) to investigate the effect of unilateral stimulus presentation on components of SPN. Participants (N = 30) performed a time estimation task where a feedback stimulus was presented 2 s after a voluntary movement, and i) the stimulus position (left or right side) and ii) the stimulus modality (auditory or visual) of feedback stimuli were manipulated. The PCA identified five spatial components, and ANOVAs on factor 1 and factor 3 showed a significant interaction of modality by laterality. Topography maps revealed that activities at the right frontotemporal area, medial centroparietal area, right parietal area, and left centroparietal area were more increased when a visual stimulus was presented in the left side compared with the stimulus presented in the right side. Furthermore, the ANOVA on the SPN in the visual condition also confirmed that the left unilateral stimulus presentation evoked a right hemisphere preponderance while there was no hemisphere difference under the right unilateral stimulus presentation. The present results confirmed that SPN is affected by spatial properties of anticipated stimuli and suggest that attention shift to a hemisphere starts before the stimulus is presented.

Poster 2-97**EEG CORRELATES OF WORKING MEMORY PERFORMANCE**Nadezhda V Tulenina, & Yuri G Pavlov
Ural Federal University*Descriptors: working memory, electroencephalography*

The current study investigated individual differences in the EEG of participants with different working memory performance. Most previous working memory studies used intermediate tasks that most participants solved with few mistakes. We varied difficulty of the tasks from intermediate to extremely hard. The tasks included sets of 5, 6 and 7 letters to memorize without any manipulations (straight order), or tasks requiring more complicated memorization, in which participants first have to mentally recombine sets of letters in the alphabetic order. The participants (N = 70; age = 21.32, SD = 3.50; all women) were divided into 2 groups: a high performance group (HPG) and a low performance group (LPG) (the 1st median and the 2nd). The mean working memory performance for HPG was $84.9 \pm 0.5\%$ and for LPG $70.9 \pm 1.4\%$. Increased memory load in the straight order tasks increased alpha2 and beta1 EEG power of the HPG participants, but not the EEG of the LPG. Comparison of EEG power for the tasks in alphabetic order revealed: 1. frontal midline theta rhythm in the tasks for memorizing 5 and 7 letters demonstrated an increase in the HPG and decrease in the LPG; 2. participants from the LPG showed higher frontal midline theta activity in most of tasks except the most difficult ones (memorizing 6 and 7 letters in alphabetic order). The results emphasize the role of alpha2 and beta1 rhythms for active inhibition of distracting and irrelevant stimuli and the importance of frontal midline theta and anterior cingulate cortex for maintenance of selective attention.

Study was supported by Russian Foundation for Basic Research (grant no. 13-06-96028) and through the "Young scientists UrFU" competition.

Poster 2-98**MINDFULNESS TRAINING INCREASES THE EFFICIENCY OF ATTENTIONAL ORIENTING: AN EXAMINATION WITH LATERALIZED EEG POWER SPECTRA**

Rob Van der Lubbe, Elian De Kleine, Karlein Schreurs, & Ernst Bohlmeijer
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Descriptors: spatial attention, mindfulness, lateralized EEG power spectra
Mindfulness based stress reduction (MBSR) training may be considered as a technique that improves the efficiency of attentional orienting. At a neurophysiological level, this efficiency can be examined by measuring the electroencephalogram (EEG) in an endogenous cuing paradigm. A task variant was employed in which one side of a double-sided arrow cued the hand at which a to-be-detected nociceptive stimulus might occur. This paradigm enables us to compute lateralized power spectra (LPS) of the EEG, which was shown to be highly sensitive for attentional orienting. Thirty-two participants were randomly assigned to two groups (A, B). Members from group A participated in our task both before (pre-A) and after (post-A) the MBSR training of eight weeks, while members from Group B took part only after the training (post-B). Examination of the results of the LPS analyses for the orienting phase during the cue-target interval revealed increased ipsilateral vs. contralateral power in the lower and higher alpha bands above parietal sites after the training both in the within-subjects (pre-A vs. post-A) and in the between-subjects (pre-A vs. post-B) comparisons. These neurophysiological findings confirm the idea that mindfulness increases the efficiency of attentional orienting.

Poster 2-99**INHIBITION OR ADAPTIVE DEFICIT THAT MATTERS TO THE ELDERLY**

Shulan Hsieh, Mengyao Wu, & Chien-Hui Tang
National Cheng Kung University

Descriptors: inhibition, adaptive, event-related potentials
Literature has documented that there are declines with increasing age in cognitive control functions, especially in inhibition-related functions. However, a more complicated scenario is that not only there are no such uniform age-related inhibition deficits with overt behavioral performance measures being found in the literature, but also that neuroimaging studies have shown that even when behavioral performance is matched between age groups, there are still differences in brain activation between age groups. Hence, the aging brain appears to be adaptive in which it engages in compensatory modulations in response to the challenges posed by declining brain structures and functions. The aim of this study is to systematically manipulate different degrees of task demands in a go/no-go task paradigm to evaluate (1) if there is a uniform deficit for elderly in withholding the response towards a no-go stimulus regardless of task demand, and (2) if there are companion compensatory brain responses in elderly to overcome their deficiency during task performance, and (3) if the compensatory responses, if found, further depend on the degree of task demand. The outcomes of this study will help us to understand if there are boundary conditions in which the adaptive aging brain can functionally well.

Poster 2-100**PSYCHOPHYSIOLOGICAL RESPONSES TO A SELF-COMPASSION MEDITATION IN TRAUMA-EXPOSED INDIVIDUALS**

Joanne Storr¹, Kaitlyn Biehler¹, Hans Kirschner¹, Willem Kuyken², & Anke Karl¹

¹University of Exeter, ²University of Oxford

Descriptors: self-compassion, loving-kindness
Beneficial effects of self-compassion, i.e., being kind and considerate to one's self with the acknowledgement that pain cannot always be avoided or fixed, for mental health and well-being have been previously demonstrated. Our group has shown that a one-off self-compassion meditation exercise in mentally and physically healthy individuals reduced negative affect, negative cognitions about the self and sympathetic arousal on one hand and enhanced positive affiliative affect and parasympathetic activity on the other hand. This research tested the hypothesis that the meditation can also be beneficial for individuals who survived psychological trauma and have posttraumatic stress disorder (PTSD), a disorder characterized by elevated physiological arousal and negative posttraumatic cogni-

tions about the self. This study used self-report and physiological measures (Heart-Rate, Heart-Rate Variability, Skin Conductance Level) in a trauma-exposed sample (Sample size = 56) with and without PTSD. Both groups show significant meditation-induced reductions in state self-criticism and sympathetic arousal (Heart-Rate, Skin Conductance Level). However, only the non-PTSD group had the expected pattern of significantly elevated state self-compassion and parasympathetic activation induced by a one-off self-compassion meditation. Gilbert's three regulatory systems theory suggests that the self-compassion meditation was enough to reduce psychophysiological threat responses and activate the safety system in the non-PTSD group but not to initiate safety and connectedness in PTSD patients.

Funding provided by the University of Exeter, UK.

Poster 2-101**THE NEURAL CORRELATES OF THE SELF BEFORE AND AFTER LOVING-KINDNESS MEDITATION IN THOSE WHO HAVE EXPERIENCED PSYCHOLOGICAL TRAUMA**

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Descriptors: self-referential processing, event-related potentials, self-compassion
After a traumatic event, negative alterations of cognitions about the self can be persistent and debilitating, and developments of negative self-schemas are associated with forms of psychopathology including PTSD (e.g. Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). A self-referential processing task based on Markus (1977) measures self-schema using event-related potentials (ERPs) to positive and negative self-descriptive adjectives. While negative self-schema and the neural correlates representing it are quite well understood in depression (e.g. Shestyk & Deldin, 2010), it has yet to be explored in this population. This research tested self-referential processing in a sample (56 participants) of trauma-exposed individuals with and without PTSD and investigated whether a single loving-kindness meditation (LKM) is able to alter negative self-schema. Kirschner et al. (2013) found that, in healthy participants, LKM reduced state self-criticism and increased self-compassion and affiliative affect. In line with our hypothesis, our initial analysis indicates that people with PTSD showed increased negative self-referential processing accompanied by elevated ERPs 600–800ms after negative self-referential words (as seen in depression) before LKM with reductions in self-criticism after LKM. Research has documented the effectiveness of directly addressing and restructuring self-referential processing with cognitive-behavioral treatments for PTSD (Bryant et al., 2008; Ehlers and Clark, 2000) and this research may help us to understand a mechanism through which changes occur.

Poster 2-102**PRE-REFLECTIVE AND REFLECTIVE SELF AT PRESENT AND IN THE PAST: ERP STUDIES OF SELF DETECTION AND REFLECTION**

Ilona Kotlewska, & Anna Nowicka
 Nencki Institute of Experimental Biology

Descriptors: social cognition, reflective self, face and name processing

Numerous studies suggest that people tend to think of themselves in the past rather than as of "another" person. This point of view is often called a third person perspective (TPP) and was the main focus of the study. However, the concept of self may be represented by two different experiences. The pre-reflective self is the whole of processes related to perception of stimuli representing self as a subject (e.g. personal pronouns, own face, name). The reflective self refers to the processes related to perceiving the self as an object: mentalizing or self-reflecting. In our ERP studies we investigated pre-reflective and reflective present and past self, compared to personally related or not related others. In the first experiment, married women detected present and past images of faces, marital and family names as well as faces and names of close-other, famous and unfamiliar persons. In the second experiment, a self-reflection task was applied to address the reflective self. Subjects evaluated personality traits as self-relevant or irrelevant. Close-other's and famous person's traits judgments were used as control conditions. Results of the first experiment showed that only P300 amplitudes to the past self name and the close-other's name did not differ whereas it was not the case for faces. In the second experiment, amplitudes of late positive potentials (LPP) revealed similar effect, i.e., lack of differences between past self and close-other. Thus our study suggests that only reflective and non-physical pre-reflective aspects of past self are processed like the close-other.

This work was funded by the National Science Centre [grant 2012/07/B/HS6/01283] (Poland).

Poster 2-103**SPATIAL FREQUENCY SENSITIVITY AND EMOTIONAL FACE PROCESSING IN ADOLESCENTS**

Jill Grose-Fifer¹, Danielle Mascarelli², Elvira Kirilko², Kevin Constante², Amy Medina¹, & Danielle diFilipo¹

¹John Jay College of Criminal Justice and The Graduate Center, The City University of New York, ²John Jay College of Criminal Justice, The City University of New York

Descriptors: adolescents, faces, emotion

Adolescents often have difficulty identifying emotional facial expressions. The ability to quickly recognize expressions is posited to rely more on low (LSF) than high spatial frequencies (HSF). LSFs have also been shown to drive the face inversion effect. During adolescence, pathways that process LSFs are posited to develop more slowly than those that process HSFs, this may impact face processing in general. This study investigated age-related differences in the ERP correlates of the face inversion effect among adolescents and adults, using emotional faces that were high pass (HP) or low pass (LP) filtered. We hypothesized there would be immaturities in the P1 and N170 in adolescents, especially with LP stimuli. Adults and adolescents viewed happy faces, fearful faces and chairs that were unfiltered, LP or HP filtered, while their EEG was recorded. All stimuli were presented in both upright and inverted orientations. P1 amplitudes were larger for adolescents than adults, but the opposite was true for the N170. In adults, the face inversion effect on N170 amplitude was larger for fearful faces than for happy faces, but the reverse was found in adolescents. The face inversion effect for N170 amplitude was attenuated in the HP condition compared to the LP and unfiltered conditions. Notably, adults and adolescents showed topographical differences in the P1 face inversion effect for LP faces. Our data suggest that the pathways that carry information about LSFs are still maturing during adolescence, and that face processing develops more quickly for happy than for fearful faces.

Funding provided by CUNY.

Poster 2-104**GENUINE AND POLITE SMILES IN THE CONTEXT OF PERFORMANCE FEEDBACK: AN ERP STUDY**

Christian Valt, Phillip Möller, & Birgit Stürmer
 International Psychoanalytic University Berlin

Descriptors: smile, feedback, cognitive conflict

Action appropriateness can often be seen on the face vis-à-vis. A genuine smile of the counterpart generally follows adequate actions whilst polite smiles are

mostly expressed after performances that were not optimal. In the present experiment event-related brain potentials (ERPs) were recorded to assess the processing of smile authenticity when emotional faces were presented as performance feedback in a cognitive conflict task. Two main factors were considered: (1) Perceptual characteristics of the smile were manipulated, that is, happy (HH), neutral (HN) or sad (HS) eyes were incorporated into the corresponding smiling face; (2) The relationship between performance quality (fast, average, or slow responses) and the type of feedback face were manipulated. Participants rated HH faces the happiest followed by HN and HS faces (HH > HN > HS). Additionally, feedback faces were rated happier after fast responses as compared to average or slow responses (fast > average > slow). The ERP showed modulations of early visual potentials according to the perceptual characteristics of the face. The P1 was larger for HH and HS than HN faces. Moreover, the relationship between performance and feedback face had a significant impact on the P2, a later ERP component. Faces elicited the largest P2 amplitude after fast responses as compared to average and slow responses. Taken together, processing the authenticity of a smile is determined by both the perceptual features of the smiling face and the context in which the smiling face occurs.

Poster 2-105**EFFECTS OF WALKING ON UNEVEN GROUND ON EEG ACTIVITY**

Diana Henz, Johanna V Maus, & Wolfgang I Schöllhorn
 University of Mainz

Descriptors: gait, motor control, electroencephalography

Several studies on cortical brain activity substantiate an increase of EEG alpha activity during and after physical exercise. In the present study, we investigated effects of walking on uneven ground on EEG activity. Subjects performed a 20-minute walk at a defined pace on two different grounds (even, uneven). Eyes-open and eyes-closed resting EEG was recorded before and immediately after walking. Eyes-open spontaneous EEG was measured during walking. Results show an increase in temporal theta activity, fronto-parietal alpha activity, and parietal beta activity after walking on uneven ground, with decreased frontal gamma activity after walking on uneven ground compared to walking on even ground in eyes-open conditions. In the eyes-closed conditions, we found a decrease in temporal and occipital alpha activity, frontal and occipital beta activity, and frontal gamma activity, with a ground by time interaction in parietal and occipital theta activity after walking. Increased frontal and central theta and alpha activity was obtained in minutes 15 to 20 during walking on uneven ground. Our results demonstrate that walking on uneven ground causes changes in brain activity. We hypothesize that alterations of brain activity result from higher affordances on somatosensory information processing and attentional focusing during walking on uneven ground.

Poster 2-106**EVALUATION OF A BRIEF NEUROMETRIC BATTERY FOR THE DETECTION OF NEUROCOGNITIVE CHANGES ASSOCIATED WITH AMNESTIC MCI AND MILD ALZHEIMER'S DISEASE**

Emily Cunningham¹, Kelly Graves², Hamid Okhravi², & Paul Kieffaber¹
¹College of William and Mary, ²Eastern Virginia Medical School

Descriptors: Alzheimer's disease, event-related potentials, electroencephalography

Although early detection of cognitive decline associated with Alzheimer's disease (AD) may be critical to successful treatment and prevention, the detection process is complicated by the fact that overt behavioral changes often do not manifest until years after the onset of neurodegeneration. ERP-based markers hold promise in this area, but are rendered impractical due to the time required to assess multiple ERP components using standard techniques. The purpose of this study was to evaluate the sensitivity and clinical practicality of a nested battery of ERP-based neurometrics (see Kappenman & Luck, 2012) for the detection of subtle changes in sensory and perceptual function associated with mild to moderate levels of cognitive impairment. The task was well-tolerated in a sample of older adults (N = 30) with amnesic mild cognitive impairment (MCI) and mild AD recruited from a local memory clinic, allowing generation of ERP profiles reflecting multiple neurocognitive domains (e.g. P50, MMN, C1, N2pc, P3, ERN, LRP). Results suggest that these profiles can be used to differentiate between individuals with differing diagnoses, and comparisons with neuropsychological (e.g. Montreal Cognitive Assessment) and volumetric (e.g. hippocampal volume) data support the potential utility of this procedure in clinical settings.

Poster 2-107**APPROACH AND AVOIDANCE BEHAVIOR IN CHRONIC BACK PAIN: THE ROLE OF PAVLOVIAN-INSTRUMENTAL TRANSFER**

Frauke Nees¹, Michaela Ruttorf², Xaver Fuchs¹, & Mariela Rance¹
¹Central Institute of Mental Health, ²Heidelberg University

Descriptors: pain, conditioning, reward

Chronic pain may predominantly or entirely depend on maladaptive learning processes - both in a respondent and operant fashion. These learning-related alterations may contribute to a mismatch in approach/avoidance behavior, most relevant to the development and maintenance of chronic pain states, and with the prediction of pain and analgesia, as well as reward and pain relief processing as possibly major factors. In the present study, we aimed at elucidating how exactly these mechanisms interact, on a behavioral, peripheral and central level, to produce maladaptive behavior in chronic back pain. We used a pain-unrelated (monetary) reward and a newly developed pain-related (pain relief) Pavlovian-instrumental transfer (PIT) task during functional magnetic resonance imaging in patients with chronic back pain and healthy controls. Moreover, participants underwent a newly developed pain-related approach-avoidance task in the laboratory. First results indicate that chronic back pain patients show reduced pain-unrelated appetitive approach involving reduced Pavlovian-instrumental transfer, and increased pain-relief avoidance behavior. This was represented by increased skin conductance responses, increased response times, and enhanced response in the amygdala, insula and orbitofrontal cortex, but reduced response in the striatum and prefrontal cortex. These data may have important clinical implications contributing to the development, and more specifically explain the maintenance of chronic pain.

This work was supported by a grant from the Deutsche Forschungsgemeinschaft (NE 1383/6-1 to F.N.).

Poster 2-108**A NEW BIOMARKER PROPOSAL FOR THE CONVERSION FROM MILD COGNITIVE IMPAIRMENT TO ALZHEIMER'S DISEASE: AN EVENT-RELATED OSCILLATIONS STUDY**

Gorsev G Yener¹, Derya Durusu Emek-Savas¹, Berrin Cavusoglu¹, Bahar Guntekin², Emel Ada¹, & Erol Basar²
¹Dokuz Eylül University, ²Istanbul Kultur University

Descriptors: electroencephalography, event-related oscillations, Alzheimer's
 Previous studies reported decreased delta event-related oscillations (EROs) due to cognitive impairment in Alzheimer's disease (AD) and mild cognitive impairment (MCI); however no study has investigated its utility in predicting disease progression. In the present study, we aimed to define an electrophysiological biomarker of disease progression and conversion from MCI to AD by using delta EROs and volumetric magnetic resonance imaging (vMRI). Twenty-two MCI patients and 23 matched healthy controls participated. EEG was recorded during a classical auditory oddball paradigm. EEG and MRI were repeated after one-year follow-up. At one year follow-up, 14 MCI patients converted to AD and 8 remained stable. The delta (0.5–3.5 Hz) EROs, volumes of whole brain, and volumes of right and left hippocampi of stable and progressive MCI at baseline and follow-up were compared. Delta ERO were lower in MCI at baseline and follow-up [$F(1,43) = 11.394, p < 0.003$]. Progressive MCI had lower delta ERO than stable MCI at F3 at baseline ($p < 0.03$). vMRI revealed that MCI patients had lower volumes at baseline in whole brain and left hippocampus, and at follow-up in whole brain, right and left hippocampi ($p < 0.009$). Moreover, a moderate correlation was found between left hippocampus volumes and delta ERO at C4 ($r = .381, p < 0.05$). The present results demonstrate that delta ERO responses may detect early changes in MCI and indicate the patients who will progress to AD in advance. Brain oscillatory responses have the potential to be used as a biomarker in MCI/AD.

This study was supported by TUBITAK 112S459 grant.

Poster 2-109**NEURAL RESPONSES TO FOOD IMAGES IN NORMAL WEIGHT, OVERWEIGHT, AND OBESE INDIVIDUALS**

Ryan L Olson, Christopher J Brush, Kathryn del Prado, & Brandon L Alderman
 Rutgers, The State University of New Jersey

Descriptors: late positive potential, obesity, eating behavior

Globally, more than 600 million people were considered obese in 2014. Obesity is a complex biobehavioral disorder that is influenced by multiple environmental, behavioral, and physiological factors. Until recently, little was known about the neural correlates of obesity. Obesity has been associated with reduced brain volumes in areas associated with reward and motivation. Alterations in these areas may influence behaviors and motivations to eat healthy foods, particularly when highly palatable unhealthy foods are readily available. The aim of this study was to examine the relationship between obesity and the late positive potential (LPP), an event-related potential component related to motivational relevance and arousal, elicited by food-related stimuli. We compared LPP responses in normal weight, overweight, and obese adults while passively viewing calorically dense (CD), calorically sparse (CS), and neutral pictures. Measures of eating behaviors and subjective food ratings were also assessed. As expected, participants displayed increased LPP amplitudes to both CD and CS images compared to the neutral images at midline sites. An attenuation of LPP amplitude to CS food images was found with obese participants compared to normal weight and overweight participants, suggesting a reduced motivational salience among this group. Positive correlations were also found between LPP amplitudes and body mass index (BMI). These results suggest that obesity in young adults may be associated with impaired neural processing of food images, which could possibly influence dietary choices.

**POSTER SESSION III
 THURSDAY, OCTOBER 1, 2015
 6:30 P.M. – 8:30 P.M.**

AUTHORS PRESENT FOR DISCUSSION AND QUESTIONS**Poster 3-1****BRAINS OSCILLATORY NEURAL MARKER REPRESENTING THE STRATEGIC SHIFT IN MOTOR SEQUENCE LEARNING**

Odelia Goldberg-Nakar, Eli Vakil, & Abraham Goldstein
 Bar-Ilan University

Descriptors: motor learning, magnetoencephalography, individual differences
 Our main goal was to identify a neural correlate of the strategic-shift in motor sequence learning (MSL), characterized by an increase in performance variability. In the current work, we used a computerized version of the finger-to-thumb opposition sequence task, and recorded magnetoencephalogram (MEG) signals to examine the relations between physiology and behavior. During the task, participants typed repeatedly an explicitly known sequence composed of five-finger movements on a response box. Performance was estimated according to speed, accuracy, variability, learning rate and key-press pattern. Synthetic aperture magnetometry (SAM) beamforming was performed for the various frequency bands. Alpha power was significantly lower during the strategic-shift phase than in the preceding and succeeding phases, preponderantly in a right ipsilateral network consisting of the postcentral gyrus, cerebellum, superior parietal lobule, anterior cingulate cortex and the inferior temporal gyrus. In bilateral dorsolateral prefrontal cortex (DLPFC) alpha power increased, and in the ipsilateral DLPFC it was inversely correlated with performance variability. Beta power was also lower during the strategic-shift, in distributed regions. Beta power levels in the left postcentral gyrus, cerebellum and precuneus were correlated. In summary, it is possible that alpha band depicts a right hemisphere involvement in exploring and selecting the best strategy, while beta band describes better the left hemisphere role in executing the selected motor plan.

Poster 3-2**CONCURRENT SOUND SEGREGATION BY ONSET ASYNCHRONY IS PRESERVED IN HEALTHY AUDITORY AGING**Alexandra Bendixen¹, Christina Brauckmann², Teresa Klohn², & Volker Hohmann²¹Chemnitz University of Technology, ²University of Oldenburg*Descriptors: auditory processing, aging*

When two sound sources are concurrently active, their acoustic signals reach the ears as a complex mixture. Human listeners can disentangle such mixtures with surprising ease. The auditory cues that permit concurrent sound segregation have received much attention, especially in the face of difficulties in sound segregation experienced by many elderly listeners. The present study investigated the capability to disentangle two overlapping sounds by small onset asynchronies between them. This mimics the observation that even when two independent sources emit sounds concurrently, it hardly ever happens that they start producing sounds at exactly the same time. The ability to use asynchronies ranging from 0 to 100 ms was compared between a group of young (26 yr.), normal-hearing participants and a group of older (65 yr.) participants with mild hearing impairment. Sound segregation was assessed both behaviorally and by means of an event-related potential (ERP) component, the object-related negativity (ORN). ORN is known to correlate with the perception of two as opposed to only one sound. Results show that both the ORN component and behavioral segregation performance increased with increasing onset asynchrony. This effect was markedly similar in both groups, implying that the central auditory ability to segregate concurrent sounds by onset asynchrony is preserved in older listeners. This contrasts some other auditory cues whose use has been shown to decline with age, and is thereby informative for models of concurrent sound segregation as well as for hearing training programs.

This work was supported by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG Cluster of Excellence 1077 "Hearing4all," and SFB/TRR 31 "The active auditory system").

Poster 3-3**HYPNOTICALLY-INDUCED VISUAL BLOCK AND ANALGESIA ARE BASED ON A BREAKDOWN OF NEURAL COMMUNICATION BETWEEN FRONTAL EXECUTIVE AND POSTERIOR SENSORY BRAIN AREAS**Wolfgang HR Miltner¹, Holger Hecht¹, Angelika M Dierolf², & Ewald Naumann²¹Friedrich Schiller University Jena, ²University of Trier*Descriptors: hypnosis, induced visual block, hypnotic analgesia*

Hypnosis is an excellent example that the human mind is a powerful agent to make the impossible happen. Why subjects don't perceive stimuli when suggested that a virtual wooden board would block the perception of visual stimuli or why people don't feel pain in response to noxious stimuli while suggested being anesthetized, is still one of the major enigmas of psychology and neuroscience. Here we present two EEG studies on the effects of hypnotic suggestions a) to virtually block subjects' perception of stimuli of a three-stimulus Oddball paradigm and b) that a virtual analgesic agent on subjects' hand would prevent pain to electrical stimuli. In both cases, ERP data indicate a significant suppression of late ERP amplitudes (P3, slow wave) when stimuli were present while exposed to hypnotic suggestions as compared to a control condition. Additional analysis in the sensor and source domain indicates a significant suppression of gamma band oscillations in visual and somatosensory brain areas during stimulus processing under the hypnotic conditions as compared to the control condition. Further connectivity analysis in the source domain revealed that this suppression is induced by a cortical source in dorsolateral frontal executive brain areas that emerges as soon as the hypnotic suggestion has started and remains active throughout the period of suggestion. Thus, hypnotic suggestion that pushes the processing of stimuli to the back of one's mind seems to be based on a breakdown of neural communication between brain areas that constitute the conscious perception of stimuli.

Poster 3-4**INDIVIDUAL DIFFERENCES IN DEFENSIVE REACTIVITY DURING ACUTE AND POTENTIAL THREAT IN PATIENTS WITH PRIMARY ANXIETY AND DEPRESSIVE DISORDERS**

Jan Richter, Anke Limberg, Katja Lindner, Mathias Weymar, & Alfons O Hamm

University of Greifswald

Descriptors: fear, anxiety, transdiagnostic approach

Following the RDoC framework mental illness might be described best by deficits in behavioral and related neurobiological systems. In the present project we investigated individual differences in threat reactivity during instructed anticipation of electric shocks between patients with primary anxiety or depressive disorders. Using varying degrees of shock probability we studied the responses when facing acute ("fear") and potential ("anxiety") threat with high and low threat predictability, respectively, as compared to a neutral condition. As expected, overall fear ratings and startle magnitudes were significantly higher during presentation of a fear cue signaling an imminent shock than during a neutral cue. As compared to a neutral context fear reactivity was also pronounced during the context in which danger cues were presented although this context was instructed to be safe. However, context reactivity was largest during that context signaling potential harm. Importantly, patients largely varied in threat reactivity depending on several clinical characteristics. For instance, startle reactivity during acute fear significantly decreased with increasing overall symptom severity while reactivity during potential harm was positively associated with the degree of comorbidity. In contrast, no significant associations with reported fear were observed. Our results confirm previous studies showing large physiological differences in defensive reactivity irrespective of verbal reports.

Poster 3-5**LAB VS. MRI: TESTING THE STARTLE PROBE METHODOLOGY IN DIFFERENT EXPERIMENTAL SETTINGS**Katja Lindner, Jan Richter, Jörg P Pfannmöller, Mathias Weymar, Alfons O Hamm, & Julia Wendt
University of Greifswald*Descriptors: threat predictability, startle, fMRI*

In humans, psychophysiological studies have shown differential influences of threat predictability on startle potentiation. Independent MRI studies show differential activations within the neural fear network, accordingly. However, joining both indices simultaneously remains a rarely accomplished goal due to the high level of artifact interference within the MRI environment. Based on our previous study, in which we established the startle probe methodology within the MRI environment, we now recorded startle EMG responses in a physiological laboratory setting and parallel to the acquisition of BOLD activity in a MRI setting within the same participants. Here, contexts were presented that differed in the degree of predictability of aversive stimuli: In the safe context (N) participants knew that no aversive stimulus was applied; in the two threatening conditions, the aversive stimulus was applied either during a visual cue (predictable, P) or at any time (unpredictable, U). Within the fear network we found stronger activations for P compared to N cues in bilateral anterior insula, left amygdala, right BNST, and ACC, whereas activity for the U context in comparison to N was enhanced only in bilateral anterior insula and right BNST. Furthermore, results show the expected potentiation of the startle response in P only in the presence of the cue, while the startle potentiation in U was independent of the presence of the cue. This pattern was identical in the laboratory and the MRI environment suggesting a high comparability of the startle probe methodology across settings.

Poster 3-6**EVALUATING THE EFFECTS OF MINDFULNESS PRACTICES IN YOUNG CHILDREN USING ERP MEASURES OF ATTENTION AND SALIVARY MEASURES OF STRESS**Trey Avery, Karen Froud, Anne Martin, & Jeanne Brooks-Gunn
Columbia University*Descriptors: attention, mindfulness, event-related potentials*

This study was conducted by an interdisciplinary team of researchers at Columbia University examining differences in attentional networks and stress in children ages 5–6, some of whom are engaged in a mindfulness program at a Bronx, NY school, using a battery of biological and behavioral measures. Preliminary data shows consistent and significant differences in ERP measures of attention using the Attention Network Task (ANT-C). Group differences in three markers of stress found in saliva (cortisol, alpha amylase and Secretory Immunoglobulin Alpha) were also observed.

This project was supported by the Dean's Grant for Research at Teachers College.

Poster 3-7**LINKS BETWEEN CARDIAC PSYCHOPHYSIOLOGY AND PSYCHOPATHOLOGY AMONG 8-12-YEAR-OLD YOUTH**Alexis Howard¹, Tiffany M Shader¹, Aimee R Zisner¹, Ziv Feinberg¹, Lisa M Gatzke-Kopp², & Theodore P Beauchaine¹¹The Ohio State University, ²The Pennsylvania State University*Descriptors: heterotypic comorbidity, pre-ejection period, respiratory sinus arrhythmia*

Heterotypic comorbidity of internalizing (INT) and externalizing (EXT) disorders is common despite little overlap in diagnostic criteria. High risk for comorbidity in youth may be explained in part by emotion dysregulation and trait impulsivity. Under appropriate stimulus conditions, respiratory sinus arrhythmia (RSA) and cardiac pre-ejection period (PEP) are physiological markers of emotion dysregulation and trait impulsivity, respectively. We expected that an RSA \times PEP reactivity interaction would predict higher INT and EXT scores across three 1-year intervals. Participants included 205 children who were 8–12 years old at study onset. RSA and PEP were collected during an emotion regulation task and a reward task, respectively, at initial assessment, and at two 1-year follow-ups. Baseline RSA, PEP, and their interaction did not predict psychopathology. Change in PEP reactivity at the initial assessment significantly predicted EXT over time. In addition, the interaction between PEP and RSA slopes significantly predicted EXT across time. Although RSA reactivity slope at initial assessment was not predictive, PEP and RSA slopes interacted to predict psychopathology (INT and EXT symptoms) across time. Such findings could have application in identifying youth who are at risk for developing both INT and EXT disorders, and suggest a need for further study.

Poster 3-8**MEDIATIONAL EFFECTS OF PARENTING ON CHANGES IN CHILDREN'S RSA DURING A PRESCHOOL INTERVENTION FOR ADHD**Ziv E Feinberg¹, Tiffany M Shader¹, Aimee R Zisner¹, Carolyn Webster-Stratton², M. Jamila Reid², & Theodore P Beauchaine¹¹The Ohio State University, ²Incredible Years, Seattle, Washington*Descriptors: respiratory sinus arrhythmia, parent-child interactions, ADHD*

Our objective was to evaluate changes in parenting behavior as a mediator of changes in children's parasympathetic-linked cardiac activity during a preschool behavioral intervention for ADHD. High frequency spectral power, an index of respiratory sinus arrhythmia (RSA), was assessed at rest and during a block-building task among a group of 99 preschool children with ADHD who completed the Incredible Years intervention with their parents. Interactions between parents and children were coded with the dyadic parent-child interaction coding system (DPICS) during a 30-min free play activity at home. Increases in positive parenting (praise, questions, positive physicality, direct commands) and decreases in negative parenting (criticism, indirect/negative commands) following the parenting training did not mediate changes in resting RSA or RSA reactivity from pre- to post-intervention. Null findings indicate the need for more research on mechanisms of change in child psychophysiology following parent-child interaction interventions. Children with low resting RSA and excessive RSA withdrawal

may elicit reactionary, escalatory parenting that perpetuates reduced parasympathetic cardiac activity. Therefore, improvements in parenting should mediate improvements in RSA in children with externalizing problems. Research with larger sample sizes and more controlled laboratory tasks to code parent-child interactions are needed to evaluate putative mechanisms through which parenting affects children's physiological regulation.

Poster 3-9**EXPECTATION OF THREAT ENHANCES PERCEPTION: PSYCHOLOGICAL AND NEURAL MECHANISMS**Jingwe Frances Jin, Tamara Sussman, Akos Szekely, Christian Luhmann, & Aprajita Mohanty
Stony Brook University*Descriptors: fear, perception, neuroimaging*

Expectation of threatening stimuli results in faster and more accurate detection of upcoming stimuli. However the mechanisms of this top-down modulation are not well understood. According to the predictive coding hypothesis, during anticipation, the brain generates perceptual templates against which to match observed sensory evidence. In the present study we manipulated the likelihood and relevance (threat vs. non-threat) of upcoming stimuli. In a two-alternative forced-choice perceptual discrimination task, participants used threatening or neutral cues of 25%, 50%, and 75% likelihood to detect perceptually degraded threatening or neutral faces, while functional magnetic resonance imaging (fMRI) data were recorded. By combining hierarchical drift diffusion model (HDDM) and multivariate pattern fMRI data, we demonstrate that perceptual prioritization of threatening stimuli can be attributed to threat-related pre-stimulus biases as measured by higher baseline evidence in favor of the threat decision and higher rate of evidence accumulation in the HDDM. Neurally, our results indicate that prioritization is aided by more precise template representations in fronto-temporal regions as demonstrated by increased correlation between population coding of threat-cue and threat-stimuli as likelihood of encountering a threat stimulus increases. Our study clarifies the behavioral and neural mechanisms of perceptual decision-making regarding threatening stimuli and has implications for understanding perceptual biases seen in clinical conditions such as anxiety.

Poster 3-10**DEPRESSION RISK AND ELECTROCORTICAL MEASURES OF SELF-REFERENTIAL EMOTIONAL PROCESSING IN ADOLESCENT FEMALES**Brittany C Speed¹, Brady D Nelson¹, Randy P Auerbach², & Greg Hajcak¹
¹Stony Brook University, ²Harvard Medical School and McLean Hospital

Descriptors: late positive potential, self-referential processing, depression risk
Female adolescents are at a particularly high risk to develop major depressive disorder (MDD), but the pathophysiological mechanisms contributing to disorder onset remain largely unknown. However, a recent study found that depressed adolescents were characterized by depressogenic negative self-referential processing biases whereby depressed adolescents exhibited a potentiated Late Positive Potential (LPP) to negative versus positive words. The current study examined self-referential emotional processing and depression risk (i.e. biological parent with lifetime history of MDD) in a community sample of 130 females aged 8–14; clinical interviews were administered to a biological parent to ascertain mental health history, and adolescents filled out self-report instruments regarding pubertal status and depressive symptom severity. In addition, adolescents completed the self-referential encoding task, whereby participants indicated on each trial whether a positive or negative adjective is self-descriptive or not, while electro-physiological data were recorded. Results revealed that depression risk was uniquely associated with a greater LPP following negative versus positive words. In addition, depressive symptom severity and pubertal development were independently associated with the endorsement of more negative and fewer positive words, but were not related to the LPP. In sum, those at high-risk for MDD show ERP abnormalities in self-referential processing that are not better accounted for by current symptoms or pubertal stage.

National Institute of Mental Health R01 MH097767 awarded to Greg Hajcak.

Poster 3-11**CAN'T BREAK THE HABIT: STARTLE HABITUATION IS MODERATED BY ERN AND BIS**

Felicia Jackson, Brady D Nelson, & Greg Hajcak
Stony Brook University

Descriptors: startle, habituation, error-related negativity, behavioral inhibition
Higher self-reported behavioral inhibition characterizes anxious individuals and has been linked to an enhanced error-related negativity (ERN). Anxiety disorders are also characterized in part by reduced physiological habituation to aversive stimuli. These correlates of anxiety have been observed early in childhood, and are believed to contribute to the development of anxiety disorders. In the present study, we simultaneously investigated the relationship between self-reported behavioral inhibition, ERN, and startle habituation. Fifty-four adolescent girls completed a fear learning startle task, the Behavioral Inhibition Scale (BIS), and a flankers task to elicit the ERN. Overall, BIS related to ERN, however, neither BIS nor ERN related to mean startle. We further conducted mixed linear model analyses to examine change in startle magnitude over the course of the task. Results showed that startle habituated across the task, and this was moderated by both BIS and ERN. Specifically, adolescents with low BIS scores showed typical startle habituation, while those with high BIS scores failed to habituate across the task. Similarly, adolescents with small ERNs showed typical startle habituation while those with large ERNs failed to habituate; these effects were independent of one another. Thus, greater self-reported BIS relates to an enhanced ERN—and both are associated with sustained defensive responding. Results highlight the utility of modeling startle habituation, and link habituation to ERN and BIS—both measures of sensitivity to potential threat.

Poster 3-12**THE IMPACT OF RISK FOR DEPRESSION AND PREVIOUS TRIAL OUTCOME ON THE NEURAL RESPONSES TO THE ANTICIPATION AND RECEIPT OF REWARDS AND LOSSES**

Zachary P Infantolino¹, Jennifer N Bress², Greg Perlman², Roman Kotov², & Greg Hajcak²
¹University of Delaware, ²Stony Brook University

Descriptors: reward, depression, developmental

The relative ERP difference in response to monetary gains compared to losses has been characterized as a Reward Positivity (RewP), and is thought to be a biomarker for depression in adults and children. Linking these findings to risk for depression, recent work suggests that a blunted RewP is associated with maternal history of MDD. However, extant studies have not considered the context in which the rewards and losses are received. The outcome on the previous trial may impact the response to feedback on the present trial; this is especially true for depression, which is associated with rumination on past failures. Furthermore, the majority of studies utilizing EEG focus on the receipt of feedback rather than the anticipation of the feedback. Due to the deficits in approach motivation associated with depression, risk for depression may also be associated with decreased anticipatory responses to feedback. The present study examined the impact of parental history of depression – a risk factor for depression – on the RewP and the stimulus-preceding negativity (SPN), as a function of the previous trial outcome. Adolescents (N = 480) with no history of depression completed a guessing task in which monetary rewards and losses were equally probable. Results indicated that, following losses, a blunted SPN and enhanced RewP independently predicted parental history of depression. This suggests that aberrant reward anticipation and receipt are context-sensitive and dissociable risk factors for depression in high-risk offspring.

Poster 3-13**EYE BLINK ARTIFACT REMOVAL USING ICA MAY BE KILLING YOUR FINDINGS: HOW VARIABILITY IN ICA SOLUTIONS INFLUENCE STIMULUS-LOCKED ERPS**

Kathryn L Gwizdala¹, Samantha R Lamkin¹, Andrew C Parks¹, David A Henning¹, Martin Billinger², Clemens Brunner³, & Matthew B Pontifex¹
¹Michigan State University, ²Hannover Medical School, ³University of Graz

Descriptors: eye blink reduction, ICA

A growing number of investigators are utilizing independent component analysis (ICA) to remove eye blink artifacts from EEG signals. However, the consistency of specific ICA algorithms in isolating the eye blink related activity is not well

established. Accordingly, the present investigation sought to examine two popular ICA algorithms on their ability to isolate blink related activity and tested the extent to which variability in their solutions may influence stimulus-locked ERP activity following removal of the eye blink component. Using neuroelectric data from thirty-eight college-aged young adults collected in response to a perceptually challenging three-stimulus oddball task, ICA decompositions were repeated 30 times for each participant for each ICA algorithm. Following each decomposition, eye blink components were removed and the EEG data were processed to create stimulus-locked ERP waveforms. Findings revealed that the FastICA algorithm resulted in the greatest variation in P3 amplitude following removal of the eye blink components, with $1.7 \pm 2.6 \mu\text{V}$ differentiating the largest and smallest solutions across all electrodes. In contrast, only $0.1 \pm 0.1 \mu\text{V}$ differentiated the largest and smallest solutions across all electrodes using the Infomax algorithm. These results indicate that although the FastICA algorithm demonstrates clear advantages in terms of computational speed; when utilized to remove eye blink related artifacts, variability in the decomposition may introduce additional sources of variance for stimulus-related ERP components.

Poster 3-14**COMBINED NEUROMODULATION USING RTMS AND NEUROFEEDBACK IN CHILDREN WITH AUTISM SPECTRUM DISORDER**

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Descriptors: Autism spectrum, TMS, neurofeedback

Autism spectrum disorder (ASD) is a pervasive developmental disorder characterized by deficits in social interaction, language, stereotyped behaviors, and restricted interests. In previous studies 1 Hz repetitive transcranial magnetic stimulation (rTMS) has been used, with positive behavioral and electrophysiological results, for the treatment in ASD. In this study we combined prefrontal rTMS sessions with neurofeedback (NFB) to reinforce TMS-induced EEG changes. The pilot trial recruited 42 children with ASD (~14.5 yrs). Outcome measures included behavioral evaluations and reaction time test with event-related potential (ERP) recording. We used rTMS-neurofeedback combination (TMS-NFB, N = 20) and waitlist (WTL, N = 22) groups to examine effects of 18 sessions of integrated rTMS-NFB treatment (or wait period) on behavioral responses, stimulus and response-locked ERPs, and other functional and clinical outcomes. The underlying hypothesis was that combined TMS-NFB would improve executive functions in autistic patients as compared to the waitlist group. Results of the study supported our hypothesis by demonstration of positive effects of combined TMS-NFB therapy in active treatment group as compared to control waitlist group, as the TMS-NFB group showed significant improvements in behavioral and functional outcomes as compared to the waitlist group. The most significant aspect of the study is the investigation of neural mechanisms of neurotherapy based on rTMS and neurofeedback using behavioral and electrocortical activity measures in cognitive task, and behavioral evaluations.

Supported by NIH grant R01MH086784 to Manuel Casanova.

Poster 3-15

CLASSIFICATION OF EEG SIGNALS OF IMAGINARY MOVEMENTS OF ONE HAND VERSUS A REST CONDITION BY MEANS OF ARTIFICIAL NEURAL NETWORK COMMITTEE

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Descriptors: *brain-computer interface, imaginary movements, EEG patterns*
 Identification of classification methods of imaginary movement (IM) EEG-patterns is important for brain computer interface (BCI) development. The purpose of this work was to study the possibility of distinction of EEG patterns of one hand fingers IM from EEG in REST trials because the distinction of such patterns could be used for activation of a BCI system. New classifier based on the committee of artificial neural networks (ANN) was developed for EEG-pattern classification. Five healthy volunteers (age 32.8 ± 3.1 [SD]) performed rhythmically 4 types of IM: with thumb, index, little and middle fingers of right hand. EEG was registered with the 10–20 system; C3 and Cz derivations were used for classification. The classifier based on the ANN committee was conducted in MATLAB and included several ANNs classifying EEG data with different types of features. Results of binary classification showed that different types of IM were discriminated with different classification accuracies (CA): for vol.1 and vol.3 the best CA was achieved for little finger IM ($85 \pm 4\%$ and $84 \pm 7\%$), for vol.2 and vol.5 - for thumb IM ($85 \pm 5\%$ and $74 \pm 8\%$); for vol.4 CA was high for thumb IM ($98 \pm 2\%$) and little finger IM ($94 \pm 4\%$). In other cases CA was 55-70%. Thus, the classifier based on the ANN committee allowed discrimination of EEG signals of IM of fingers and REST trials. At least one type of IM with rather high classification accuracy was found for each volunteer.

The study was supported by the RFBR foundation grant 13-01-12059 ofi-m.

Poster 3-16

MEMORY TRACE MIGHT MEDIATE CONTEXTUAL FEAR GENERALIZATION

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Descriptors: *context conditioning, fear generalization*
 Pre-exposure to a context, later associated with an aversive unconditioned stimulus (US), strengthens the context's representation and prevents contextual fear generalization. Here, we report the effects of context pre-exposition in humans. On Day1, 48 participants (pre-exposure group) explored two virtual offices, while 40 participants (no-exposure group) explored a virtual stadium. On Day2 (24h later), all participants received an unpredictable painful electric shock (US) while visiting one office (CTX+), but never in a second office (CTX-). In a test phase on Day3, which was 24h or 2 weeks later for half of each group, all groups visited the CTX+, the CTX- and a new generalization context (G-CTX) consisting of 50% of CTX+'s furniture and 50% of CTX-. We found successful context conditioning on Day2 as indicated by negative valence, high arousal and anxiety level as well as startle potentiation to CTX+ as compared to CTX-. On Day3, startle attenuation to CTX- and G-CTX was evident as compared to CTX+ suggesting generalization of safety. Contrarily, G-CTX was rated as negative, arousing and anxiogenic as CTX+ and more than CTX- suggesting fear generalization. Exploratively, we observed greater startle response to G-CTX and CTX+ than to the CTX- in those participants who underwent the test phase 2 weeks later suggesting generalization of fear. In summary, we found a dissociation between implicit (startle) and explicit (ratings) responses. Importantly, independently from pre-exposure, the memory trace of the contexts weakened over time causing enhanced fear generalization.

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Poster 3-17

CHALLENGING THE IMPACT OF NEGATIVE EMOTIONS ON PAIN – BEHAVIORAL AND NEUROPHYSIOLOGICAL CORRELATES

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Descriptors: *placebo, nocebo, emotion*

The pain increasing effect of negative emotions is a well-established finding. However, the question remains to what degree the impact of negative affective stimuli on pain is susceptible to an additional cognitive (placebo/nocebo) manipulation. To this end, we compared two different experimental groups that were either told that negative affective pictures would increase pain (congruent group), or the exact opposite (incongruent). Afterwards, the incongruent group underwent nocebo conditioning where negative pictures (nocebo) were paired with stronger electrical stimuli, and the incongruent group underwent placebo conditioning and received less intense electrical stimuli while watching negative pictures (placebo). In addition, all participants watched neutral pictures, which were introduced to have no effect on pain. In the following test phase, participants watched again the pictures but received identical pain stimuli. Somatosensory evoked potentials (SEP), the late positive potential (LPP) and pain ratings were obtained. Pain ratings during the test phase were elevated for nocebo (incongruent) and decreased for placebo trials (incongruent) compared to neutral pictures. SEPs were decreased for placebo trials (negative pictures) compared to the neutral condition in the incongruent group only. During conditioning, the LPP failed to differentiate between negative and neutral pictures in the incongruent group. The results show that a nocebo/placebo manipulation can change the relative pain increase by negative affect and supposedly alters early emotion processing.

Poster 3-18

TIME FLIES WHEN YOU'RE HAVING FUN, AND IT FLIES FASTER WHEN YOU'RE FEELING BLUE: NEGATIVE MOOD INDUCTION INCREASES THE OVERESTIMATION OF TIME

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Descriptors: *time perception, electroencephalography, mood induction*

The present study examined the influence of negative mood induction on time perception as assessed in a temporal memory task and the Contingent Negative Variation (CNV) potential. Participants were asked to determine whether visually identical green dots were presented for the same duration as a "target" (2000ms) by pressing "yes," or pressing "no" if they were presented for any other duration: "Very Short" (1250ms), "Short" (1600ms), "Long" (2500ms), or "Very Long" (3125ms). Post-induction, there was a significant increase in "yes" responses for the short duration and a significant decrease in the long condition ($ps < .05$), but no significant differences in the other conditions. At electrode CPz, the amplitude of the CNV preceding the target time significantly increased for the long and very long conditions in the pre-induction condition ($ps < .05$), but not the post-induction condition ($ps > .1$). Difference scores pertaining to subjective sadness from pre- and post-induction correlated with CNV slope in the post-induction condition for the long and very long durations ($rs .3$ & $.4$, $ps < .07$). To assess how the CNV may explain the observed differences in behavioral data, we conducted a 2(induction) X 5(condition) repeated measures ANOVA with the peak latency of the CNV as the dependent variable; however, there were no significant interactions that explained the observed pattern of behavior. Additional analyses should investigate laterality and/or a P300-like component present after stimulus offset that appears sensitive to the demands of a mood induction.

Poster 3-19**MOTIVATIONAL CONSEQUENCES OF (NON-INVASIVE) BLOOD LOSS STRESS**

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University of Trier

Descriptors: approach-avoidance behavior, lower body negative pressure, stress

Blood loss represents a serious threat to survival, and elicits strong stress responses. Blood loss may be induced non-invasively by applying lower body negative pressure (LBNP). We here tested whether blood loss stress alters the recruitment of adaptive motivational behavior tendencies, such as the avoidance of aversive, danger signaling cues, and the approach to appetitive, shelter-signaling cues. In a newly developed stereoscopic virtual environment task participants reacted to human-like, 3D, walking avatars displaying dynamically changing happy and fearful facial expressions. They had to perform joystick operations, in order to approach or avoid avatars by either moving themselves (MOVE-SELF, N = 24) or moving the avatar (MOVE-OTHER, N = 24) to a different position in the virtual space. At the same time LBNP was applied at 0, -15 and -30 mmHg. LBNP induced sympathetic activation and vagal withdrawal. Approach of "happy" and avoidance of "fearful" avatars (congruent behavioral pattern) was initiated earlier than the incongruent pattern, respectively ('congruency effect'). The main result of this study is, that LBNP-induced blood loss stress enhanced the congruency effect, but exclusively in the deep-rooted "MOVE-SELF" condition, leaving the more shallow -rooted "MOVE-OTHER" condition unaffected. These findings demonstrate that internal body signals mimicking the visceromotor activity pattern of blood loss influence the use of basal motivational movement patterns, and open new questions on the neural as well as evolutionary basis of approach-avoidance behavior.

Poster 3-20**FAST OPTICAL IMAGING TRACKS THE TIME COURSE OF SYLLABLE PROCESSING IN PREMATURE INFANTS**

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Descriptors: premature infants, optical imaging, language

The cerebral cortex of premature infants, born early in the last trimester of gestation, undergoes dramatic anatomical changes critical for the development of proper cortical function. During this period, many neurons are still migrating to their final location and myelin is just beginning to develop. Infants at this young age are capable of hearing and recent work has suggested that despite the immature cortical circuitry, premature infants engage a network of perisylvian regions following the presentation of simple syllables (Mahmoudzadeh et al., 2013). The goal of the present study was to investigate the temporal organization of these structures in a group of 20 premature infants. We recorded the Event-Related Optical Signal (EROS) elicited by standard and deviant trains of syllables in infants in their 7th or 8th month of gestational age (GA). Deviant syllables elicited an early response in superior temporal gyrus (STG) followed by a later response in inferior frontal gyrus. The first syllable in the train also elicited a response in STG. The latency of this sensory response was shorter at 8 month GA compared to 7 month GA, but the response habituated across syllables similarly in the two groups. These results indicate that the measurement of EROS in premature infants can provide important information about the development of brain circuits involved in auditory change detection and, more specifically, highlights the maturation of auditory sensory processes occurring during the period between the 7th and 8th month of GA.

Poster 3-21**STRATEGIC CONTROL ADJUSTMENTS IN AGING: BEHAVIORAL AND ERP FINDINGS**

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Descriptors: cognitive control, aging

Cognitive control involves the ability to adjust behavior to cater to pertinent demands. As this ability declines with age, we examined expectancy-related con-

trol adjustments in older adults using a cued flanker task that has been shown to elicit behavioral adjustments in young adults. Young (n = 16; 18–37 yrs) and older (n = 16; 57–77) adults were tasked to indicate the identity of a centrally-presented letter (H or S), which was flanked by identical (compatible trial e.g., SSSS) or conflicting letters (incompatible trial, e.g., HSHH). Cues at the start of each trial denoted whether the trial stimulus was likely to be compatible (PC), incompatible (PI) or equally likely to be compatible or incompatible (PN). Despite self-reports of low cue utility and the absence of explicit strategy instructions, we found cue-related effects in both age groups. Flanker interference effects were smaller after PI and PN trials compared to PC trials. Event-related potentials revealed a reliable cue effect and a cue by age interaction at F3 characterized by a more positive shift for PI compared to PC and PN trials which was more pronounced for older compared to younger adults at around 600 ms. There was also a less robust but significant cue by age interaction at 425 ms, but this was driven by greater PI positivity in younger adults, suggesting an earlier recruitment of control processes compared to older adults. This study indicates that frontal ERP activity is correlated with strategic modulation in both younger and older adults even in the absence of explicit instruction.

Poster 3-22**BRIDGING THE BRAIN: A CROSS-VS.-WITHIN HEMISPHERE COMPARISON OF AGE-RELATED CHANGES IN RESTING STATE FUNCTIONAL CONNECTIVITY**

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University of Illinois at Urbana-Champaign

Descriptors: functional connectivity, resting state, aging

Age-related changes in brain function are sometimes attributed to declines in structural and functional connectivity. Previous studies of resting state functional connectivity (RSFC) have demonstrated decline along the anterior-posterior brain axis. Although the corpus callosum (CC) clearly becomes smaller with age, it has not yet been shown that the decline of long-range RSFC with age generalizes to the left-right brain axis. To evaluate this issue, we investigated age-related changes in RSFC in a sample of 42 adults varying in age between 18 and 77 years, focusing on two networks, the default mode network (DMN) and the dorsal attention network (DAN), which encompass anterior and posterior areas in both hemispheres. Our results suggest that: (a) only RSFC between areas of the opposite hemisphere show clear changes with age; (b) age-related declines in RSFC tend to affect the anterior more than the posterior portion of the brain; and (c) at least in some cases, long-range RSFC increases rather than decreases with age. Finally, only some of the age-related changes appear to be mediated by variations in CC size. Overall, these results call into question some of the ideas related to long-range RSFC, and the way that these measures reflect the degree of connection/disconnection between areas. Specifically, increases in RSFC with age may reflect reduced inter-hemispheric inhibition rather than real increased connectivity.

Poster 3-23**SECURE AND HEALTHIER: SECURE ATTACHMENT IN ADULTS IS ASSOCIATED WITH LOWER HEART RATE AND HIGHER VAGAL TONE**

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Descriptors: heart rate variability, attachment, secure

Vagal tone has been suggested to be an index of physical and mental health. Specifically, lower vagal tone may be indicative of deficient adaptation of the cardiovascular system to body demands. The aim of this study was to investigate the association between adult attachment styles and heart rate and heart rate variability. Participants included 120 undergraduate students (half women) previously screened for mental and physical health. To evaluate self-reported attachment, we employed the Relationship Scale Questionnaire (RSQ). Electrocardiogram was recorded during 10 minutes at rest, in supine position, to extract mean heart rate and heart rate variability, representing biological traits. Analysis of heart rate variability included time domain (RMSSD – root mean square of the standard deviation) and frequency domains (HF and LF – high and low frequency power) measures, representing predominantly parasympathetic activity or vagal tone. Spearman correlations showed that individuals with more secure profile present lower heart rates and higher heart rate variability at rest. Further, the preoccupied profile is negatively correlated with heart rate variability. Our findings support the hypothesis that secure style in adult relationships is associated with healthier physiological parameters at rest (biological traits) and may indicate less vulnerability to physical and mental dysfunctions.

CAPEs, CNPq, UFOP.

Poster 3-24**SCENE CATEGORIZATION: THE GOOD, THE BAD AND THE EARLY**

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Descriptors: scenes, templates, feedback

Humans are extraordinarily quick at processing natural scenes. Furthermore, good exemplars of natural scene categories are not only categorized more easily but are also more readily detected than bad exemplars. However, it remains unclear when and how this good exemplar advantage arises. To address this question, we measured event-related potentials (ERPs) while participants viewed (and made a delayed judgment about) good and bad exemplars of six scene categories: beaches, city streets, forests, highways, mountains and offices. Good and bad exemplars first evoked differential ERPs 250 to 350ms after onset, with bad exemplars producing greater frontal negativity than good exemplars. This effect is consistent with the N3 complex, previously associated with global structure in an image. The results thus indicate that structural processing is easier for good than for bad exemplars. Good exemplars then elicited a larger late positive complex (LPC) response, likely reflecting more confident judgments for these items. Overall, the results indicate that the good exemplar advantage may not only extend to eased cognitive processing, but also to perceptual processing, having its roots in higher order visual processing and possible feedback to lower level processing areas.

Funding provided by ONR MURI (DMB) and by the James S. McDonnell foundation (KDF).

Poster 3-25**EFFECTS OF EXPECTEDNESS AND SENTENTIAL CONSTRAINT ON MEMORY FOR WORDS: BEHAVIORAL AND ELECTROPHYSIOLOGICAL EVIDENCE**

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Descriptors: N400, prediction, memory

Contextual constraint (operationalized by cloze probability) impacts how easily words are processed, as evinced both behaviorally and electrophysiologically in the form of graded reductions of N400 amplitude. Moreover, ERP studies have demonstrated that unexpected-but-plausible words in strongly constraining contexts - where a strong prediction is violated - elicit a frontally distributed positiv-

ity. To better understand the processing mechanisms that give rise to these effects, we examined their downstream consequences on memory. Participants read strongly and weakly constraining sentences with expected or unexpected endings (“The prisoners planned for their escape/party”), and later were tested on their memory for sentence ending words. Critically, the memory test contained lures that were expected (“escape”) but were never read (participants saw “party”). Behaviorally, subjects accurately discriminated old from new items, but significantly false alarmed to the expected-item lures. This effect did not differ by contextual constraint. ERPs to words at test showed that, in the N400 time window, higher contextual constraint increased amplitudes for predictable words but decreased amplitudes for unpredictable ones, while there was little difference for weak constraint items. Later old/new effects (the LPC) did not differ based on constraint. These ERP differences not reflected in behavioral outcomes suggest subjects may utilize different strategies for discrimination across constraint, and that differences in prediction may have costs and benefits to later memory.

Poster 3-26**PSYCHOPHYSIOLOGICAL RESPONSE PATTERNS TO THREE DISTINCT TASKS AMONG WOMEN IN TREATMENT FOR CHEMICAL DEPENDENCE**

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Descriptors: emotion, multi-diagnostic sample, clinical setting

Many psychophysiological studies are conducted with healthy participants in a laboratory setting while fewer studies incorporate these measures into clinical treatment with multi-diagnostic samples. In this study, we used a within-subjects design to examine changes in respiratory sinus arrhythmia (RSA) and electrodermal activity (EDA) across three tasks designed to elicit distinct emotional and psychophysiological response patterns. The sample consisted of 75 women in substance use disorder treatment, 70% of whom screened positive for PTSD. They participated in three tasks: watching a sad movie, rumination on a stressful event, and a mindful body awareness meditation. Repeated measures ANOVAs were conducted to examine changes from baseline to each task. For RSA, there was a significant decrease from baseline to film, $F(1,69) = 7.03$, $p = .01$ and an increase from baseline to the body awareness task $F(1,73) = 13.82$, $p < .001$. For EDA, there was a significant increase from baseline to film task, $F(1,61) = 5.43$, $p = .02$, and a decrease from baseline to the body awareness task, $F(1,65) = 7.14$, $p = .01$. The rumination task did not show significant changes from baseline. Findings add to the literature translating psychophysiological tasks into clinical settings with complex samples. Different tasks showed distinct response patterns; the standardized film task was more evocative than a non-structured rumination paradigm. Further, the body awareness task induced significantly increased RSA and decreased EDA from baseline, which may have implications for research and treatment with clinical sample.

Poster 3-27**GENERALIZED AND DIFFERENTIAL REINSTATEMENT - THE ROLE OF ANXIETY AND STRESSFUL LIFE EVENTS**

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University Medical Center Hamburg-Eppendorf

Descriptors: reinstatement, fMRI

Current treatments for anxiety disorders are effective but the high frequency of clinical relapse remains a major problem. Relapse can be modeled in the laboratory by so called return of fear (ROF) manipulations in fear conditioning paradigms such as spontaneous recovery (passage of time), renewal (contextual change) and reinstatement (re-occurrence of the aversive event). ROF following reinstatement has been extensively investigated in animals, but in humans systematic investigations of experimental and individual boundary conditions are currently lacking. In the human literature, different qualities of reinstatement induced ROF have been reported (generalized and differential), but the factors contributing to these divergent findings remain unclear. To fill this gap, a two-day fear conditioning, extinction and reinstatement paradigm was conducted in 84 participants. We present evidence from fMRI and autonomic measures for the idea that generalized and differential reinstatement represent different psychological processes. Moreover, the individual history of stressful life events (study 1) and the level of state anxiety (study 2) affect the differentiability of the ROF in both autonomic and neural activation pattern. This represents the first step for establishing systematic investigations on individual difference factors in human ROF studies. Our findings contribute to a better understanding of ROF, and may ultimately aid improvement of current treatments and prevention of relapse.

This work was funded by the German Research Foundation (DFG) through the SFB TRR 58 (sub-projects B07 and Z02) as well as LO1980/1-1 to TBL.

Poster 3-28**LONGITUDINAL RELATIONS BETWEEN TEMPERAMENTAL SURGENCY AND EXTERNALIZING: THE MODERATING ROLE OF PEP**

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The Pennsylvania State University

Descriptors: pre-ejection period, temperament, externalizing

The purpose of this study was to examine if children's temperament and cardiac pre-ejection period (PEP) longitudinally predicted externalizing behaviors. Studies find that temperamental surgency and emotion regulation interact to predict externalizing behaviors (e.g., Stifter, Putnam, & Jahromi, 2008); such that children high in surgency and low emotion regulation tend to have the highest externalizing problems. The present study extends these findings to physiological measures by using PEP as an index of emotion regulation – given that high resting PEP (reflecting less sympathetic activity) is frequently related to externalizing problems (e.g., Beauchaine, Gatzke-Kopp, & Mead, 2007). Mothers reported on their children's surgency (~3 years; N = 63; partial sample), and on their externalizing behaviors at the end of kindergarten (~6 years). PEP was collected during a laboratory visit at ~5 years. As expected, externalizing behaviors were related to surgency, $r(61) = .38, p < .01$, and high PEP, $r(61) = .32, p = .01$. Moreover, the interaction between surgency and PEP predicted externalizing behaviors ($\beta = .007, p < .01$); such that surgency predicted externalizing behaviors only for children with high PEP ($\beta = .17, t = 4.5, p < .01$). These findings replicate previous studies and add the finding that high surgency coupled with poor self-regulation (indexed by PEP) predicts higher risk for externalizing behaviors.

Poster 3-29**MY COMPETITOR'S TEARS MAKE ME SMILE: FACIAL MIMICRY AND COUNTER-MIMICRY OF OUT-GROUP EXPRESSIONS**

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Descriptors: emotion, mimicry, tears

Mimicry, the imitation of the nonverbal display of others, depends on affiliation. Thus, members of out-groups or those with whom we have a competitive relationship tend to be mimicked less, especially in regard to sadness, and sometimes participants even show counter-mimicry. Yet, people believe that they give more emotional support to people who cry – but they also hold more negative views of those who cry, whether the tears are happy or sad (Hendriks

et al., 2008). We asked the question whether participants are more likely to mimic sad out-group members (supporters of a competing soccer team) when they show tears. As a control condition we showed happy out-group members with and without tears. A total of 51 soccer fans saw either happy or sad expressions with and without tears at two levels of intensity, while facial EMG at the corrugator supercilii (frown), zygomaticus major (smile) and orbicularis oculi (wrinkles around the eyes) site was measured. Sad expressions with tears were rated as more sad independent of the intensity of the expression, whereas for happy expressions tears made no difference, but more intense expressions were rated as more happy. Participants showed mimicry towards less intense sad and more intense happy expressions. Given that the expressers were male and stereotypes about male emotionality, this could suggest that participants mimicked only "appropriate" expressions by out-group members.

Poster 3-30**THE PHYSIOLOGY OF CHILDREN'S EMOTION REGULATION STRATEGIES: EFFECTS OF DISCRETE EMOTIONS AND PARENTAL EMOTION SOCIALIZATION**

Elizabeth L Davis
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Descriptors: emotion regulation, reappraisal, respiratory sinus arrhythmia

Emotion regulation (ER) can be indexed by respiratory sinus arrhythmia (RSA), a cardiac measure of parasympathetic activity. Higher resting levels and greater RSA suppression during challenges relate to better ER. Although parents also influence children's ER, little work has examined how supportive parenting relates to the physiology of ER. Thus, we don't know (1) how children's use of specific, directed ER strategies influences RSA patterns, (2) whether this varies by age or discrete emotion (i.e., sadness versus fear), or (3) whether certain ER strategies work better for particular children, given individual differences in prior experience with certain strategies (via parents' socialization). The goal of this investigation was to provide preliminary answers to these questions. 74 younger (3–7 years; M = 5.28; 48 girls) and 60 older (8–11 years; M = 9.28; 29 girls) children and their parents provided physiology (children) and report of reactions to children's negative emotions (parents). Children were randomly assigned to conditions within a 2 (emotion: sadness versus fear) × 3 (ER instructions: Distraction, Reappraisal, or Control) design. Analyses revealed a 3-way interaction of age, emotion, and ER strategy predicting children's RSA recovery from evocative to neutral contexts $F(2, 124) = 4.20, p = .017, \eta^2 = .069$. Higher RSA recovery scores were associated with greater supportive parenting ($r_s > .51, p_s < .05$) for children instructed to reappraise sadness, but lower endorsement of minimizing reactions for children instructed to reappraise fear ($r = -.49, p = .014$).

Poster 3-31**PARENTAL PROVISION OF EMOTION REGULATION STRATEGIES PROMOTES RSA FLEXIBILITY**

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Descriptors: emotion regulation, parenting socialization, respiratory sinus arrhythmia

Parenting contributes to children's developing emotion regulation, which can be measured physiologically (RSA; Denham, 1998). RSA indexes parasympathetic activity, so a pattern of suppression during stressors relative to higher levels during periods of rest would indicate a flexible and responsive system (Gottman, 2002) that would support adaptive responding to emotional challenges. Before age 6–7, children rely more heavily on external agents like their parents for emotion regulation support. Thus, we expected to see different patterns of physiological reactivity before and after age 6 based on the sophistication of strategies parents provided. We examined RSA among 138 4- to 11-year-olds (70 boys) across three contexts: a baseline, a disappointment task, and a second baseline. Parents interacted naturally with their disappointed children, and the emotion regulation strategies they provided were coded for non-cognitive (physical comforting, behavioral distraction, expressive encouragement) and cognitive (reappraisal, cognitive distraction, and reallocating attention) types. Children showed the expected pattern of RSA flexibility when parents provided physical comforting, $F(2,260) = 3.624, p = .028$; quadratic $F(1,130) = 5.565, p = .020$, but this was only true for the younger (4–5 years) children, $F(2,78) = 3.129, p = .049$, quadratic $F(1,39) = 5.701, p = .022$. This pattern was not detected for older children whose parents used physical comforting, in line with the idea that older children do not benefit from over-reliance on external agents to promote emotion regulation.

Poster 3-32

**PRINCIPLE COMPONENTS ANALYSIS ON A MODIFIED
MONETARY INCENTIVE DELAY TASK REVEALS
DIFFERENTIAL COMPONENT RESPONSES TO DURING
ANTICIPATION**

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University of Sydney

Descriptors: motivation, anticipation, event-related potentials

Neural correlates for the anticipation of probable rewards and punishments are frequently assessed using hemodynamic responses during a monetary incentive delay (MID) task. Unfortunately, these imaging methods are not well suited to examining the time-course of neural activity during an experimental trial. Recent ERP studies have reported differential neural responding across anticipation periods, suggesting that reward/loss prospect affects some anticipatory processes but not others. Here we used principle components analyses (PCA) to assess the ERP time-course for discrimination between probable gains and losses within experimental trials. 19 participants completed a modified MID task while a concurrent EEG was recorded. Cue stimuli indicated the probable outcome of each experimental trial as well as the required response hand to the target stimuli. A temporal judgment task was embedded in the MID task and participants were informed that more accurate responding (as close to 1 second post-target) would increase the likelihood winning rather than losing money. Post-experiment self-reports confirmed cuing stimuli signaling probable reward and probable loss were more arousing and motivating than cues signaling no monetary change. PCA of ERPs revealed that cuing stimuli signaling the prospect of probable gains and probable losses are processed along different temporal scales. Early components appear to be more sensitive to the anticipated prospect of a loss, while later components appear to be more sensitive to the anticipated prospect of a gain.

Poster 3-33

**TRAIT ANXIETY MEDIATES THE LINK BETWEEN
INFERIOR FRONTAL CORTEX VOLUME AND NEGATIVE
AFFECTIVE BIAS IN HEALTHY PARTICIPANTS**

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University of Illinois at Urbana-Champaign

Descriptors: inferior frontal cortex, anxiety, negative bias

Patients with affective disorders such as anxiety show a negative bias that likely reflects reduced executive control. Among several brain regions, the inferior frontal cortex (IFC) has been critically associated with performance in tasks that require executive control. This suggests the possibility of a link between this brain region, symptoms of anxiety, and performance in executive tasks. Here, we investigated the triadic relation among IFC grey matter volume, symptoms of anxiety, and variations in executive control measured as negative bias, in healthy participants. Sixty-two adults performed an Affective Go/No-Go task (AGN), completed the trait subscale of the State-Trait Anxiety Inventory (STAI-T), and underwent structural MRI scanning. A negative bias index was calculated as the difference in reaction time to positive vs. negative AGN targets, and IFC grey matter volume was extracted using automatic segmentation in Freesurfer. Results showed a negative association between the left IFG volume and trait anxiety, and a positive association between trait anxiety and the negative bias. Furthermore, a mediation analysis confirmed that trait anxiety mediated the indirect negative relation from the left IFC volume to the negative bias. Overall, the present results suggest that IFC volume protects against symptoms of anxiety, which in turn have a mediating effect on negative affective bias.

Poster 3-34

**THE EFFECT OF HANDSHAKE ON NEURAL AND
PHYSIOLOGICAL CORRELATES OF OBSERVING DYNAMIC
SOCIAL INTERACTIONS**

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Florin Dolcos, & Sanda Dolcos
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Descriptors: skin conductance, fMRI, social interaction

Previous evidence suggests that nonverbal behavior, such as a handshake, can influence impression formation during social interaction. However, it is unclear how these effects are linked to changes in physiological and neural responses, and how they are influenced by factors that may shape the perception of such

behavior, such as power. In this study, 33 subjects viewed a series of movies showing animated guest-host interactions. The hosts displayed either approach or avoidance behavior, which was preceded or not by a handshake, and was followed by subjects' ratings of the behavior. Eighteen subjects completed the evaluation task while their skin conductance response (SCR) and fMRI data were recorded, whereas power was manipulated among 15 subjects via episodic recall prior to the evaluation task. Observing handshakes overall increased the ratings for approach and avoidance behaviors, and this effect was positively correlated with SCR only to approach behavior. The SCR was negatively correlated with activity in the medial prefrontal cortex (BA 9/32) also for approach behavior only. Subjects in the high power condition showed less sensitivity to handshakes preceding avoidance behavior. These findings suggest that the effect of handshakes on evaluative judgments is linked to increased arousal possibly reflecting excitement, and are consistent with evidence showing inverse relationships between physiological arousal and neural responses when observing approach behavior. The findings also suggest that power diminishes the positive impact of handshakes in negative interactions.

Poster 3-35

**CHANGES IN SKIN CONDUCTANCE DURING 60 VS. 90-
MINUTE PROLONGED EXPOSURE THERAPY SESSIONS**

Antonia N Kaczurkin, Anu Asnaani, Carmen P McLean, & Edna B Foa
University of Pennsylvania

Descriptors: skin conductance, PTSD

This study investigated the changes in physiological arousal that accompany post-traumatic stress disorder (PTSD) symptom reduction as the result of receiving therapy. This study measured skin conductance responses (SCR) during a randomized controlled trial which compared the efficacy of 60-minute and 90-minute sessions of prolonged exposure (PE) therapy in patients diagnosed with PTSD. This study hypothesized that SCR during imaginal exposure (repeatedly revisiting the trauma memory) would decrease over time and that the amount of reduction would be similar for 60-minute and 90-minute sessions. The results of this study showed significant reductions in SCR during imaginal exposure over time for both conditions, suggesting that patients' arousal levels to the traumatic memory decreased with repeated exposure. This study showed no significant differences in SCR between the 60 vs. 90-min sessions, suggesting that a shorter duration PE session is equally effective in reducing physiological arousal to trauma-related cues. The results show that recording SCR during PE provides an additional tool for researchers and clinicians to measure objective reductions in arousal to trauma memories beyond relying on patients' subjective self-report of their distress levels. In addition, the equivalent reduction in physiological arousal in the two durations of session length has important consequences for treatment burden and costs associated with this disorder.

Poster 3-36**ELECTROPHYSIOLOGICAL ENDOPHENOTYPES IN AUTISM:
A FAMILY STUDY**Ann Clawson, South Mickle, & Michael J Larson
Brigham Young University

Descriptors: event-related potentials, Autism spectrum, cognitive control

Autism spectrum disorder (ASD) is highly heritable and milder symptoms are often present in relatives. Improved understanding of symptoms and heritability may be fundamental in identifying diagnostic groups and improving treatment. One promising area of research is the identification of endophenotypes of ASD. We examined the error-related negativity (ERN) and error-positivity (Pe) as endophenotypes by collecting data from 19 ASD and 19 control (CON) families during a flanker task. We compared the ERN/Pe in ASD and CON youth using robust Group \times Accuracy ANOVAs. We hypothesized that ASD youth would display reduced-amplitude ERN/Pe. The Group \times Accuracy interaction for ERN was significant, $TWJt/c = 6.22, p = .02$, with smaller Δ ERN/ Δ Pe in ASD probands and unaffected biological family members relative to CON families. We hypothesized that ASD relatives would display reduced-amplitude ERN/Pe. We conducted linear regressions with Group, Kinship (mother, father, sibling, proband), and Group \times Kinship interactions as independent variables and families as clusters. No predictors or interactions were significant for the Δ ERN. The effect of kinship on Δ Pe was significant for mothers ($t = -3.25, p = .002$) and fathers ($t = -2.08, p = .05$). The Group \times Kinship interaction was only significant for fathers ($t = -2.0, p = .05$). Though Δ ERN differed between ASD and CON youth, the ERN may not qualify as an endophenotype, as reduced Δ ERN was not present in relatives. However, Pe differences among ASD fathers may indicate genetic risk.

Poster 3-37**THE EFFECTS OF TIME OF DAY AND EXERCISE ON
EVENT-RELATED POTENTIAL INDICES OF RESPONSE
INHIBITION TO HIGH- AND LOW-CALORIE FOODS**Kaylie A Carbine, Katie Slinn, Pettit J Cory, Rick LeCheminant, James LeCheminant, & Michael J Larson
Brigham Young University

Descriptors: response inhibition, food, electroencephalography

Increased understanding of the neural processes associated with individual responses to food cues is needed to ultimately improve weight and health interventions. The No-Go N2 event-related potential (ERP), associated with response inhibition, may be related to eating behaviors. We examined the influence of food calorie status (high vs. low calorie), time of day (morning vs. evening), and exercise (acute exercise vs. sedentary) on ERP correlates of food-related response inhibition. We hypothesized that N2 amplitudes would be greater for high-calorie foods, in the morning, or after exercise, reflecting enhanced inhibitory response towards food. ERP data were collected while 39 healthy-weight participants completed two food Go/No-Go tasks between 7–10am or 7–10pm, once after resting and once after 45 minutes of treadmill walking at 3.8mph. All participants completed tasks using high-calorie foods as No-Go stimuli and low-calorie foods as No-Go stimuli in counterbalanced fashion. A 2-calorie (high, low) \times 2-time (morning, night) \times 2-exercise (rest, exercise) ANOVA revealed larger N2 amplitudes for high-calorie foods relative to low-calorie foods ($p = .001$) and at night relative to morning ($p = .01$). A calorie by time of day interaction showed a larger difference in N2 amplitude between high- and low-calorie foods in the morning, but not as large of a difference in the evening ($p = .055$). No main effects or interactions with exercise status were significant ($ps > .25$). Time of day may influence neural responses to various foods differently, possibly affecting subsequent eating behaviors.

Poster 3-38**TRIARCHIC CONCEPTUALIZATION OF PSYCHOPATHY AND
ERP INDICES OF PERFORMANCE MONITORING IN A GO/
NOGO TASK**Pablo Ribes, Rosario Poy, Alicia Fonfría, Carlos Ventura-Bort, Pilar Segarra, Angels Esteller, & Javier Moltó
Universitat Jaume I

Descriptors: triarchic, psychopathy, error-related negativity, NoGo N2

Here we examined, in a sample of 141 undergraduates (34 males), the relationships between the three phenotypic domains of the triarchic model of psychopathy—boldness, meanness and disinhibition—and electrophysiological indices of error processing (ERN/Pe) and response inhibition (NoGo-N2/NoGo-P3) in a Go/NoGo task (1200 trials, 80% Go). We used regression-based component scores from exploratory factor analysis on indices of triarchic domains that were derived from scores on three self-report measures: Triarchic Psychopathy Measure, Psychopathic Personality Inventory-Revised, and NEO PI-R. Correlational analyses showed that Disinhibition scores were significantly related to diminished ERN amplitudes (FCz: $r = .29$; Cz: $r = .20, ps < .02$) and reduced NoGo-N2 amplitudes (Fz: $r = .23$; FCz: $r = .26, ps < .002$), but not to Pe and NoGo-P3 amplitudes (all $ps > .10$). Subsequent multiple regression analyses using triarchic scores as predictors revealed that only Disinhibition significantly predicted reduced ERN and NoGo-N2 amplitudes at FCz (5.9% and 5.8% of explained variance, respectively; beta weights = .30, $ps < .01$). Our results indicate that both deficient error processing (reduced ERN) and inhibitory control (reduced NoGo-N2) in psychopathy are specifically related to Disinhibition, but not to Meanness nor to Boldness domains of the triarchic conceptualization of psychopathy, and suggest that the ERN and NoGo-N2 amplitudes in a Go/NoGo task could be considered as neurobiological indices of the externalizing tendencies comprised in this personality disorder.

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Poster 3-39**YOUNG OFFSPRING AT HIGH-RISK FOR DEPRESSION
DISPLAY BLUNTED CARDIOVASCULAR RESPONSES TO AN
AMUSING FILM**Ben Allen¹, Ilya Yaroslavsky², & Maria Kovacs¹
¹University of Pittsburgh, ²Cleveland State University

Descriptors: heart rate

Accumulating evidence suggests that low levels of positive affect precede the onset of clinical depression. To test this hypothesis, we examined cardiovascular reactions to an amusing film among children at high- ($n = 83$) or low-risk ($n = 116$) for familial depression. Subjects were 8 - 19 years old and 51% were boys. Each child completed a clinical interview and a laboratory protocol that included an affectively neutral stimulus (film clip of swimming fish) and an amusing stimulus (film clip of Mr. Bean). An electrocardiogram was collected, and the within-subject linear and quadratic trend in inter-beat interval (IBI) was calculated for each stimulus. Both the neutral (Cohen's $D = 1.05$) and happy films (Cohen's $D = 0.63$) were associated with significant decreases in IBI (both $p < .001$). High and low-risk offspring displayed similar IBI responses to the neutral film ($p = .155$). However, the high risk offspring exhibited a significantly attenuated, blunted IBI response to the happy film compared to the low risk offspring (Cohen's, $D = 0.35, p = .045$). Furthermore, the relationship between risk for depression and blunted IBI response to the happy film was mediated by children's current depressive symptoms (indirect effect: $Z = 1.976, p = .048$). Overall, this study suggests that cardiovascular responses to hedonic stimuli can help to differentiate those at high vs. low depression risk. IBI may be a practical and usable biomarker of atypical emotional reactions that precede the onset of depression.

MH085722.

Poster 3-40

**VISUOCORTICAL CHANGES DURING DISCRIMINANT
AVERSIVE CONDITIONING: EFFECTS OF INTER-
INDIVIDUAL DIFFERENCES IN CONTINGENCY
AWARENESS AND AUTONOMIC ENGAGEMENT**

Forest Gruss, & Andreas Keil
University of Florida

Descriptors: aversive conditioning, contingency ratings, ssVEP

Classical aversive conditioning can be used in the laboratory to study changes in sensory, autonomic and behavioral processes in humans. By implementing an uninstructed, differential conditioning paradigm, change across response measures can be observed in a trial-by-trial fashion. Specifically, we examined to what extent contingency awareness (online ratings) relates to measures of visuocortical and autonomic processing. The aim of the study was to explore the predictive value of brain and body responses to behavioral outcomes over acquisition and extinction. This was done utilizing Gabor gratings, by which one of two grating orientations was paired with a 96dB noxious white noise. Initial pairing occurred 100% of the time, with partial conditioning (66%) in the later part of conditioning, and one re-exposure pairing during uninstructed extinction. Gabor gratings rapidly phase reversed at 14Hz to evoke steady-state visually evoked potentials (ssVEPs). Initial results revealed one group ($n = 24$) to show quick contingency awareness with persistence into extinction, while the other group ($n = 13$) adjusted their contingency ratings more accurately to the changing conditioning regime. Skin conductance responding was positively related to contingency ratings for the former group, accompanied by greater heart rate deceleration. Visuocortical discrimination differences between groups were most pronounced during extinction, in which individuals indicating persistent likelihood of the noxious stimulus were noted to have enhanced ssVEP signal to the aversively paired grating.

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Poster 3-41

**SINGLE-TRIAL AVERSIVE LEARNING: EFFECTS OF
AWARENESS & CONFIDENCE**

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Junghöfer³, & Peter J Lang²
¹Universitat Jaume I, ²University of Florida, ³University of Münster

Descriptors: emotion, conditioning, neutral stimuli

Psychophysiological responses, contingency reports and confidence ratings were assessed in a single-trial aversive conditioning study to determine relationships between awareness and reactivity. During acquisition (48 trials), 12 different faces and 12 objects were each paired only once with an aversive human scream, whereas 24 other neutral stimuli (12 faces, 12 objects) were never paired with a scream (CS-). Reflexive startle blinks and skin conductance were measured during extinction. Evaluative ratings clearly depended on CS+/UCS contingency reports, with scenes rated as more unpleasant and arousing only for pictures correctly identified as CS+, compared to misses. A similar pattern was found for skin conductance, in which electrodermal activity was heightened for CS+ stimuli that were correctly reported, compared to misses. Differences were more evident for faces, compared to objects, and for high confidence contingency reports. On the other hand, startle modulation varied with whether the stimulus was actually paired with a scream (i.e. real CS+), regardless of contingency reports. These data complement prior conditioning studies finding that electrodermal activity is related to awareness whereas startle magnitude is not, in a paradigm using single trial reinforcers which provide equivalent numbers of trials in which CS+ is correctly detected or missed.

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Poster 3-42

**EXPERIENCE-RELATED CHANGES IN RETINOTOPIC
VISUAL CORTEX ARE ORIENTATION-SPECIFIC, LOCATION-
SPECIFIC, AND EYE-SPECIFIC**

Nina N Thigpen, Felix Bartsch, Logan A Dubnick, & Andreas Keil
University of Florida

Descriptors: perceptual biases, plasticity, electrophysiology

Experience changes perception, leading to measurable sensory prioritization of behaviorally relevant cues, often referred to as perceptual biases. Experience-dependent plasticity has been discussed as a possible neurophysiological mechanism underlying such biases. Based on work in the animal model, the present study tested the hypothesis that experience changes the initial afferent volley to retinotopic visual areas in humans. The present study presented 16 subjects with stimuli designed to challenge various aspects of retinotopic neurons: Gradient Field stimuli (areas of 250 lines) were presented at two orientations (75° and 195°) in upper and lower visual fields, during monocular perception (left vs. right eye). A noxious sound (90 dB white noise) was paired with one combination of these factors (i.e. orientation, visual field, and eye) in a differential aversive conditioning paradigm. All other combinations were presented without the sound, to serve as control conditions. Retinotopic responses were measured with high-density electroencephalography, extracting the C1 visual event-related component (60–90 ms latency), which reflects activity in retinotopic areas. C1 amplitude was persistently and selectively enhanced during acquisition for only the conditioned stimulus. A reverse pattern was observed during extinction. These narrowly localized changes suggest the transient retinotopic changes during conditioning are orientation-specific, location-specific, and eye-specific, pointing to short-term plasticity in visual neurons as a mechanism to bias relevant sensory input.

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Poster 3-43

**AN ELECTROPHYSIOLOGICAL STUDY OF AUDITORY
PROCESSING IN CHILDREN WITH HIGH FUNCTIONING
AUTISM SPECTRUM DISORDERS**

Jewel E Crasta, William J Gavin, Blythe LaGasse, & Patricia L Davies
Colorado State University

Descriptors: Autism spectrum, auditory processing, electroencephalography, event-related potentials

Auditory processing is one of the most commonly reported sensory processing deficits in autism spectrum disorders. This study sought to determine whether children with high-functioning autism spectrum disorders (HFA) differ from typically developing children on neurophysiological measures of auditory information processing. EEG data were collected from 19 children with HFA and 19 age- and gender-matched typically developing peers, ages 5 to 12 years. Participants watched a silent movie and heard random presentations of four auditory stimuli; two different frequencies (1 and 3 kHz) each at two intensities (50 and 70 dB). An analysis of variance and post-hoc t-tests of ERP components revealed that children with HFA had significantly smaller N2 amplitudes for the low frequency soft tone ($t(35) = -2.53, p = 0.016$), and significantly smaller P3 amplitudes to the loud tones at both frequencies ($t(36) = 2.73, p = 0.01$) compared to typically developing children. Children with HFA also had significantly longer P2 latencies for the high intensity high frequency tone compared to typically developing peers, suggesting delayed processing and discrimination of auditory stimuli. These findings suggest that children with HFA have increased difficulty in automatic stimulus discrimination and reduced cognitive processing to simple auditory stimuli. ERP measures correctly distinguished children with HFA from typically developing children with 78% accuracy. These results can help practitioners understand the neurophysiological basis of sensory processing deficits in children with HFA.

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Poster 3-44**DEVELOPMENTAL TREND OF ERROR-RELATED NEGATIVITY (ERN) IN 7-TO 25-YEAR-OLDS AFTER ADJUSTING FOR TRIAL-TO-TRIAL VARIABILITY**Mei-Heng Lin, William J Gavin, & Patricia L Davies
Colorado State University*Descriptors: error-related negativity, children, adolescents, latency variability*

Studies have examined developmental trends in ERN amplitude; however, none of these studies have corrected for trial-to-trial variability in latency. This latency “jitter” is known to attenuate amplitudes and may alter the interpretation of findings in samples with high variability (e.g. children). Our study explored the developmental trend of ERN before and after adjusting for latency jitter. We applied the Woody filter technique to adjust for latency jitter on ERN data collected from 240 participants aged 7–25 years. Results showed that regardless of age, ERN amplitude after the Woody filter adjustment ($M = 22.99$ microvolt, $SD = 9.18$) was significantly larger than before adjustment ($M = 12.74$ microvolt, $SD = 6.99$), $F(1,238) = 157$, $p < .001$. Regression analysis showed that linear [$B = -3.99$, $t(236) = -2.23$, $p = .027$], quadratic [$B = 9.61$, $t(236) = 2.61$, $p = .01$], and cubic [$B = -5.37$, $t(236) = -2.74$, $p = .007$] relationships of age to ERN amplitude were found before the Woody filter adjustment [overall model: $F(3,236) = 17.54$, $p < .001$, adjusted $R^2 = .17$]. However, only the cubic relationship between age and ERN amplitude [$B = -4.24$, $t(236) = -1.99$, $p = .048$] remained significant after the adjustment [overall model: $F(3,236) = 2.96$, $p = .03$, adjusted $R^2 = .024$]. Further, trial-to-trial variability of ERN latency decreases with age in a linear pattern, $F(1,238) = 98.66$, $p < .001$, adjusted $R^2 = .29$, suggesting that latency jitter significantly decreases with age. By adjusting for trial-to-trial variability, researchers may gain a more precise interpretation of ERN changes and the development of error monitoring ability.

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Poster 3-45**DEVELOPMENT OF THE ERROR-RELATED NEGATIVITY DURING A FLANKER TASK IN CHILDREN: A PRELIMINARY DESCRIPTIVE META-ANALYSIS OF PEAK AMPLITUDE**Wen-Pin Chang
Creighton University*Descriptors: error-related negativity, development, meta-analysis*

The error-related negativity (ERN) has been a useful index to study typical development of error monitoring. Although available studies on age-related ERN differences in children show an increase in ERN amplitude throughout childhood, many unresolved issues make it difficult to use ERN as a diagnostic marker for children with disabilities. One issue that requires further clarification is the potential normative value of the ERN in typically developing children. This study specifically determines the ERN peak amplitude in neurotypical children ages 6–16 years during a flanker task. The preliminary search identified seven studies with reported means and standard deviations that met the study purpose. For ages 6–9, the grand mean of the ERN peak amplitude was -0.70 μV . The result of random-effects meta-analysis showed the weighted grand mean was -0.93 μV with the 95% confidence interval (CI) of 0.17 to -2.03 μV , $Cochrane Q = 10.30$, $p = .067$, $I^2 = 51.44\%$. For ages 10–16, the grand mean of the ERN peak amplitude was -1.89 μV . The result of random-effects meta-analysis showed the weighted grand mean was -1.93 μV with the 95% CI of -0.15 to -3.71 μV , $Cochrane Q = 17.76$, $p = .087$, $I^2 = 38.06\%$. These results not only confirm age-related differences in the ERN peak amplitude, but also suggest that exploring other measures of ERN from different tasks, such as ERN peak-to-peak amplitude and go/nogo task, is warranted as the value of ERN peak amplitude seems small and may lack sensitivity to serve as a standard against which any individual can be compared.

Poster 3-46**TEMPORAL DYNAMICS OF FACE PROCESSING CIRCUITRY: ERP SOURCE ANALYSIS GUIDED BY fMRI**Maria Antonieta Bobes¹, Agustin Lage¹, Ela Olivares², Johana Perez¹, Jaime Iglesias², & Pedro Valdes Sosa¹¹Cuban Neuroscience Center, ²Autonomous University of Madrid*Descriptors: faces, event-related potentials, fMRI, inverse solutions*

Although functional magnetic resonance imaging (fMRI) identifies brain areas involved in face processing, it does not provide information about the timing of their activation. Here we use fMRI guided source localization of event-related potentials (ERPs) to examine the activation of face processing areas in different times. The Bayesian Model Averaging method was used to estimate the contribution of face areas (defined by fMRI) to the ERPs generated by unfamiliar, visually familiar, and personally-familiar faces. Higher prior probabilities in the solution space were assigned to the fMRI-defined face areas. Source analysis was carried out in three time windows: early (150–210 ms), middle (300–380 ms) and late (460–580 ms). The early and middle responses were generated in fMRI-defined face areas while the late response was generated outside the face recognition system for all three face categories. Different face areas contributed to the generation of the early ERPs elicited by unfamiliar and familiar faces: the occipitotemporal face areas and the posterior cingulate cortices for unfamiliar faces; and the fusiform, posterior cingulate and anterior temporal areas for visually familiar faces, and for personally significant faces also the medial orbitofrontal areas and other structures of the extended face system. A more extended and reliable involvement of the corresponding set of structures contributes to the generation of the middle response for unfamiliar and familiar faces. These indicate that familiarity information is activated as early as 150–210 ms after stimulus onset.

Poster 3-47**PRE-ATTENTIVE BRAIN RESPONSES TO /L/ AND /R/ PHONEME CONTRASTS DIFFER BETWEEN NATIVE JAPANESE AND NATIVE ENGLISH SPEAKERS: ERP STUDY**Breyia S Walker¹, Holly Staggs¹, William W Jones¹, Rochelle Rodriguez², Kafia Said¹, Jacob Park¹, Katelynn Hicks², Franks Andrasik¹, & Jeffrey J Sable²¹University of Memphis, ²Christian Brothers University*Descriptors: mismatch negativity, English, Japanese*

We are examining how age of acquisition and level of experience with the English language influence brain responses in native Japanese speakers. Event-related brain potentials (ERPs) provide one way to examine language processing. We are measuring the mismatch negativity (MMN), which is an automatic brain response to acoustic changes in response to contrasting /la/ and /ra/ sounds. We hypothesized that the MMN would be smaller in native Japanese speakers than in native English speakers, and that more experience with English would produce larger MMNs. In our results, native English speakers had larger and earlier MMNs than native Japanese speakers, although only the latency difference was statistically significant. In native Japanese speakers, MMN amplitudes were inversely related to years of experience with English, which is contrary to our hypothesis.

Poster 3-48**PHASE SHIFTS IN EEG UNDER CONDITIONS OF DIFFERENT FREQUENCY NECKER CUBE INTERPRETATION CHANGES**

Nataliia V Ievpak, Illya P Kuznietsov, Oksana Yu Rakovets, Alona P Sokol, & Ivanna M Marchuk

Lesya Ukrainka Eastern European National University

Descriptors: Phase shift, electroencephalography, Necker cube

The changes of phase interactions between brain cortex regions may reveal the formation of subjective representation. In our study we evaluated three phase synchrony coefficients, which represent the ratio between mean signal phase differences in the pre-stimulus and post-stimulus interval. Each coefficient represented the changes of phase difference in relation to the pre-stimulus interval on different time sections of the post-stimulus interval (0–300 ms, 300–600 ms and 600–900 ms, respectively). The study was conducted on 42 volunteers, males, 18–25 years old, right-handed. All subjects were divided into two groups, depending on Necker cube depth perception changes – 34 subjects reported the perception changes, while 8 subjects didn't. The EEG was registered simultaneously with eye movements. The experiment consisted of 15-trial stimuli presentations; each trial lasted 5 s, followed by a 0.2 s white-screen interval. Results were processed by the software developed in Matlab. Findings indicate that persons who didn't report perception changes have more connections, which include frontal areas of brain cortex, especially during 600–900 ms after stimulus presentation. This may reflect a more pronounced top-down control on perception processes in the group not reporting perception changes. Both groups had more pronounced connections in the right hemisphere, which may reflect its specialization on spatial processing.

Poster 3-49

FEATURE-SPECIFIC AND CATEGORY-SPECIFIC
ATTENTIONAL CONTROL SETTINGS ARE
DIFFERENTIALLY AFFECTED BY ATTENTIONAL
RESOURCE ENGAGEMENT IN CONTINGENT ATTENTIONAL
CAPTURE

Xia Wu, & Fu Shimin
Tsinghua University

Descriptors: attention, event-related potentials

Contingent attentional capture proposes that attentional control settings (ACS) can guide involuntary attentional capture to distractors sharing target relevant property. Although feature-specific ACS and category-specific ACS were reported in single-dimensional search task, it is still unclear whether these two ACSs operate simultaneously in a conjunction search task and how they relate to each other. Three experiments were conducted to investigate and compare feature-specific and category-specific ACS under different search strategies. The matching level between peripheral distractors and central target on feature and category dimensions was manipulated in a rapid serial visual presentation task. The influence of attentional resource engagement was also manipulated by the temporal lags between target and distractor. N2pc component, as well as the deficits in target accuracy, were measured to be indicative of attentional capture. Results consistently showed both category-specific and feature-specific ACS. Moreover, relative to category-specific ACS, the feature-specific ACS seems to be having more weight. Importantly, feature-specific ACS operated regardless of attentional resource engagement, whereas category-specific ACS was prevented by insufficient attentional engagement. It is concluded that feature-specific ACS and category-specific ACS are differentially monitored by attentional resource engagement and have different weights in conjunction search.

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Poster 3-50

PARASYMPATHETIC NERVOUS SYSTEM DYSFUNCTION IN
FRONTOTEMPORAL DEMENTIA: A STUDY OF PATIENT-
CAREGIVER INTERACTIONS

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Descriptors: dementia, autonomic nervous system, social interaction

Behavioral variant frontotemporal dementia (bvFTD) is associated with neural degeneration in brain regions (e.g., insula, anterior cingulate) critical for regulating autonomic nervous system (ANS) response. Consistent with this are reports of altered autonomic function at rest in bvFTD patients. The present study examined heart rate variability (HRV) in patients and their neurologically normal spousal caregivers in a more social context, during a 10-minute discussion of an area of marital conflict. HRV was derived from second-by-second averages of cardiac interbeat interval obtained during the discussions. Participants were 34 patients (14 female) with bvFTD and their caregiver spouses and 20 patients with Alzheimer's Disease (AD; 9 female) and their caregiver spouses (spouses served as a normal control group). A significant group difference was found in HRV, $F(2,105) = 3.15, p < .05$. Follow-up comparisons revealed that bvFTD patients had lower HRV than AD patients and controls (AD patients did not differ from controls). A subgroup analysis ($N = 39$ patients) controlling for the use of acetylcholinesterase inhibitors (which impact ANS responding) suggested that the group differences still remained, $F(1,36) = 3.98, p = .054$. This study extends previous findings of ANS dysfunction in bvFTD into the realm of social interactions. These ANS dysfunctions likely contribute to the well-documented problems bvFTD patients have in social and emotional domains.

Poster 3-51

COHERENCE BETWEEN EMOTIONAL EXPERIENCE AND
PHYSIOLOGY IS RELATED TO GREATER LIFE
SATISFACTION

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University of California, Berkeley

Descriptors: emotion coherence, life satisfaction, skin conductance

Many emotion theories propose that emotions promote coherence among emotion response systems (e.g., subjective experience, expressive behavior, physiology). In previous work we found that individuals with meditation training evidenced greater coherence between subjective experience and physiology compared to those with dance training and controls. We used data from this earlier study to determine whether greater emotional coherence was associated with greater life satisfaction. 21 experienced Vipassana meditators, 21 experienced dancers, and 21 controls completed a measure of life satisfaction and watched a series of emotional film clips. During the films they continuously rated their emotional experience using a rating dial while skin conductance level (SCL) was recorded. Time lagged cross-correlations were used to calculate within-subject coherence between emotional experience and SCL. Results revealed that the three groups did not differ in life satisfaction. However, across groups greater coherence was associated with higher life satisfaction (even after controlling for group membership) ($\beta = .32, p = .02$). These results indicate that having greater emotional coherence is associated with greater life satisfaction, an important positive real-world outcome. Coherent emotions may be maximally effective in dealing with life's challenges and opportunities and in promoting effective communications with conspecifics, leading to improved quality of life and, thus, greater life satisfaction.

Poster 3-52

NEURAL CORRELATES OF ATTENTIONAL CONTROL IN
BEHAVIORAL VARIANT FRONTOTEMPORAL DEMENTIA

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Descriptors: emotion regulation, attentional control, neuroanatomy

The use of attentional control to direct visual attention away from an emotion elicitor is one of the basic ways we regulate emotion. It may involve voluntary, top-down control of attention involving frontal and temporal regions of the brain, or it may be associated with the automatic, bottom-up processing of visceral information involving the insula, amygdala, and anterior cingulate cortex. Behavioral variant frontotemporal dementia (FTD) is a neurological disease characterized by atrophy in the frontal and temporal lobes and limbic and paralimbic structures. Previous research suggests that FTD patients show diminished attentional control behaviors while viewing a disgusting film clip compared to patients with Alzheimer's disease, a neurological disease primarily characterized by memory deficits (Otero & Levenson, manuscript in preparation). The current study examined the neural correlates of attentional control behaviors in 34 FTD patients and 7 controls. Participants viewed a disgusting film clip while attentional control behaviors were measured using behavioral coding of head, body, and eye position. Regional brain volumes were determined from structural MRIs. Results indicated that diminished attentional control behaviors were associated with smaller superior temporal lobe volume ($\beta = .434, p < .01$). No significant associations were found between attentional control behaviors and the insula, amygdala, or anterior cingulate. These findings suggest that looking away from an emotional stimulus may implicate top-down neural regions, specifically temporal lobe regions.

Poster 3-53**NEUROCOGNITIVE ASSESSMENT OF REGULATORY FLEXIBILITY**Jean M Quintero^{1,2}, Peter Luehring-Jones³, Laura J O'Toole², George A Bonanno⁴, & Tracy A Dennis^{1,2}¹The Graduate Center, The City University of New York, ²Hunter College of The City University of New York, ³City College of The City University of New York, ⁴Teachers College, Columbia University,*Descriptors: emotion regulation, flexibility, event-related potentials*

Regulatory flexibility, or the ability to respond sensitively to context by drawing on a repertoire of strategies, may represent the most adaptive approach to emotion regulation. Few methods exist, however, for assessing emotion regulation (ER) flexibility. The present study examined links between biobehavioral measures of context sensitivity and repertoire flexibility in relation to self-reported adaptive ER among 73 adults. Event-related potentials (ERPs) were used to measure sensitivity to emotional context during the go/no-go task (N170) and regulation strategies during the reappraisal task (late positive potential; LPP). Performance was sensitive to emotional context during the go/no-go task: Correct go responses were faster for happy versus fear faces [$t(73) = 3.32, p = .001$] and greater N170 amplitudes to no-go fear faces were associated with faster correct responses to self-report of more adaptive ER strategy use (acceptance and positive refocusing; $r_s = .27, p_s = .03$). Reappraisal was also sensitive to emotional context: LPPs were larger in the increase ($p = .03$) and maintain ($p = .02$) versus the decrease condition for pleasant images [$F(2, 144) = 3.11, p = .048$]. Larger LPPs to pleasant images in the increase versus decrease condition were associated with greater use of several ER strategies (reappraisal: $r = .25, p = .04$; positive refocusing: $r = .35, p = .003$; flexibility in strategies following difficult events: $r = .27, p = .03$). Taken together, findings provide support for a neurocognitive approach to conceptualizing and assessing regulatory flexibility.

Poster 3-54**A GAMIFIED ATTENTION BIAS MODIFICATION APP REDUCES STRESS REACTIVITY DURING PREGNANCY**Peter T Luehring-Jones¹, Jean M Quintero^{2,3}, Laura J Egan³, Margaret Altemus⁴, Shari Gelber⁴, & Tracy A Dennis^{2,3}¹City College of The City University of New York, ²The Graduate Center, The City University of New York, ³Hunter College of The City University of New York, ⁴Weill Cornell Medical College*Descriptors: attention bias modification, gamification, pregnancy*

Prenatal stress affects health outcomes for both the mother and the developing fetus. Cost-effective and accessible treatments to reduce such stress are needed for pregnant women. The present study explored whether four weeks of mobile, gamified attention bias modification training (ABMT) versus placebo training (via an iOS application, or app) reduced subjective anxiety, threat bias, and stress reactivity in a group of pregnant women ($n = 19$) between their 15th and 25th week of pregnancy. The ABMT group showed less stress reactivity than the placebo training group following app play [$F(1,15) = 5.06, p = .04$]. Event-related potentials were used to measure whether discrete stages of threat processing [attention allocation (P1), discrimination (N170), affective evaluation (P2), cognitive control (N2)] were associated with anxious or depressed mood prior to app play. At baseline, greater trait anxiety was associated with enhanced discrimination of threat (N170: $r = -.48, p = .04$), depression was associated with dampened emotional evaluation of threat (P2: $r = -.55, p = .01$), and both anxiety and depression were associated with reduced controlled processing of threat (N2: $r = .60, p = .009$ and $r = .76, p < .001$). Taken together, these results indicate that extended use of a mobile, gamified ABMT app effectively reduced behavioral stress reactivity during pregnancy. In addition, patterns of neurocognitive responses to threat varied with anxious and depressed mood, suggesting that ERPs could serve as treatment-relevant measures of threat processing in ABMT research.

Poster 3-55**THE INFLUENCE OF MOTOR IMAGERY ON THE LEARNING OF A SEQUENTIAL MOTOR SKILL**Jagna Sobierajewicz^{1,2}, Anna Przekoracka-Krawczyk², Wojciech Jaśkowski³, Willem Verwey⁴, & Rob van der Lubbe^{1,4}¹University of Finance and Management in Warsaw, ²Adam Mickiewicz University, ³Poznan University of Technology, ⁴University of Twente*Descriptors: motor imagery, motor learning, event-related potentials, lateralized readiness potential*

Motor imagery has been argued to affect the acquisition of motor skills and to improve performance in sports disciplines and rehabilitation. The present study examined whether motor imagery induces the learning of a sequential motor skill by employing a modified discrete sequence production (DSP) task: the Go/NoGo DSP task. In our task, sequences of five stimuli signaling a specific response sequence were presented. After an informative cue, the cued response sequence had either to be executed, to be imagined or to be withheld. To establish an effect of motor learning, the experiment was divided into a practice phase, and a final test phase. In the latter phase we compared mean response times and accuracy during the execution of new sequences, old imagined sequences and old executed sequences. The electroencephalogram (EEG) was measured to compare activity between motor imagery, motor execution, and motor inhibition in the practice phase. Event-related potentials (ERPs) and event-related lateralizations (ERLs) in the practice phase showed strong similarities on trials requiring motor imagery and motor execution, while a major difference was found on trials for which the response sequence should be withheld. Behavioral results in the test phase revealed that the accuracy for imagined sequences in the practice phase was improved relative to new sequences, which confirms the idea that motor imagery induces motor skill learning.

Poster 3-56**TEMPORAL DYNAMICS OF POSITIVE EMOTION REGULATION**Emmanuel Garcia¹, Jean M Quintero¹, Laura Fonseca², & Douglas S Mennin¹¹The Graduate Center, City University of New York, ²Hunter College of The City University of New York*Descriptors: positive emotion regulation, affective disorders, event-related potentials*

Affective disorders are commonly associated with negative emotion regulation strategies, while positive emotion regulation (PER) remains under-explored. To address this gap in research, we examined the temporal nature of PER using event-related potentials (ERPs). Healthy undergraduates ($n = 25$) passively viewed emotional (affiliative, erotic, threatening, mutilation) and neutral images, while an electroencephalogram (EEG) was recorded. Responses to Positive Affect, a self-report measure of trait PER, were used to examine how the degree of PER may impact the late positive potential (LPP; 400ms-1000ms post-stimulus onset) responding. We expected people scoring higher on trait PER to display greater differences in activation between neutral and emotional images than those who scored lower. Overall, emotional images elicited significantly greater mean activations than neutral images. Significant interactions were found between activation to emotional images and high-versus-low levels of PER. People higher in trait PER were better able to distinguish between emotional and neutral images. People lower in trait PER had elevated reactivity to neutral and threatening images, with blunted reactivity to affiliative, erotic, and mutilation images. Combined, these results suggest that PER may modulate elaborative emotional processing, highlighting the importance of further investigating the underlying mechanisms of PER. ERP investigations of PER may contribute to a more comprehensive understanding of emotion regulation and improved treatment of emotional disorders.

Emmanuel Garcia and Laura Fonseca are funded by the NIH MBRS-RISE Program at Hunter College Grant# GM060665.

Poster 3-57**THE INFLUENCE OF DEPRESSIVE SYMPTOMS AND TRAIT IMPULSIVITY ON THE REWARD POSITIVITY**Belel Ait Oumeziane, & Dan Foti
Purdue University

Descriptors: event-related potentials, reward processing, depression
Recent theoretical models have emphasized reward processing as a central component of mood disorders. In particular, neutral and behavioral evidence indicate that depression is associated with reduced sensitivity to rewards. Yet, reward dysfunction is not unique to depression, as it has also been observed in trait impulsivity. However, the interplay of depression and impulsivity with reward sensitivity has been largely ignored. In the current study, a large undergraduate sample ($N = 258$) was assessed using a self-report depression measure (DASS-21) and a multifaceted measure of impulsivity (UPPS-P). The reward positivity (RewP), a neural measure of reward, was recorded using event-related potentials on a simple guessing task. Results indicate an interaction between Positive Urgency (i.e., impulsivity facet) and Depression ($\beta = -.13$, $p < .05$). Depression acted as a moderator among individuals high but not low on Positive Urgency. Item-level analyses suggest this relationship was driven by feelings of down-heartedness and hopelessness. The present findings highlight the importance of assessing critical factors that may have a substantial influence on reward dysfunction. Specifically, our findings suggest that the interplay between impulsivity and depression has meaningful implications on reward sensitivity. Further research is needed to elucidate whether this relationship is unique to subclinical depression or if it generalizable to clinical samples.

Poster 3-58**PREDICTABILITY MODULATES THE BLUNTED RESPONSE TO THREAT IN MAJOR DEPRESSIVE DISORDER: EVIDENCE FROM EVENT-RELATED POTENTIALS**Paige Ethridge¹, Anna Weinberg¹, & Greg Hajcak²
¹McGill University, ²Stony Brook University

Descriptors: major depressive disorder, late positive potential, threat
Abnormal attention to threat appears critical to the pathogenesis of unipolar depressive disorders. The threat-elicited Late Positive Potential (LPP), an event-related potential thought to reflect attentional engagement, is often blunted in individuals with depression. However, it is not clear whether expectations regarding encounters with threat can modulate this deficit. The present study, therefore, sought to explore the extent to which the blunted LPP is specific to individuals experiencing depression, and what role predictability might play. To that end, we examined the magnitude of the LPP to predictable and unpredictable threat in a group of individuals with Major Depressive Disorder (MDD) and a comorbid diagnosis of Generalized Anxiety Disorder (GAD; $n = 29$), a psychopathology control group with GAD alone ($n = 36$), and a group of healthy controls ($n = 38$). In one task, participants viewed 60 randomly-presented neutral and unpleasant images. In another, they viewed the same images preceded by a cue indicating the content of the forthcoming image. When threat images were unpredictable, the LPP was blunted in the comorbid MDD group, consistent with past reports, but was enhanced in GAD alone. However, when threat was predictable based on the preceding cue, the comorbid MDD group displayed a comparably enhanced LPP to the GAD group. These findings indicate that deficits in attentional engagement observed in depression are specific (i.e., not observed in GAD), but also flexible, and suggest they may be amenable to directed attention interventions.

Poster 3-59**NEURAL MECHANISMS UNDERLYING THE ANTICIPATION OF RESPIRATORY THREAT**Andreas von Leupoldt¹, Roland Esser², Matthias Gamer², Christian Büchel², & Cornelia Stoeckel²
¹University of Leuven, ²University of Hamburg

Descriptors: anticipation, respiration, fear
The perception of dyspnea (breathlessness) is a threatening key feature of many respiratory diseases, but also of mental disorders. Already the anticipation of this aversive respiratory symptom is thought to elicit fear in many patients and to result in unfavorable health behavior. This study examined the brain mechanisms underlying the anticipation of dyspnea. We used resistive load breathing to induce

dyspnea in healthy individuals during parallel functional magnetic resonance imaging. Blocks of severe dyspnea alternated with blocks of mild dyspnea. Each block was preceded by a visually cued anticipation period. Subjective ratings confirmed the successful induction of mild and severe dyspnea and indicated increased fear during dyspnea anticipation. The perception of dyspnea activated an extensive network of sensorimotor and limbic areas including the bilateral insula. The bilateral insula showed increased activations already during dyspnea anticipation. Moreover, the right insula showed increased connectivity with periaqueductal gray and right amygdala when severe dyspnea was anticipated. Finally, higher right insular activation during anticipation was associated with higher insular and amygdala activation during perception of dyspnea. Thus, dyspnea anticipation activates and influences brain areas involved in dyspnea perception. The prominent activation of emotion-related areas such as insula and amygdala during dyspnea anticipation most likely reflects anticipatory fear of dyspnea and might underlie the development of unfavorable health behaviors in affected patients.

DFG: LE 1843/9-2, LE 1843/10-1, LE 1843/10-3.

Poster 3-60**APPETITIVE ACTIVATION IN THE PRESENCE OR ABSENCE OF FOOD: PHYSIOLOGICAL RESPONSES TOWARD HEALTHY AND UNHEALTHY FOOD ADVERTISING**Adrienne Muldrow, & Rachel L Bailey
Washington State University

Descriptors: food cues, appetitive motivation, primary biological motivation
Food is a primary biological motivator that triggers automatic approach and consumption responses when we encounter it or cues that represent it. Because humans need food to maintain proper metabolic balances, we are also biologically predisposed to prefer foods that are the most energy dense (i.e. high fat, high sugar). This study examines how the presence of food affects appetitive responses toward healthy and unhealthy food stimuli in food advertisements. Fifty-six college students watched a set of advertisements for products that were perceived as either healthy or unhealthy (i.e. granola bars vs. snack cakes). Half were randomly assigned to an environmental condition where a tray of the advertised food products was present and half where it was not. During exposure to the ads, participant's skin conductivity levels (SCL) were collected. Results support that unhealthy food ads elicited the most SCL across exposure, $F(14,784) = 1.87$, $p < .03$. However, the presence or absence of food moderated this effect, $F(14,784) = 3.39$, $p < .0001$. In the presence of food, SCL was similar for healthy and unhealthy food ads. When food was absent, unhealthy food ads elicited greater SCL compared to healthy food ads. This suggests that when food is present in the environment a more general level of appetitivity occurs, but if food isn't actually present, cues for more palatable foods create greater appetitive activity in order to encourage mobilization for search, approach and consumption.

Poster 3-61**PRIMARY BIOLOGICAL APPEALS IN FOOD ADVERTISEMENTS: FOOD CUES AND PERCEIVED HEALTH INFLUENCE APPETITIVE RESPONSES**

Jiawei Liu, & Rachel L Bailey
Washington State University

Descriptors: food cues, primary biological motivation, food advertising

Food cues encourage us to eat in general but also are influential in our eating choices. Previous research has found that the most direct food cues (color, shine) in advertisements, which provide information about nutritional and hedonic value of food, trigger greater appetitive motivational responses than less direct food cues (logos, brands) (Bailey, 2015). This study investigated how direct food cues interact with food palatability in advertisements to alter appetitive responses during ad exposure and the subsequent desire to eat the advertised foods. Ads for more palatable foods (high fat, sugar), compared to less, elicited more sympathetic arousal level, $F(4,228) = 3.66, p = .007$. Further, orbicularis oculi data supported that direct cue ads were more appetitive, but when indirect cues were used, greater food palatability closed this gap. Indirect cue ads for less palatable food elicited significantly less orbicularis oculi activity, $F(4,244) = 2.98, p = .02$. Desire to eat categorizations (want to eat- don't want to eat) of the advertised items before and after ad exposure revealed that influences of palatability and cue directness in ads interact to alter later motivations. After exposure to the ads, food items that were directly cued in ads, irrespective of palatability, were categorized as more desirable than indirectly cued items. Thus, the availability of food cues in ads significantly affects later desire for food.

Poster 3-62**INDIVIDUAL DIFFERENCES IN EATING BEHAVIOR AFFECT INFORMATION PROCESSING OF OBESITY PREVENTION MESSAGES**

Tianjiao Wang, & Rachel L Bailey
Washington State University

Descriptors: primary biological motivation, individual differences, restricted eating

This study examined how individual differences in eating behaviors affect the cognitive processing of obesity prevention fear appeal messages. It was expected that restrained eaters, individuals purposefully restricting eating to maintain or lose weight, would process these messages more effortfully. Fear appeals were conceptualized as messages that varied the presence and intensity of negative (threat, e.g. danger of heart disease) and positive (solution, e.g. limit intake of high fat foods) information. Restrained eaters were expected to most effortfully process intense messages that contained both threats and solutions. Sixty-five participants viewed sixteen messages categorized as negative only or coercive (positive and negative) at both low and high intensities. Heart rate was collected during exposure. Restrained eating, measured via the Dutch Eating Behavior Questionnaire (Van Strien, et al, 1986), significantly modulated encoding across time, $F(4,248) = 3.072, p < .05$. Restricted eaters versus non-restricted eaters exhibited greater cardiac deceleration, indicative of more effortful encoding, when exposed to low arousal messages than when exposed to high arousal messages, irrespective of whether the messages were only threatening or also contained solutions-based information. Some acceleration was exhibited at higher intensities, which may indicate stimulus rejection. Thus, restrained eaters are attuned to obesity-related threat, but may not attend solutions-based information with behaviors already in place to avoid obesity and related social and health threats.

Poster 3-63**PERFORMANCE MONITORING IN YOUNG HEAVY DRINKERS**

Ingmar HA Franken, Frederik M van der Veen, & Jan W van Strien
Erasmus University Rotterdam

Descriptors: error, performance, alcohol

Recent studies suggest that compromised performance monitoring (error processing) is an important characteristic of substance use disorders (SUD). In general, SUD patients show decreased electrophysiological responses when an error is made. Particularly, a reduced Error-Related Negativity (ERN) and a reduced Error Positivity (Pe) is observed in SUD patients. However, unknown is whether

performance monitoring is also present in heavy substance users who are not necessarily a SUD patient. One preliminary study suggests that there are problems with performance monitoring in female heavy drinkers. In the present study, 49 light and 48 heavy alcohol drinkers were recruited and both ERN and Pe components were measured using electroencephalography while participants performed an Eriksen flanker task. Results indicated no differences in ERN amplitude between heavy and light drinkers. However, Pe amplitudes of heavy drinkers were smaller than light alcohol drinkers. The results indicate that there are no large deficits in performance monitoring in young heavy drinkers. The decreased Pe amplitude might be an indication that heavy drinkers attribute less motivational significance to the making of errors than light drinkers.

Poster 3-64**ENHANCED EARLY POSTERIOR NEGATIVITY IN RESPONSE TO TRYPOPHOBIC STIMULI**

Jan W Van Strien, & Manja K Van der Peijl
Erasmus University Rotterdam

Descriptors: tryphobia, early posterior negativity, phylogenetic fear

People may experience aversion when seeing images of clusters of circular objects (e.g., honeycombs). This aversion is thought to have survival value: the visual characteristics of tryphobic stimuli are also found in many poisonous animals. As our previous ERP studies demonstrated that the early posterior negativity (EPN) is highly responsive to phylogenetically threatening stimuli, we expected tryphobic stimuli to evoke larger EPN than nontryphobic stimuli. Twenty-four participants filled out a tryphobia questionnaire and watched the random rapid serial presentation of 450 tryphobia pictures, 450 pictures of poisonous animals, 450 pictures of snakes, and 450 pictures of birds (1800 in total, at a rate of 3 pictures/s). The EPN was scored as the mean activity at occipital electrodes (PO3, O1, Oz, PO4, O2) in the 225–300 ms time window after picture onset. The EPN was significantly larger for snake pictures, tryphobia pictures, and poisonous animal pictures than for bird pictures. The enhanced EPN was limited to O1, Oz and O2 for tryphobic and poisonous animal pictures, but more widespread (including PO3 and PO4) for snakes. Remarkably, the scores on the tryphobia questionnaire were correlated with the EPN amplitudes for tryphobia pictures at Oz ($r = -.46, p = .024$) and O2 ($r = -.51, p = .010$), with participants that experienced higher aversion to these stimuli showing larger EPN amplitudes. The limited topography of the EPN tryphobia effect suggest that it is based on low level visual characteristics such as the spectral composition of these stimuli.

Poster 3-65**FRONTAL ASYMMETRY AS A PREDICTOR OF BEHAVIOR IN A VIRTUAL T-MAZE**

Johannes Rodrigues, & Johannes Hewig
University of Würzburg

Descriptors: frontal asymmetry, virtual reality

Frontal asymmetry, as proposed by Davidson, has been investigated in terms of trait asymmetry, a stable disposition of frontal activation and state asymmetry, representing variable reactions of frontal brain regions to situations. In state based approaches, different stimuli are used to induce frontal asymmetry. One major problem of many state based approaches is the lack of opportunity to show behavior. In this study, desktop virtual reality was used to induce frontal asymmetry, giving participants the opportunity to react to stimuli and showing frontal asymmetry as well. 30 participants explored a virtual T-maze, containing different events with positive, negative and neutral outcomes. The events were either "single events", showing one stimulus, or "conflict events", with two stimuli occurring at the same time. Each event was signaled via color cues. Frontal asymmetry was assessed during cueing period, because of different visual properties of the events. Also, behavior in every trial was recorded. Considering only the events and frontal asymmetry, there is a main effect of the event on frontal asymmetry, showing more alpha power on the left frontal sites during "monster" condition, where one encounters "monsters", and potential loss of credits if one is not able to flee. For frontal asymmetry as a predictor of the resulting behavior, there is a fixed effect, showing higher probability to approach a stimulus than to withdraw oneself, if there is a higher score in frontal asymmetry, indicating more brain activation on the left side of the frontal brain.

Universitätsbund Würzburg.

Poster 3-66**WHEN DECISIONS LEAD TO CREEPY-CRAWLIES. A STUDY ON THE FUNCTIONAL MEANING OF THE FEEDBACK RELATED NEGATIVITY**

Roman Osinsky, & Johannes Hewig
University of Würzburg

Descriptors: feedback-related negativity, decision making, outcome evaluation
Previous research has indicated that the feedback-related negativity reflects an early bad-versus-good evaluation of action outcomes in the posterior medial frontal cortex. We were interested in whether this evaluative mechanism is sensitive to the internal affective valence of a particular outcome or rather to its correctness in terms of an explicit task rule. We recorded an electroencephalogram while individuals (N = 32) performed a two-choice task in which each decision resulted in seeing a picture either of a spider, a beetle, a bird, or a rabbit. In one block of this task no explicit rule was provided ('no rule' block) whereas in another block participants were instructed to search the spiders ('spider rule' block). Pictures of spiders and beetles were rated more negatively than those of birds and rabbits. In the 'no rule' block the picture-locked FRN did not reflect these differences in emotional valence. However, in the 'spider rule' block the FRN reflected action correctness, being larger for beetles, birds and rabbits compared to spiders. Thus, our results indicate that the mechanism underlying the FRN evaluates whether an action outcome is correct/intended in terms of abstract rules rather than the internal outcome valence.

Poster 3-67**FROM ALPHA TO THETA: REWARD DISTRIBUTION KNOWLEDGE IMPACTS DECISION MAKING STYLE**

Cameron D Hassall, & Olave E Krigolson
University of Victoria

Descriptors: decision making, alpha oscillations, theta oscillations
Decision making is typically studied by presenting participants with a small set of options. The decision systems under study, however, are routinely tasked with choosing from a continuous set of options, e.g. when controlling one's arm/hand in order to maximize the likelihood of successfully grasping a coffee mug. There is evidence that during decision making humans engage in two different modes of control — a fast, exploitative system (sometimes called System I) and a slow, deliberative system (sometimes called System II). Our goal here was to engage both modes of control in participants using a task in which values and decisions varied along a continuum. Specifically, we recorded electroencephalographic (EEG) data while participants "mined for gold" by selecting spatial locations at which to dig. One environment (sparse) contained only a single gold "hot spot", while the other environment (abundant) contained many such areas. At the time of the decision about where to dig, we observed an increase in parietal alpha power in the sparse environment relative to the abundant environment, which may reflect a release of control resources associated with an exploitative (System I) decision. We also observed an increase in frontal midline theta activity following feedback in abundant environments compared to sparse environments, possibly indicating an increase in cognitive control associated with the System II decision process. These results suggest that decision making in continuous environments involves context-dependent transitions between different modes of control.

Poster 3-68**EMBRACING THE "NEW STATISTICS" IN ERP DATA ANALYSIS**

Olave E Krigolson¹, Cameron D Hassall¹, Christie John², & Michael Masson¹
¹University of Victoria, ²Dalhousie University

Descriptors: methods, event-related potentials, electroencephalography
There is a growing belief that null hypothesis testing is not leading to accurate data analysis and valid inferential claims (Cumming, 2013). Indeed, Cumming and others have recently suggested that we abandon traditional statistical analyses and our obsession with p-values and embrace the "New Statistics". Here, we follow Cumming's suggestions and some key ideas from Luck (2005, 2014) and propose a new technique for the analysis of event-related brain potential data that does not rely on peak detection approaches and "classic" inferential tests. Instead, we are proposing a method where we embrace difference waveforms to examine

experimental effects as opposed to experimental conditions. Further, we propose that the analysis of difference waveforms should be done solely via confidence intervals and effect sizes instead of via methods reliant upon null hypothesis testing. We embrace and promote Cumming's suggestion that meta-analysis should be done whenever possible to examine true population effects. We support our proposal for a new method of data analysis by demonstrating the success of our approach in examining ERP components associated with attention (P1, N1), reward processing (FRN), and context updating (P300). Finally, to further validate our claims we compare our new analysis approach with more traditional analyses to highlight when and where the traditional methods fail. We hope the approach we promote will lead to a new, more open and quantitative science of event-related brain potential data.

NSERC, NSHRF, CFI.

Poster 3-69**ENHANCED SENSITIZATION TO ANIMAL, INTERPERSONAL, AND INTERGROUP FEAR-RELEVANT STIMULI (BUT NO EVIDENCE FOR ONE-TRIAL FEAR LEARNING)**

Ottmar V Lipp¹, Sophie L Cronin², Sakinah SJ Alhadad²,
& Camilla C Luck¹
¹Curtin University, ²University of Queensland

Descriptors: fear learning, sensitization, fear-relevance

Selective sensitization has been proposed as an alternative, non-associative explanation for enhanced responding to animal fear-relevant stimuli, snakes and spiders, during extinction of Pavlovian fear conditioning. The current study sought to replicate the phenomenon using a shock work-up procedure as the sensitizing manipulation and to extend it to interpersonal and intergroup fear-relevant stimuli, angry faces and other-race faces. Assessment of selective sensitization was followed by a one-trial fear learning procedure. Selective sensitization, larger electrodermal responses to fear-relevant than to control stimuli after sensitization or a larger increase in electrodermal responding to fear-relevant than to control stimuli after sensitization, were observed across stimulus domains. However, a subsequent one-trial fear learning procedure failed to provide evidence for enhanced fear conditioning to fear-relevant stimuli. One-trial fear learning was either absent or present for fear-relevant and non fear-relevant stimuli. The current study confirms that electrodermal responses to fear-relevant stimuli across stimulus domains are subject to selective sensitization.

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Poster 3-70**REDUCED EARLY ERP RESPONSE TO FEARFUL FACE STIMULI AS AN INDICATOR OF CALLOUS-UNEMOTIONALITY ('MEANNESS')**

Isabella M Palumbo¹, James R Yancey¹, Sarah J Brislin¹,
Salekin T Randall², & Christopher J Patrick¹
¹Florida State University, ²University of Alabama

Descriptors: event-related potentials, psychopathy, facial expression

The Triarchic model of psychopathy (Patrick et al. 2009) conceptualizes this clinical condition as encompassing three distinct dispositional tendencies: boldness, disinhibition, and meanness. The latter construct, termed callous-unemotionality (CU) in the child psychopathy literature, entails deficient empathy, lack of affiliative capacity, and predatory exploitation of others. Prior research has reported lower detection accuracy and reduced amygdala reactivity to fearful face stimuli in individuals exhibiting high CU tendencies (Marsh & Blair, 2008). The current study recorded ERP responses to face stimuli in a simple visual processing task to investigate neurophysiological indicators of the meanness/CU construct. Participants (226 adults) viewed fearful and neutral faces along with scrambled images in a passive viewing task that included an attentional check (i.e., respond to change in central fixation). Meanness was operationalized using subscales from the Externalizing Spectrum Inventory (ESI; Krueger et al. 2007) that load selectively on the ESI's callous-aggression subfactor. Analyses revealed a significant negative association between ESI-Meanness scores and degree of differential response in N170 and P2 components of the ERP to fearful versus neutral/scrambled faces. This result corroborates prior work with younger participants, and points to reduced early ERP response to fear expressions as a neural indicator of meanness/CU. Implications for understanding the neurobiological basis of this core symptomatic facet of psychopathy will be discussed.

Poster 3-71**CORRUGATOR EMG ACTIVITY DURING EMOTIONAL PICTURE VIEWING: DISTINCT RELATIONS WITH THREAT SENSITIVITY AND CALLOUS-AGGRESSION**James R Yancey, Noah C Venables, & Christopher J Patrick
Florida State University*Descriptors: corrugator, threat sensitivity, callous-aggression*

Corrugator EMG is reliably enhanced during processing of aversive pictures or images and covaries with reported stimulus unpleasantness (Lang, 1995). Two dispositional constructs linked to processing of aversive stimuli are threat sensitivity (THT+) or trait fear, and callous-aggression (Call-AGG). This study examined associations between these two dispositional constructs and corrugator response to emotional pictures. Subjects were 462 adults tested in a picture-viewing procedure that included pleasant, neutral, and aversive IAPS stimuli. THT+ was assessed using a 55-item scale designed to index fearful/fearless tendencies, and Call-AGG was measured using relevant items from the Externalizing Spectrum Inventory. THT+ and Call-AGG each showed distinct relations with corrugator reactivity to aversive relative to neutral pictures, with THT+ predicting enhanced reactivity and Call-AGG predicting reduced reactivity. Contrasting effects for the two dispositions were evident across other-victim (i.e., mutilation) and self-threat (i.e., weapon/attacker) scenes. Unexpectedly, threat sensitivity also predicted corrugator enhancement to action and erotic pictures. Implications for understanding of facial EMG response to emotional pictures in relation to these and other dispositional constructs will be discussed.

Poster 3-72**ALTERNATIVE APPROACHES TO QUANTIFYING PROBE P3 AMPLITUDE DURING A PASSIVE PICTURE VIEWING TASK**Laura E Drislane, Noah C Venables, & Christopher J Patrick
Florida State University*Descriptors: event-related potentials, probe P3, individual differences*

The occurrence of an unexpected intense noise evokes a rapid-onset defensive reaction that includes a startle blink component and subsequent cortical orienting ("probe P3") response. Probe P3 amplitude is reliably modulated by foreground stimulus valence, and appears to reflect a defensive cortical "call to arms" (Drislane et al., 2013; Herbert et al., 2006) – an index of the brain's dedication of resources toward processing and coping with an unexpected event. However, there are methodological challenges to quantifying probe P3 amplitude, such as differences in waveform morphology across individuals and the need to disaggregate overlapping ERP components. The current study compared three alternative approaches to quantifying probe P3 in a sample of participants (476 adult twins) who completed an affective picture viewing task that included intervening noise probes. Probe P3 was extracted from the average ERP waveform for each picture condition and quantified for amplitude using (1) a traditional windowed approach, (2) hand scoring, and (3) principal components analysis (PCA). There was strong convergence across the methods in quantifying overall amplitude ($r_s = .77 - .90$) and affective modulation ($r_s = .74 - .80$) of the probe P3 response. However, windowed and PCA-derived P3 components displayed somewhat stronger associations with individual difference characteristics (dispositional fear and externalizing proneness) than did hand-scored responses. Pros and cons of each approach to quantifying probe P3 will be discussed as well as implications for future research.

Poster 3-73**TRIARCHIC PSYCHOPATHY FACETS AND EARLY ERP REACTIVITY TO EMOTIONAL FACES**Sarah J Brislin, James R Yancey, Noah C Venables, & Christopher J Patrick
Florida State University*Descriptors: event-related potentials, facial expressions, triarchic, psychopathy*

This study examined, in 414 adults, early ERP reactivity to affective faces in relation to triarchic psychopathy facets of meanness, disinhibition, and boldness. Prior research on affective-face reactivity (Marsh & Blair, 2008) reported behavioral (lower accuracy) and physiological (reduced amygdala reactivity) effects related to callous-unemotional and antisocial tendencies. We examined ERP indices of early processing of happy and fearful faces (i.e., N170, P2) during an emotional Stroop task. At the bivariate level, both meanness (i.e., callous-aggressive

tendencies) and disinhibition (i.e., general externalizing proneness) were associated with reduced N170 negativity to emotional faces at temporal sites. A regression analysis revealed that the overlap between meanness and disinhibition accounted for the relationship. For P2, Meanness showed a negative association with amplitude of response to fear faces, in both bivariate and regression analyses. Thus, meanness and disinhibition were both related to deficits in early N170 response to emotional faces, with meanness related to deficits in somewhat later P2 response to fear faces specifically. These findings suggest that previously reported deviations in behavioral and fMRI response to emotional faces in psychopathy may reflect deficits in early visual-affective processing.

Poster 3-74**EXPERIENCE BUT NOT EXPECTANCY ENHANCES OSCILLATORY NEURAL RESPONSES IN VISUAL CORTEX AND THE HIPPOCAMPUS IN DELAY AND TRACE CONDITIONING**Melissa Yuan¹, Constantino Méndez-Bértolo², Bryan Strange², & Stephan Moratti²¹Harvard University, ²Polytechnic University of Madrid*Descriptors: magnetoencephalography, expectancy, fear conditioning*

Trace conditioning, in which the conditioned stimulus (CS) is followed by a time interval (e.g. of 500ms) before the presentation of the unconditioned stimulus (US), has been shown to be fundamentally different from delay conditioning, in which the CS overlaps or is immediately followed by the US. We recorded magnetocortical brain activity and behavioral responses during trace and delay conditioning using a gambler's fallacy paradigm ("Perruchet-effect"). For each participant, CS-alone and CS-US paired trials were presented following a random intermittent reinforcement schedule with 50% US probability. However, random drawings were taken from a set of runs of 1-4 CS-alone and CS-US pairings instead of individual trials, thus inversely manipulating expectancy of the US and number of conditioning trials. In delay conditioning, we replicated a previous finding that increasing associative strength (number of US-CS pairings) was associated with increased visual cortex activation, but decreased expectancy ratings. In trace conditioning expectancy ratings also decreased with associative strength, while magnetocortical oscillatory responses increased in the hippocampus. These results indicate that delay and trace conditioning result in magnetocortical activity changes in visual perceptual and memory related brain regions, respectively, and thus are likely distinct forms of learning.

Poster 3-75**COMT VAL158MET POLYMORPHISM MODULATES FEAR BRADYCARDIA TO LONG-TERM CONDITIONED AND EXTINGUISHED FEAR**

Christian Panitz, Christiane Hermann, Jürgen Hennig, Tim Klucken, & Erik M Mueller

Justus Liebig University Giessen

Descriptors: fear extinction, COMT Val158Met, heart period

Conditioned threat cues commonly evoke fear bradycardia (i.e. stronger cardiac deceleration compared to safety cues), which attenuates again after successful fear extinction. Cardiac responses to external stimuli and long-term fear conditioning and extinction are presumably affected by prefrontal catecholamine activity, which is modulated by the catechol-O-methyltransferase (COMT) Val158Met polymorphism. The goal of the present study was to test whether COMT Val158Met affects long-term conditioned and extinguished fear bradycardia. N = 76 male participants underwent differential fear conditioning with two neutral faces as CS+ and two other faces as CS- and an aversive noise burst as US. Subsequently, one CS+ and one CS- were presented during an extinction phase (CS+E, CS-E), while the other two CS were not (CS+N, CS-N). In a critical recall test 24 h later, all CS were presented again. In the recall test, CS type and COMT genotype modulated CS-evoked heart period 2-5 s post-stimulus. Val/Val carriers showed successful retrieval of both conditioned fear (stronger bradycardia for CS+N vs. CS-N) and extinction (CS+E < CS+N). Meanwhile, Met/Met carriers failed to show any differentiation between the CS. Our results on evoked fear bradycardia support previous assumptions that prefrontal catecholamine activity is associated with long-term fear conditioning and extinction. Moreover, the lack of a CS differentiation in the cardiac response of Met/Met carriers suggests a diminished ability to adaptively modulate cardiac responses to emotional stimuli in these individuals.

Poster 3-76**ELECTRIC SHOCK VERSUS WHITE NOISE BURST: WHICH US-TYPE IS BETTER FOR FEAR CONDITIONING WITH MANY TRIALS?**Matthias FJ Sperl, Christian Panitz, Christiane Hermann, & Erik M Mueller
Justus Liebig University Giessen*Descriptors: fear conditioning, fear extinction, unconditioned stimulus*

Several methods that are promising for studying the neurophysiology of fear conditioning (e.g., EEG, MEG) require a high number of trials to achieve an adequate signal-to-noise ratio. While electric shock and white noise burst are among the most commonly used unconditioned stimuli (US) in conventional fear conditioning studies with few trials, it is unknown whether these stimuli are equally well suited for fear conditioning paradigms with many trials. Here, N = 32 participants underwent a 260-trial differential fear conditioning and extinction paradigm with a recall test 24h later. White noise bursts or electric shocks with commonly used intensities (90 dB or shock intensity rated as "annoying but not painful", respectively) served as US while neutral faces served as conditioned stimuli followed (CS+) and not followed (CS-) by the US. Subjective ratings (arousal/valence) on day 1 and 2 indicate faster, more extinction-resistant and more stable fear conditioning with white noise burst vs. electric shock. Moreover, skin conductance responses only discriminated CS+ and CS- when the white noise burst served as US. While subjective ratings of the pleasantness of the US did not differ before acquisition, white noise burst was evaluated as significantly more unpleasant than the electric shock after acquisition. Consequently, inferior fear conditioning for the electric shock US may be interpreted as a result of stronger habituation to that type of stimulus. Especially when many trials are presented and habituation to the US is presumably high, white noise burst should serve as US.

Poster 3-77**FRONTAL THETA AND DISCONFIRMED PREDICTIONS IN THE LANGUAGE DOMAIN**Joost Rommers¹, Danielle S Dickson¹, James JS Norton¹, Edward W Wlotko², & Kara D Federmeier¹¹University of Illinois at Urbana-Champaign, ²Tufts University*Descriptors: language, prediction, time-frequency analysis*

A strategy for dealing with rapid input streams, as characterizes language among other domains, is to use context to preactivate likely upcoming information. Despite strong evidence for prediction during language comprehension, the underlying mechanisms – and the extent to which they are general purpose – remain unclear. Here, we investigated spectro-temporal EEG signatures of dealing with disconfirmed predictions, which, in nonverbal tasks, has been associated with frontally distributed theta (4–7 Hz) increases. 32 participants read predictable words or plausible alternatives in strongly or weakly constraining contexts ("The children went outside to play/look" and "Joy was too frightened to move/look"; Federmeier et al., 2007). Time-frequency representations of power in the four conditions were contrasted using cluster-based permutation tests. A frontally distributed theta increase to plausible alternatives relative to predictable words was seen only in strongly constraining sentences. A late frontal ERP effect from the same contrast, reflecting processing differences in confirmed vs. disconfirmed expectations, correlated with the theta effect across participants. At the same time, removing the phase-locked power (time-frequency analysis after subtracting the ERPs from individual trials) left the theta effect largely unchanged, suggesting related but at least partially distinct signals. The results are in agreement with those observed in nonverbal tasks, consistent with potentially similar mechanisms in language and other cognitive domains.

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Poster 3-78**EFFECTS OF VISUAL PERCEPTUAL LOAD ON THE AUDITORY MISMATCH NEGATIVITY**Malina Szychowska, Rasmus Eklund, Mats Nilsson, & Stefan Wiens
Stockholm University*Descriptors: mismatch negativity, perceptual load*

The ability to focus on task-relevant events is critical in any goal-directed behavior. At the same time, the environment needs to be monitored for any important events. Because the auditory system is particularly useful to monitor the environ-

ment, previous research examined whether task-irrelevant, auditory distracters are processed even during demanding visual tasks. This research suggests that demanding visual tasks decrease the auditory mismatch negativity (MMN). Because a recent behavioral study found that high perceptual load strongly decreased detection sensitivity of irrelevant tones (Raveh & Lavie, 2014), we used this task to determine if high perceptual load eliminates the auditory MMN derived from electroencephalography (n = 28). As predicted, high perceptual load decreased performance on the visual task. In contrast, the MMN was observed during both low and high load, and perceptual load did not decrease the MMN. Further, preliminary results of follow-up studies suggest that these effects are not moderated by the sound pressure level of the auditory distracters. Together, these findings do not support the claim that visual perceptual load strongly reduces the MMN to auditory distracters.

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Poster 3-79**WORKING MEMORY LOAD DECREASES ATTENTION TO EMOTIONAL DISTRACTERS**Stefan Wiens¹, & Danielle E Cosme²¹Stockholm University, ²University of Oregon*Descriptors: load, late positive potential, working memory*

Selective attention is required to focus on task-relevant stimuli while ignoring distracters. According to Load theory (Lavie, Hirst, de Fockert, & Viding, 2004), selective attention requires working memory (WM) resources. In previous studies, people performed a WM task with low load (e.g., remember 1 number) or high load (e.g., remember 5 numbers) and also performed a selective attention task with distracters. During high WM load, people tended to be more distracted. This supports Load theory that distraction increases with fewer WM resources. However, previous research has mainly used neutral distracters (e.g., faces), and evidence is scarce for effects of emotional distracters. Here, participants (n = 50) performed a WM task with low or high load. Nested within the WM task, they monitored a 6-letter row for the letter X (on 20% of trials). The letters were superimposed on distracting emotional pictures (negative, positive, or neutral). High-density EEG was recorded to determine whether the distracters captured attention. Results for the late positive potential (LPP, 350–800 ms) were that compared to low WM load, high load decreased the difference between the LPP to emotional pictures (negative and positive combined) versus the LPP to neutral pictures. This finding suggests that emotional distracters captured attention less during high than low WM load. Because Load theory would predict the opposite, these findings are more consistent with a shared resource explanation. As WM resources decrease during high WM load, emotional distracters are processed less.

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Poster 3-80**PSYCHOPHYSIOLOGICAL REACTIONS TO RELEVANT PROPER NAMES: IMPLICATIONS FOR MOTIVATIONAL PRIMING AND PROCESSING INTERRUPT HYPOTHESES**

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Descriptors: emotion from identity, startle, peripheral psychophysiology

The processing of emotional words has been associated with a pattern of peripheral and central responses that parallels those found with visual stimuli. However, modulation of the startle reflex by verbal foreground materials has yielded a somewhat different scenario, where pleasant words prompt larger blinks, compared to neutral stimuli. This effect has recently been found to depend on depth of processing (Herbert & Kissler, 2010), with deep processing strategies being associated to startle potentiation by pleasant words, compared to both neutral and unpleasant. On the other hand, relevant proper names have been shown to automatically get preferential processing, as indexed by larger P300 and P200 amplitudes, compared to common names (Tacikowski et al, 2014). Building upon these findings, the present study was aimed at exploring whether verbal stimuli that are processed in a preferential way and, at the same time, are evaluated as pleasant (relevant proper names) would either inhibit or potentiate the startle reflex. A sample of 36 female participants took part in this experiment, where names belonging to three different categories (Loved Familiar, Famous, Unknown) were presented in a pseudorandom order. Results showed that the visualization of relevant proper names was associated with potentiated startle, heart rate acceleration, larger skin conductance and zygomaticus EMG activity and, finally, inhibition of corrugator responses. The implications of these findings for the motivational priming and processing interrupt hypotheses are discussed.

Poster 3-81**SKIN CONDUCTANCE AND EMOTIONAL REACTIONS DURING PURE AND GUIDED MIRROR EXPOSURE IN WOMEN WITH HIGH BODY DISSATISFACTION**

Sandra Díaz-Ferrer¹, Blanca Ortega-Roldán², José Luis Mata-Martín¹, Rafael Delgado¹, Sonia Rodríguez-Ruiz¹, Isabel A David³, M. Carmen Fernández-Santaella¹, & Jaime Vila¹

¹University of Granada, ²University of Jaén, ³Fluminense Federal University

Descriptors: body dissatisfaction, skin conductance, body discomfort

Body exposure is an important technique to reduce body dissatisfaction in women with eating disorders and body image disturbances. However, the underlying psychophysiological mechanisms are still unknown. The aim of this study was to evaluate the psychophysiological mechanisms underlying two body exposure techniques by examining the psychological and physiological changes occurring during and between body exposure sessions in a subclinical population. Thirty-five university women with high body dissatisfaction were randomly assigned to one of two treatment groups: Pure Exposure (n = 17) or Guided Exposure (n = 18). All participants received six 45-min treatment sessions twice a week. Dependent variables were: (a) physiological reactions (skin conductance) and (b) subjective psychological changes (body discomfort) within and between the initial and final treatment sessions. Pure exposure tended to show a sustained higher electrodermal response while in guided exposure this response was modulated by the part of the body being described. Body discomfort showed a different pattern of change in both groups during the session: pure exposure showed a quicker habituation of body discomfort with a linear decrease within the session and guided exposure showed an initial decrease followed by a progressive increase, with maximum peak at roughly the middle of the session. These findings suggest that pure exposure and guided exposure are effective interventions to improve body image disturbances, but operate through different underlying emotional and physiological mechanisms.

This study has been funded in part by a research project of the Spanish Ministry of Economy and Competitiveness [MINECO PSI2012-31395] and Spanish Ministry of Education [FPU grant Ref. AP2009-3078].

Poster 3-82**GENDER DIFFERENCES IN AFFECTIVE STARTLE MODULATION AND EMOTION REGULATION IN BORDERLINE PERSONALITY DISORDER**

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Icahn School of Medicine at Mount Sinai and the James J. Peters Veterans Affairs Medical Center

Descriptors: startle, borderline personality disorder, emotion regulation

Affective startle modulation (ASM) is a translational psychophysiological metric of emotion-processing, mediated by the amygdala, and shown to be abnormal in borderline personality disorder (BPD). The neurobiology of gender differences in BPD is not understood. We examined gender differences in emotion-processing in a transdiagnostic sample of 141 veterans at risk for suicide (history of suicidal ideation and/or suicide attempt(s)) with BPD+ (39M,16W) and without BPD- (57M,29W). All underwent an ASM paradigm with an intermixed series of unpleasant, neutral and pleasant IAPS pictures and received the Difficulties in Emotion Regulation Scale (DERS). A Diagnosis (BPD+ vs. BPD-) × Gender × Picture Type × Trial Block (early, late) MANOVA on ASM scores showed a significant Diagnosis × Picture Type interaction ($F[2,136] = 11.21$, $p < 0.0001$) indicating that compared with BPD-, BPD+ patients exhibited greater ASM during unpleasant pictures (Fisher's LSD, $p < 0.0001$) and no differences during neutral or pleasant pictures. Women but not men with BPD showed greater ASM during the later picture trials (Diagnosis × Gender × Trial Block interaction, $F[1,137] = 4.03$, $p < 0.05$; averaged over picture type). A Diagnosis × Gender ANOVA on DERS total score showed significant main effects indicating BPD patients and women had greater emotion dysregulation than their comparison group ($F[1,134] = 20.39$, $p < 0.0001$, $F[1,134] = 6.14$, $p < 0.02$, respectively) but no interaction. These findings suggest the neurobiology of BPD differs in men and women which may have important treatment implications and will be discussed.

This research was supported by a grant from the Department of Defense to EAH and MG.

Poster 3-83**THE PRESENTATION TIMING OF TASK-IRRELEVANT STIMULI AND THE DISTRACTION EFFECT**

Sanae Naka, & Jun'ichi Katayama
Kwansei Gakuin University

Descriptors: distraction effect, P300, multimodal

Task irrelevant environmental changes attract attention and cause the impairment of ongoing cognitive processes, observed as a longer RT. This study investigated the relationship between this distraction effect and the amount of resource allocated to task irrelevant stimuli by manipulating task difficulty and the presentation time of the task irrelevant stimulus. Task relevant visual stimuli were presented once every 1200 ms with long or short duration (50% each). Duration of long stimulus was always 400 ms and short duration was either 100 (easy) or 200 ms (hard condition). Twelve participants performed choice RT task for the duration of the visual stimuli. Task irrelevant auditory stimuli were also presented around the visual stimulus onset (-200, -100, -50, 0, 50, 100, 200, or 400 ms). The auditory stimulus (500 Hz, 50 ms, 70 dB SPL) was deviant (10%) from the frequent stimuli (250 Hz). RT for the choice reaction was longer for hard condition. Distraction effect, i.e., longer RT for the trial with auditory deviant than for those with the frequent stimulus, was larger when the auditory stimulus was presented 50 and 100 ms after the visual stimulus. The P3 amplitude for auditory deviant stimulus was larger in these trials than the trials with other timings. However, there was no effect of task difficulty on the distraction effect or P3 amplitude. The results suggest that more attentional resources were allocated to the task irrelevant stimuli when they were presented during the processing of task relevant stimuli, producing the biggest distraction effects.

Poster 3-84

THE SPATIAL EXPECTATION IS MODULATED BY CONGRUENCY BETWEEN APPROACH OF VISUAL STIMULI AND LOCATION OF SUBSEQUENT SOMATOSENSORY STIMULI

Tsukasa Kimura, & Jun'ichi Katayama
Kwansei Gakuin University

Descriptors: multimodal interaction, expectation, P300

The present study investigated how the approach of visual stimuli toward the body modulates expectations regarding subsequent somatosensory stimuli. To examine this, we recorded event-related brain potentials (ERPs) during a simple reaction time task to somatosensory stimuli. The participants (N = 12) were instructed to put their arms on a desk, with 32.0 cm intervals, and three LEDs were placed between arms with equal distance (8.0 cm each). The somatosensory stimulus was an electrical pulse, with the intensity of three times as high as the threshold for each participant, which never caused pain. These stimuli were presented to the left (or right) wrist with a high probability, and to the opposite wrist with a low probability. One trial was composed of three visual stimuli followed by one electrical stimulus, with the interval (SOA) of 1000 ms. Four blocks (105, including 5 catch trials each) were presented in each condition. In the congruent condition, the right, center, and left (or reverse order) LEDs were turned on sequentially toward the wrist to which the high probability stimulus was presented. In contrast, LEDs were presented sequentially toward the wrist with low probability stimulus, in incongruent condition. The low probability stimuli in the congruent condition elicited larger P3 amplitude than those in the incongruent condition. This result suggests that approach of visual stimuli functioned as an automatic cue for spatial expectations of location of subsequent somatosensory stimuli.

Poster 3-85

NON-CONTACT MEASUREMENT OF COGNITIVE, EMOTIONAL, AND PHYSIOLOGICAL CHANGES IN HEART RATE WITH A WEBCAM

Christopher R Madan¹, Tyler Harrison², & Kyle E Mathewson²
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Descriptors: heart rate, emotion, webcam

Heart rate, measured in beats per minute (BPM), can be used as a diagnostic tool for heart disease and as an indicator of general health. Each time the heart beats blood is expelled and travels in a radial motion through the body. This radial motion of blood can be detected in the face using a standard webcam that is able to pick up minute changes in color that cannot be seen by the naked eye. These changes in color are analyzed using a technique known as photoplethysmography (PPG): the detection of variations in transmitted or reflected light. Due to the light absorption spectrum of blood we are able to use PPG to detect differences in the amount of green light absorbed by the blood traveling just below the skin. Using cognitive, emotional, and physical stress to elicit changes in heart rate we explored to which degree a webcam could be used for the purpose of physiological monitoring during psychological tasks. It was found that there is in fact a high level of agreement between well-established physiological measures (electrocardiogram and blood pulse oximetry) and the information gathered from the webcam. We thus present a quick, inexpensive, and non-invasive method for measuring heart rate using a simple webcam. This can allow people to monitor their heart's health at their own convenience or to monitor another person's heart rate easily during an experiment, even without their knowledge.

Natural Sciences and Research Council of Canada.

Poster 3-86

MAKING WAVES IN TWO STREAMS OF CONSCIOUSNESS: AN INTERACTION BETWEEN SPATIAL AND TEMPORAL ATTENTION

Sayed AD Kizuk, & Kyle E Mathewson
University of Alberta

Descriptors: temporal attention, entrainment, alpha oscillations

Oscillatory processes are a fundamental feature of the physical world. Furthermore, regular temporal rhythms can provide information about the timing and predicted state of sensory objects, facilitating their processing. Oscillatory rhythms can also serve cognitive functions like attention, allowing for a modula-

tion of sensory processing by phase and amplitude, and multiple frequency-specific bands have been measured in the brain through electrophysiology. Recently, it has been shown that oscillations in the alpha (8–14 Hz) band can be entrained to repetitive visual stimuli. It has also been shown that visual stimuli that appear out-of-phase with the same repetitive visual stimulation are more difficult to detect. Because of known links between alpha oscillations and attentional biasing, here we tested whether the direction of attention in the visual field would interact with these entrained alpha oscillations. Following a predictive directional cue at the start of each trial, we entrained alpha oscillations with repetitive visual stimuli in bilateral peripheral visual fields. Subsequently, we presented either validly and invalidly cued targets in or out-of-phase with those rhythmic stimuli in a left-right discrimination task. EEG recordings were used to demonstrate that performance on this task was dependent on an interaction between the validity of the cue and the phase and power of these preparatory alpha oscillations.

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Poster 3-87

SELECTIVE VISUAL ATTENTION TO EMOTIONAL WORDS

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University of Bielefeld

Descriptors: motivated attention, nouns, event-related potentials

Love is just a word. Although it is a simple array of letters, it is emotional. We learn to relate certain meanings to words. Words therefore differ in their emotional quality. Electroencephalographic (EEG) studies show that our brain can differentiate between emotional and neutral words, reflected in a larger early posterior negativity (EPN) and a larger late positive potential (LPP) for emotional words. Motivated Attention describes that emotional content itself attracts visual attention. In this study effects of attention, emotion and their interaction are investigated using word stimuli. Twenty-five participants either viewed passively or actively counted negative, neutral or positive nouns while high-density EEG was recorded. There were no significant differences in accuracy or response speed. Regarding ERPs, we found increased EPN and LPP amplitudes for emotional as well as for attended words. Crucially, at the LPP we also found an interaction: Explicit attention to emotional nouns led to a substantial increase of the LPP amplitudes. In source space, enhanced visual processing was found in the EPN and LPP time windows for both main effects. For attention, in addition larger activity was found in broad paracentral, parietal and frontal areas. The interaction at the LPP was mirrored in source space, where enhanced visual activity was found for only for counted emotional nouns. Results confirm findings of Motivated Attention: Attention and emotion processes act separately at early but interact at late processing stages. We could locate this interaction in visual areas.

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Poster 3-88**ABERRANT DEVELOPMENT OF POST-MOVEMENT BETA REBOUND IN YOUNG ADULTS WITH FETAL ALCOHOL SPECTRUM DISORDERS**Andrei A Vakhtin¹, Piyadasa W Kodituwakku², Christopher M Garcia¹, & Claudia D Tesche¹¹University of New Mexico, ²University of New Mexico Health Sciences Center*Descriptors: fetal alcohol spectrum disorders, post-movement beta rebound, inhibition*

Prenatal alcohol exposure results in cognitive and physical impairments in children, which are collectively defined as fetal alcohol spectrum disorders (FASDs). While no neurophysiological markers of FASD have been identified to date, animal models consistently report deleterious effects of prenatal ethanol exposure on the development of GABA-ergic inhibitory pathways. The post-movement beta rebound (PMBR) in the motor cortex, a power increase in the 15–30 Hz range following termination of movement, has been implicated as a neural signature of GABA-ergic activity that increases as a function of age throughout adolescence. Speculating that impairments in GABA-ergic inhibitory control may underlie the neuropsychological impairments in individuals with prenatal alcohol exposure, we hypothesized that PMBR development in FASD patients would be impaired relative to healthy controls. Twenty-two subjects with FASD (12 F; 15.6 ± 2.9 y. o.) and 22 age and sex-matched controls (12 F; 16.3 ± 3.0 y. o.) underwent MEG scans while performing an auditory oddball task, which required button presses in response to target stimuli. Localized PMBR activity was entered into a 2 × 2 × 2 ANOVA (group × age × PMBR latency), revealing a significant interaction between group and age. While age had a significant effect on PMBR in the control group, no simple effect of age was detected in the FASD group. The described findings provide further evidence for impairments in inhibitory processes in adolescents with FASD, possibly related to aberrant development of GABA-ergic pathways.

Poster 3-89**NOVEL NEUROPROTECTIVE ROLE FOR HYDROGEN SULFIDE IN A RAT MODEL OF STRESS BRAIN INJURY**Eman A Elbassuoni, & Walaa H Nazmy
Minia University School of Medicine*Descriptors: hydrogen sulfide, stress, brain*

Objectives: Hydrogen sulfide (H₂S), a novel gaseous mediator, has been recognized as an important neuromodulator agent in the central nervous system. Since stress is among the most important factors involved in several pathophysiological brain processes; this study investigated the effect of exogenous H₂S on the possible negative effect of acute cold-restraint stress (ACRS) on the brain of male albino rats and the underlying mechanisms. **Methods:** Rats were divided into 3 groups; control, ACRS, H₂S treated + ACRS (intraperitoneal administration of sodium hydrosulfide (an H₂S donor) (3 mg/kg) just before the stress application). Brain injury markers measured were serum S100 protein and gamma enolase. **Results:** Biochemical assay of the serum and brain homogenates revealed that, in ACRS rats, serum and brain level of catecholamines, corticosterone, glucose were significantly elevated. Serum S100 protein and serum gamma enolase were significantly elevated, brain nitric oxide (NO) level was significantly lowered, brain and serum lipid peroxidation were significantly elevated which revealed significant oxidative damage. Compared to ACRS group, H₂S pretreatment before ACRS had reduced brain injury markers, lipid peroxidation, catecholamines, corticosterone, glucose both in the brain and the serum, and produced a significant increase in NO level in the brain. **Conclusions:** H₂S has a significant neuroprotective role in the nervous system against stress-induced significant brain injury through a mechanism that involves the reduction of oxidative stress and the increase of NO.

Poster 3-90**THE EFFECT OF MULTIPLE DISTRACTORS ON LATERALISED EVENT-RELATED POTENTIALS**Dion T Henare, Emily R Whelan, Jude Buckley, & Paul M Corballis
University of Auckland*Descriptors: visual, distractors, N2pc*

Over the past 20 years, research on visual selective attention has increasingly used lateralized ERP components as direct neural measures of attentional processing. This work has primarily relied on the N2pc component. Recently however, contralateral positivities have been identified which appear to index distractor suppression or disengagement. In the present experiment we attempted to characterize the effect of distractor numerosity on the amplitudes of these lateralized ERP components. We used a target-decoy paradigm in which participants search for a colored T in a circular array of grey filler T's. Typically these displays also include a single colored distractor however in our experiment displays included either 1 or 2 of these distractors. Prior research has used similar paradigms and found no effect of distractor numerosity on either of these lateralized components, however some suggest that this may have been due to their use of homogeneous distractors. In the present experiment we included both homogeneous and heterogeneous distractor conditions in order to test this idea. Our results show a larger distractor-related positivity in the 2- (vs. 1-) distractor condition which was equivalent for homogeneous and heterogeneous distractor conditions. While this appears to contradict Munneke and colleagues (2013), our use of fillers may have effectively caused all displays to be treated as heterogeneous distractor displays. Our data suggest that multiple heterogeneous distractors may require increased suppression and therefore elicit a larger lateralized positivity.

Poster 3-91**INVESTIGATING THE EFFECTS OF COMPETITION AND ADAPTATION ON THE AMPLITUDE OF THE FACE-RELATED N170**Sreekari Vogeti, Oliver Saltmarsh, & Paul M Corballis
University of Auckland*Descriptors: competition, adaptation, N170*

When multiple faces are presented at the same time, they appear to 'compete' for representation in the visual system. Evidence for this comes from studies reporting context-specific modulation of the N170 component of the event-related potential (ERP) when a stimulus is presented. The N170 evoked by the presentation of a target face is attenuated when the face is flanked by other faces compared to when it is flanked by other objects or by scrambled faces. Similarly, the N170 evoked by a target face is reduced in amplitude when another face is presented prior to it. This is attributed to adaptation or repetition suppression. It has recently been suggested that both competition and adaptation may reflect the same underlying process. Here, we examined the temporal development of competition and adaptation by examining the N170 evoked by target faces. We presented (i) a single face, (ii) a face and two peripheral flankers simultaneously, (iii) two peripheral flankers followed by a face (as in competition paradigms), and (iv) a central face followed by the target (as in adaptation paradigms). We found a reduction in N170 amplitude for target faces when there was an interval between the presentation of S1 and S2, but there was no attenuation when faces appeared simultaneously. This suggests that an inter-stimulus interval may be necessary for the N170 attenuation attributed to competition - perhaps because it reflects the same neural mechanisms as adaptation.

Poster 3-92**MODELING FACIAL EXPRESSION AND MICROEXPRESSION WITH THE AUCKLAND FACE SIMULATOR**

Jingwen Mao, Mark Sagar, David Bullivant, Paul Robertson, Oleg Efimov, Khurram Jawed, Ratheesh Kalarot, & Paul M Corballis
University of Auckland

Descriptors: facial simulator, microexpression, emotion

Facial expression is essential to human social communication, and there is considerable research interest in psychology and psychophysiology in understanding how emotion is conveyed on the face. However, this research is significantly hampered by poor stimulus control. Considerable efforts have been expended to develop sets of stimuli that realistically portray facial expressions. Most of these stimuli are static images of posed facial expressions, and thus preclude systematic exploration of the role of dynamic information in facial expression. Likewise, many face stimuli lack verisimilitude – appearing posed or “stagy”. Here we introduce a suite of novel, physiologically based software applications – collectively termed the “Auckland Face Simulator” (AFS) that can be used to create realistic, dynamic, and fully controllable representations of human facial expressions, including microexpressions. At the core of the AFS is a computer-controlled dynamic avatar that contains realistic simulations of the facial musculature, postural muscles of the neck, skull, soft tissue, and skin. The contractions of individual facial muscles or groups of muscles can be controlled by a user or experimenter, and result in realistic changes to the configuration of the face and produce believable and dynamic changes in facial expression. The AFS offers a tool for stimulus generation that allows the generation of an essentially limitless range of dynamic facial stimuli with an unprecedented level of control and manipulation over facial muscles which cannot be achieved with videos.

Poster 3-93**USING CONCURRENT THERMOGRAPHY AND PLETHYSMOGRAPHY TO ASSESS THE GENDER-SPECIFICITY OF WOMEN’S AND MEN’S SEXUAL RESPONSES**

Jackie S Huberman, & Meredith L Chivers
Queen’s University

Descriptors: sexual psychophysiology, gender

Men’s genital responses are significantly greater to sexual stimuli of their preferred gender compared to their nonpreferred gender (gender-specific), whereas women’s genital responses are generally similar to sexual stimuli of women or men (gender-nonspecific). This pattern of genital response has only been demonstrated using vaginal photoplethysmography (VPP) in women and primarily penile plethysmography (PPG) in men. These measures assess different aspects of genital vasocongestion, thereby limiting comparisons between genders. Thermography is a newer sexual psychophysiology methodology that measures genital vasocongestion via temperature change and is better suited to assess sexual response between genders because the dependent measure, genital temperature, is similar for women and men. Further, past studies have assessed gender-specificity of sexual response across short sexual stimuli, allowing only the examination of initial sexual responses. We examined gender-specificity of sexual arousal by measuring genital responses to lengthier stimuli with concurrent thermography and VPP/PPG. Gynephilic men (i.e., attracted to women; $n = 27$) and androphilic women (i.e., attracted to men; $n = 28$) viewed 10-minute films of men masturbating, women masturbating, and a nonsexual film and reported feelings of arousal while genital responses were assessed. Across measures, men’s sexual responses were gender-specific and women’s responses were gender-nonspecific, indicating that the gender difference in gender-specificity of arousal is robust to methodology and to stimulus duration.

Natural Sciences and Engineering Research Council of Canada.

Poster 3-94**SPECIFICITY OF AUTOMATIC AND CONTROLLED ATTENTIONAL BIASES TO PREFERRED AND NONPREFERRED SEXUAL STIMULI IN HETEROSEXUAL WOMEN AND MEN**

Samantha Dawson, & Meredith Chivers
Queen’s University

Descriptors: sexual psychophysiology, visual attention, gender

The Information-Processing Model of sexual arousal proposes that sexually relevant stimuli elicit an automatic attentional bias and recruit greater attentional engagement than sexually irrelevant stimuli. Based on this model, we investigated automatic and controlled attentional processes to sexually relevant (preferred) and irrelevant (nonpreferred) sexual stimuli in heterosexual women and men using eye-tracking. We predicted gender differences in patterns of visual attention given gender differences in the specificity of genital responses. Specifically, psychophysiological studies routinely observe nonspecific genital response patterns among women, whereas men show category-specific responses. Women and men were simultaneously presented with images of nude male and female targets in a forced attention paradigm while eye movements were recorded using a Tobii T60 remote sensor eyetracker. Automatic attentional biases (time to first fixation) to preferred versus nonpreferred sexual stimuli differed based on participant gender. Men showed an automatic attentional bias for female stimuli whereas women showed no bias. In comparison, a controlled attentional bias (total fixation duration) for sexually preferred stimuli was observed for both women and men. The lack of an automatic attentional bias in women is consistent with observed automaticity of genital response to a range of sexual stimuli. These data highlight key differences in how women and men attend to and process sexual information at an automatic level, but demonstrate gender similarities in controlled processing.

Natural Sciences and Engineering Research Council of Canada.

Poster 3-95**ELECTROMAGNETIC CORRELATES OF EMOTION REGULATION IN FUNCTIONAL NEUROLOGICAL SYMPTOMS INDICATE INVOLVEMENT OF SENSORIMOTOR BRAIN REGIONS**

Brigitte S Rockstroh, Johanna Fiess, & Astrid Steffen
University of Konstanz

Descriptors: emotion regulation, functional neurological symptoms, magnetoencephalography

Medically unexplained sensory and/or motor symptoms, labeled functional neurological symptoms (FNS), have been attributed to conversion of emotion processing to bodily/somatosensory expression in the absence of abnormal emotion regulation, without an identified mechanism. This was explored across 210 trials in which 20 patients with FNS and 20 healthy controls (HC) either passively watched unpleasant or neutral IAPS pictures or employed instructed cognitive reappraisal strategies to down-regulate emotional responses to unpleasant pictures. MEG alpha (8–12 Hz) power modulation during 2-s instruction (watch or regulate) and 2-s picture presentation was analyzed in sensor and source space, with alpha power decrease relative to pre-stimulus baseline a measure of facilitated information processing. Downregulation instructions reduced frontal alpha power in HC but not in FNS patients. In contrast, downregulation instructions reduced sensorimotor alpha power in FNS patients but not in HC. In addition, participation in the task reduced the discomfort threshold for transcutaneous stimulation in FNS patients more than in HC. Results suggest frontally unmodulated sensorimotor activity as a potential mechanism of conversion of experienced emotion into bodily symptoms.

Deutsche Forschungsgemeinschaft (German Research Foundation).

Poster 3-96**PATERNAL EDUCATION MODERATES THE ASSOCIATION BETWEEN TRAIT ANXIETY AND RESTING HEART RATE VARIABILITY IN YOUNG AFRICAN AMERICAN WOMEN**Lori S Hoggard¹, & LaBarron K Hill²¹University of North Carolina-Chapel Hill, ²Duke University Medical Center

Descriptors: heart rate variability, socioeconomic status, African Americans
Resting heart rate variability (HRV) is increasingly recognized as an important marker of cardiovascular and overall health. Emerging evidence indicates that African Americans exhibit higher resting HRV compared to other groups; however, the relationship between psychosocial factors and this 'vagal' benefit remain unclear. Socioeconomic status (SES) is one of the most commonly studied pathways linking psychosocial factors and health, and previous research has linked lower SES with diminished vagal responsivity. In the present study we investigated the influence of SES on the relationship between resting HRV and a common psychological correlate, trait anxiety, in a sample (n = 35) of young (mean age = 19.49 ± 1.31), healthy African American women. Heart rate data were collected during a 10-minute resting baseline and participants completed the Spielberger Trait Anxiety Inventory. SES was assessed by self-report as the highest level of education completed by both parents and estimated family/household income. The association between HRV and trait anxiety was marginal (r = -.30, p = .08) but consistent with prior findings. Regression analyses revealed a significant interactive effect of father's education and trait anxiety on resting HRV (p = .02). In particular, increasing trait anxiety was associated with a more rapid decline in HRV, but only among individuals reporting the lowest level of paternal education (i.e. high school and lower). While further research is warranted, these findings extend the importance of SES to resting cardiac vagal function in African Americans.

Research conducted by L.S.H was supported by a postdoctoral grant from the National Science Foundation (#537597). Research conducted by L.K.H was supported by a grant from the National Institute of Aging (5T32AG000029-38).

Poster 3-97**THE ROLE OF EXPERIMENTER GENDER IN PLACEBO ANALGESIA**Magne Arve Flaten¹, Per Matti Aslaksen², Espen Bjørkedal², Yngve Brox², & Peter S Lyby³¹Norwegian University of Science and Technology, ²University of Tromsø, ³Ullevål Hospital

Descriptors: placebo analgesia, stress, classical conditioning
The psychosocial context in which information about a treatment is provided may modulate the response to the treatment. It was investigated whether the gender of the subject and experimenter could modify pain and placebo analgesia. Cold pain was applied to the underarm. The Conditioned group received capsules prior to presentation of less painful stimulations, to associate intake of the capsule with reduced pain. The Pain control group received the same stimulation as the Conditioned group, but no capsules. The Capsule control group received the capsules, but no change in the painful stimulation. It was hypothesized that in the Conditioned group, an expectation of reduced pain should be induced after administration of the capsules, and this should generate placebo analgesia. Subject and experimenter gender were crossed across groups. Placebo analgesia was observed in the Conditioned group, as expected, and also in the Capsule control group, probably due to previous conditioning history with painkillers. For pain threshold, placebo analgesia was observed in female, but not male, participants. The capsules were rated as more effective in reducing pain after administration by a male experimenter compared to a female experimenter, and medication provided by a male experimenter was more effective in reducing pain. Placebo analgesia for pain threshold was seen only with a male experimenter. Thus, social context may modulate expectations, and indirectly affect placebo analgesia.

Bial Foundation, Portugal. University of Tromsø, Norway.

Poster 3-98**"YOUR SUPPORT IS NOT HELPFUL AT ALL!" - A SELF-DETERMINATION-THEORY BASED APPROACH EXAMINING EFFECTS OF INSTRUMENTAL SUPPORT ON CARDIOVASCULAR STRESS REACTIVITY**Richard Zniva, & Stefan M Schulz
University Hospital of Würzburg

Descriptors: social support, overprotection, cardiovascular stress reactivity
Self-Determination theory (Ryan & Deci, 2000) suggests that individuals with an autonomy-supporting environment perceive stressors as challenging rather than stressful. In contrast, overprotective support may do more harm than good. N = 65 undergraduates received instrumental support under one of four conditions while solving arithmetic tasks: autonomy support from a confederate (n = 14), autonomy support from a computer (PC, n = 10), overprotection from a confederate (n = 13), overprotection from a PC (n = 11), or no support (n = 17). In a second phase, they solved arithmetic tasks on their own. Heart rate (HR) and blood pressure (BP) were measured continuously. Repeated measures ANCOVAs showed that autonomy support attenuated HR and increased BP from the first to the second phase, regardless of whether the support came from a confederate or PC. Participants in the confederate-conditions showed a significant increase of HR at the beginning of the first phase (i.e., while getting support). Individuals receiving overprotection by a confederate also showed an increase of BP in this phase which further increased throughout the second phase. The results suggest that overprotective support from a confederate is the most inappropriate form of instrumental support. Receiving this type of support seems to be an additional stressor rather than a stress-buffer and also prolongs cardiovascular reactivity when confronted with the stressor alone.

Poster 3-99**NOVEL SOCIAL CONTEXTS AND ELEVATED CORTISOL LEVELS: THE ROLE OF PUBERTAL MATURATION AMONG FEMALE ADOLESCENTS**Sasha M Rojas¹, Hediemarie Blumental², Renee Cloutier², & Ellen W Leen-Feldner³¹University of Arkansas, ²University of North Texas, ³University of Arkansas

Descriptors: puberty, cortisol, girls
Female pubertal maturation marks increased risk for psychological vulnerability. The hypothalamic-pituitary-adrenal (HPA) axis, central in stress-related processes, undergoes significant changes during puberty. Given cortisol is indicative of downstream output of the HPA-axis, evaluating girls' cortisol levels, in response to developmentally-relevant (e.g., novel, socially-laden) stressors, may help to broaden our understanding of stress reactivity as a function of pubertal status. The current study examined cortisol output (via saliva samples) in response to a novel social environment, initial exposure to a research laboratory, as a function of female adolescents' pubertal status, while controlling for several important factors. Participants included 30 female adolescents between the ages of 9 and 16 years (M = 11.77, SD = 1.99). Hierarchical regression analysis was used to examine the relation between pubertal status and cortisol level. After controlling for covariates (age, trauma history, depressive symptoms, anxiety symptoms) at step 1, pubertal status was positively associated with residualized cortisol values [F(5, 24) = 3.60, p = .014, adjusted R² = .31]. More advanced pubertal status uniquely relates to greater cortisol response to a novel context, highlighting a role of pubertal maturation in how female adolescent distress may be elicited by novel experiences. Findings are discussed in terms of the interplay between maturational processes and novel (social) experiences in the documented increase in internalizing-type problems among girls during adolescence.

Poster 3-100**THE SAN INDEXES MEMORY FOR SOUND OBJECTS
RATHER THAN PITCH CONTOUR**Christine Lefebvre, & Pierre Jolicoeur
Université de Montréal*Descriptors: auditory short term memory, working memory, sustained anterior negativity*

The sustained anterior negativity (SAN) is an electrophysiological index of maintenance in auditory STM (ASTM). It is characterized by increased negativity at frontocentral electrodes when a larger number of stimuli are effectively maintained. Our goal was to verify whether the SAN indexes individual sounds or the contour created by pitch transitions between sequential tones. To test that possibility, participants memorized a series of one to four tones interspersed with irrelevant white noise bursts, and had to compare the memorized set with a second set, comprised with tones only. The insertion of white bursts made it harder to perceive a contour. ERPs were recorded during the 2s silent interval between memory and probe presentation. This memory condition was compared to a control condition in which only white noise bursts were presented in the memory set, and therefore no stimuli maintained. There was a sharp return to zero of activation after presentation of the memory set in the control condition, confirming the SAN indexes maintenance of sounds, and not other processes that follow stimulation. We also observed Load modulation of amplitude at fronto-central electrodes that was correlated with individual performances, as individuals with a larger ASTM span had larger increases in SAN with Load. Since white noise bursts were added randomly, in some trials all tones were presented consecutively. The SAN modulation was observed whether tones were grouped or not. This suggests the SAN is an index of the maintenance of sound objects, rather than contour, in ASTM.

Poster 3-101**HORIZONTAL BED REST AFFECTS CORTICAL ACTIVITY IN
ELDERLY VS. YOUNG WOMEN: EVIDENCE FROM ERPS**Chiara Spironelli, & Alessandro Angrilli
University of Padova*Descriptors: aging, body position, recognition potential*

The present research investigated the effects of body position on learning ability in young and elderly women. Our main hypothesis stated that 2-hour horizontal Bed Rest position would affect, in a word learning task, the first negative component (N1), corresponding to word recognition, and that this impairment is significantly enhanced by aging. To this aim, 30 young (mean age 23.2 years) and 20 elderly women (mean age 82.8 years) were split in two equal groups, one assigned to the Seated Position [SP], and the other to the horizontal Bed Rest position [hBR]. In the Learning Phase, participants were shown 60 words randomly distributed. In the Recognition Phase, they had to recognize old learned words from 60 new words. Behavioral analyses showed age-group effects, since young women had faster response times [$F(1,46) = 104.16, p < 0.001$] and higher accuracy rates than elderly women [$F(1,46) = 27.51, p < 0.001$], but no interaction of body position with age was found. Analysis of the N1 component (250–270 ms) revealed greater left posterior negativity in both sitting age groups, but significant posterior left-lateralized N1 only in young bedridden women [$F(1,46) = 4.80, p < 0.05$]. Elderly BR women showed a lack of N1 left lateralization. Results suggest that 2-h horizontal Bed Rest affects the automatic word processing only in elderly women: they failed to activate the left hemisphere linguistic network typically involved in word recognition. This finding has important clinical implications, with particular regard to the long-term side-effects of forced Bed Rest on elderly patients.

Poster 3-102**DECISION-MAKING IN WOMEN WITH HIGH
PSYCHOPATHIC TRAITS**Eleonora Poli, Chiara Spironelli, & Alessandro Angrilli
University of Padova*Descriptors: psychopathy, decision-making, Iowa Gambling Task*

Psychopaths are impaired at learning from punishment, have perseverations, and are highly responsive to immediate reward. The aim of this study was to investigate decision-making capabilities and punishment/reward sensitivity among healthy women with high psychopathic traits ($n = 22$), compared with healthy female controls ($n = 21$). Participants performed the Iowa Gambling Task (IGT) while the EEG signal was recorded. IGT requires participants to choose between decks of cards yielding rare big gains but frequent greater losses (disadvantageous decks), or decks of cards yielding low but frequent gains and smaller losses (advantageous decks). After a card is selected, feedback informs about positive or negative outcomes. Women with psychopathic traits presented perseverative responses and an impaired punishment/reward sensitivity, picking a higher number of cards from disadvantageous decks compared to controls ($t(41) = 2.45, p < 0.05$), even if they reported greater confidence in their choice after picking from advantageous compared to disadvantageous decks. We analyzed the Feedback-Related Negativity (FRN), a component elicited in response to negative outcomes, and the Slow Negative Complex (SNC), a component elicited by feedback in orbitofrontal sites. Compared to controls, women with psychopathic traits showed smaller FRN amplitudes in response to negative feedback ($F(1,34) = 6.45, p < 0.05$), indexing a reduced sensitivity to monetary loss, and greater SNC amplitudes in response to gain feedback ($F(1,34) = 4.18, p < 0.05$), revealing higher sensitivity to immediate rewards.

Poster 3-103**FRONTAL THETA ACTIVITY AS AN EEG INDICATOR OF
MOOD-DEPENDENT EMOTIONAL PROCESSING IN
DYSPHORIA**Rocco Mennella, Simone Messerotti Benvenuti, Giulia Budo, & Daniela Palomba
University of Padova*Descriptors: dysphoria, emotional processing, frontal theta activity*

Several studies have examined the neural correlates of mood-dependent emotional processing in depression, showing a reduced activity in rostral anterior cingulate cortex (rACC) in response to pleasant vs. unpleasant stimuli in depressed individuals, but the opposite pattern in healthy controls. The present study aimed at examining whether frontal theta activity, an electrophysiological measure of rACC activity, could be an EEG indicator of mood-dependent emotional processing in individuals at risk for depression. To this end, EEG was recorded in 27 individuals with dysphoria and in 29 individuals without dysphoria during an emotional imagery task, including pleasant, neutral and unpleasant scripts. Self-reported valence, arousal and vividness, and change in frontal theta activity were collected during the task. No differences between groups in subjective measures were noted. Conversely, frontal theta activity was reduced from baseline to the imagery of pleasant compared to unpleasant scripts in the group with dysphoria, whereas the opposite pattern of reduction in frontal theta activity was noted in the group without dysphoria. In addition, more severe depressive symptoms were correlated with greater reduction in frontal theta activity in response to pleasant, but not neutral and unpleasant, scripts. These findings suggest that frontal theta activity may be an EEG indicator of mood-dependent emotional processing in dysphoria. The present study also suggests that dysphoria is more likely to be associated with abnormal processing of positive rather than negative emotions.

Poster 3-104**THE LATE POSITIVE POTENTIAL AS A MARKER OF PREOCCUPATION WITH BODY SIZE**Helen Uusberg, Krista Peet, Andero Uusberg, & Kristi Akkermann
University of Tartu

Descriptors: late positive potential, body image, working memory
Misjudging and emphasizing one's body size is a key mechanism in the etiology of eating disorders. We used the Late Positive Potential (LPP) to investigate the brain mechanisms of body size processing. Thirty six women (age $M = 20.31$, $SD = 2.01$; BMI $M = 21.70$, $SD = 2.56$) compared their actual body sizes to a series of digitally modified images of themselves and a size-matched model (from -10% to $+10\%$ in 2% intervals). Concurrently, they performed a working memory (WM) task that required memorizing a sequence of either 2 (low load) or 6 (high load) consonants for the duration of each trial. Three main effects were observed. LPP amplitudes (central-posterior electrodes, 400 - 900 ms) were larger in response to images of self, reflecting increased motivational significance. As expected, LPP was attenuated by high WM load. Finally, larger amplitudes were recorded for both reduced (-10% to -4%) and in particular enlarged ($+4\%$ to $+10\%$) compared to normal (-2% , 0 , $+2\%$) body sizes, suggesting higher attentional deployment to deviations from participant's actual size. These dynamics were altered by individual differences in preoccupation with body image and body weight (self-report). Preoccupation amplified an interaction between stimulus identity and size. In people with high preoccupation LPP differentiated modified bodies from normal more significantly for pictures of self than the model, indicating more attentional deployment to own body size. Preoccupation also correlated with the number of mistakes in the high WM load condition after viewing enlarged images of self ($r = .38$, $p < .05$).

Poster 3-105**AUDITORY SENTENCE COMPREHENSION: SENTENTIAL CONSTRAINT EFFECTS ON WORD PROCESSING**Ya-Yi Wang¹, Ovid J.-L. Tzeng^{1,2}, & Hsu-Wen Huang^{2,3}
¹Academia Sinica, Taiwan, ²National Chiao Tung University, ³National Taiwan Normal University

Descriptors: language, semantics, N400
The current study examined sentence comprehension processes with auditory stimuli. Participants listened to strongly and weakly constraining sentences followed by predicted and unpredicted (but plausible) words for comprehension. Consistent with prior work with visual presentation, predicted endings elicited smaller N400s than unpredicted items, and this was true both within strongly and weakly constraining sentence frames. Also, predicted words in strongly constraining contexts elicited smaller N400 amplitudes than those in weakly constraining contexts. Moreover, the frontal positivity associated with the cost by the revision of unpredicted words in strongly constraining sentences was displayed from 700 to 1100 ms post-stimulus onset. These findings suggest that context effects on word processing unfold over multiple processing stages, and the processes between visual and auditory modalities share similar stages.

Poster 3-106**HOW DO WE TRUST STRANGERS? THE NEURAL CORRELATES OF DECISION MAKING AND OUTCOME EVALUATION OF GENERALIZED TRUST, AND INDIVIDUAL DIFFERENCES**Yiwen Wang¹, Zhen Zhang¹, Sheng Yuan¹, Yiming Jing², Emilio Valadez², & Robert Simons²
¹Tianjin Normal University, ²University of Delaware

Descriptors: trust, feedback-related negativity, event-related potentials
This study investigates the brain correlates of decision making and outcome evaluation of generalized trust (i.e., trust in unspecified and unfamiliar others), as well as their individual differences. We measured 18 (9 male) Chinese participants' event-related potentials (ERPs) while playing the role of the trustor in a one-shot trust game with unspecified social agents (the trustees). At the decision making phase, greater N2 amplitudes were found for the trustor's distrusting decisions compared to trusting decisions, which may reflect greater cognitive control exerted to distrust. Additionally, source localization identified the precentral gyrus (part of the mentalizing system) and superior parietal lobule (part of the mirror-neuron system) as possible neuronal generators of this N2 component. At

the outcome evaluation phase, more negative going FRN amplitudes were found in response to loss feedback, indicating that the absence of reward for trusting was unexpected by the trustor. Furthermore, such FRN responses to loss were greater among the trustors who exhibited greater tendencies to trust in the game. Results highlight the habituated tendency of people to trust and reciprocate their fellow citizens, and the importance of individual differences in modulating brain correlates of trust.

This work was supported by the National Natural Science Foundation of China [31371045]; the MOE Project of Key Research Institute of Humanities and Social Sciences at Universities [12JJD190004], and the Program for New Century Excellent Talents in Universities [NCET-11-1065]. Corresponding Author, Yiwen Wang, Email:wangeven@126.com

Poster 3-107**THE USEFULNESS OF SILENT READING TECHNIQUE AT BASELINE MEASUREMENT ON CARDIOVASCULAR RESPONSE**Yosuke Tezuka
Osaka University of Health and Sport Sciences

Descriptors: baseline, cardiovascular
Most studies have not paid attention to the importance of baseline measurement, though cardiovascular reactivity and recovery are assessed by the change from baseline states. In this study, we investigated the influence of silent reading at baseline period on cardiovascular reactivity. In comparison with other measurement techniques, silent reading is expected to have some merits. First, it is possible to diminish unstable physiological condition because of low cognitive load. Second, participants would be required to read a magazine silently and not given any instruction to conduct a task (e.g. vanilla baseline), and they would be released psychologically from the unfamiliar laboratory situation. Forty six undergraduate were randomly divided into three groups. Each group behaved as per the instructions at 8-min baseline period. The reading group selected their favorite magazine from a set given by the experimenter and read that. The vanilla group conducted the color detection task (i.e. vanilla baseline). The control group was instructed to sit quietly. After the baseline period, each group conducted a speech task with evaluative observation. Cardiovascular reactivity was assessed by hemodynamic indices. At baseline period, there were no differences among three groups. On the other hand, the vanilla group's diastolic blood pressure and heart rate accelerated more than other groups at speech period. The usefulness of the silent reading technique at baseline measurement will be discussed.

This work was supported by JSPS KAKENHI Grant Number 25780448.

Poster 3-108**THE EFFECTIVENESS OF NEUROFEEDBACK TRAINING FOR THE ENHANCEMENT OF WORKING MEMORY**Yuri G Pavlov
Ural Federal University

Descriptors: neurofeedback, working memory
Recent research has demonstrated that EEG of participants with high working memory performance is associated with greater representation of the high alpha activity frequency throughout memorizing as well as at the rest state. Twenty participants (9 males, $M = 20$, $SD = 0.92$) were recruited for this study. They were assigned to the waiting control group ($N = 10$) and the experimental group ($N = 10$). Participants of the experimental group were trained to increase occipital alpha2 (individual alpha frequency (IAF) - IAF+2.5 Hz) power at eye closed state. They performed from 6 to 8 neurofeedback training sessions. Working memory performance was measured before and after all training sessions. We found no significant effects for factors Group (experimental vs. control) and Time (pre vs. post) to working memory task score. Also all participants didn't reveal any changes in alpha2 power by comparing pre and post rest state EEG. These findings show that neurofeedback with stimulation of alpha2 power doesn't have any influence to working memory performance. Our research and the previous ones where significant effects were demonstrated have the following key differences: the electrode sites we used (usually ones located at the frontal sites) and the state of our participants (who performed training in the eye closed state). Perhaps alpha2 neurofeedback might have different effects on working memory at the opened eyes and the closed eyes states.

Study was supported by Russian Foundation for Basic Research (grant no. 13-06-96028) and through the "Young scientists UrFU" competition.

Poster 3-109**COMPLEX PSYCHOPHYSIOLOGICAL AND PSYCHOPHYSICAL STUDY OF INTERACTION BETWEEN COLOR AND EMOTIONAL SEMANTICS**

Andrey A Kiselnikov, Arkadiy A Sergeev, Anna P Dolgorukova, Dmitry A Vinitzky, Janna M Glozman, Alexander V Vartanov, Stanislav A Kozlovskiy, Maria M Pyasik, & Julia A Marakshina
Lomonosov Moscow State University

Descriptors: color, emotion, semantics

Multidimensional color and emotional semantic spaces were previously separately studied in the 'Vector psychophysiology' school of thought (E.N. Sokolov, 2013). The universal spherical model was verified, but brain mechanisms of interaction between these spaces are unclear. The same 20 Russian words of two categories were used in psychophysical and EEG series (10 basic emotions and 10 basic colors). Every possible successive combination of these stimuli was presented to subject and $20 \times (20-1) = 380$ measures of (dis)similarity were registered. In separate series were recorded, multidimensionally scaled and intercorrelated: 1. Subjective semantic differences (1-9 point scale); 2. Reaction time for deciding if the category of new stimulus changed in comparison with previous one (measuring indirect semantic differences); 3. 600-ms visual evoked potentials (16-channels EEG) to 380 abrupt changes of stimuli. 5 full $20 \times (20-1)$ matrix passes in psychophysical series and 100 passes in EEG series were conducted and 45 subjects participated in the study. Results: 1. Integral subjective space was spherical and color-emotional isomorphic (much closed to Russell's affective circumplex and Newton's color wheel simultaneously); 2. RT-matrix significantly correlated with subjective differences only in 10×10 'first emotion-then color' submatrix; 3. Significant correlations of subjective differences with VEP amplitudes were found in 'first emotion-then color' submatrix above temporal cortex at T5 and T6 leads in N87 and P300 components and slow negative shift starting from 400 ms.

The study was partially funded by Russian Foundation for Humanities project # 13-06-00570.

Poster 3-110**FACE PROCESSING AND PARENT ANXIETY DURING EARLY CHILDHOOD INTERACT TO PREDICT ADOLESCENT ANXIETY IN AUTISM SPECTRUM DISORDER**

Emily Neuhaus¹, Emily JH Jones², Karen Barnes¹, Lindsey Sterling³, Annette Estes⁴, Jeff Munson⁴, Geraldine Dawson^{3,5}, & Sara J Webb^{1,4}

¹Seattle Children's Hospital, ²Birkbeck College, ³University of California, Los Angeles, ⁴University of Washington, ⁵Duke University

Descriptors: Autism spectrum, anxiety, face processing

Individuals with autism spectrum disorder (ASD) carry heightened risk for anxiety disorders. Previous analyses from our group suggest that ERPs to faces (N300) during early childhood predict levels of anxiety symptoms during adolescence among children with ASD. However, both neurobiological and environmental risk factors likely contribute to anxiety. Here, we explore moderating effects of parent anxiety on the link between face processing during childhood and adolescent anxiety. At age 3, children with ASD viewed neutral and fearful faces as EEG data were collected, and parent anxiety was assessed. Families were followed longitudinally and adolescents completed self-report measures of anxiety symptoms at age 14 years. A series of regression models was computed to examine predictive effects of ERPs and parent anxiety on adolescent outcome. Longer ERP latencies to neutral faces and higher parent anxiety during early childhood predicted higher anxiety during adolescence. However, parent anxiety also interacted with response amplitude such that less negative N300 amplitudes predicted higher anxiety symptoms only in the context of greater parent anxiety. Throughout analyses, paternal anxiety emerged more frequently as a significant predictor than did maternal anxiety. Face processing and parent characteristics early in a child's life predict susceptibility to later anxiety symptoms, thus highlighting two potential avenues for preventive and intervention efforts. Future work into contributing mechanisms may help further specify treatment targets.

**POSTER SESSION IV
SATURDAY, OCTOBER 3, 2015
2:15 P.M. – 4:15 P.M.****AUTHORS PRESENT FOR DISCUSSION AND QUESTIONS****Poster 4-1****ANXIOUS ATTACHMENT MODERATES THE INFLUENCE OF POSITIVE CONVERSATION ON RSA RESPONSES TO LABORATORY STRESS**

David K Parkhurst, C. Jessie Duncan, Kaylee Rosenbusch, Mary H Burleson, & Nicole A Roberts
Arizona State University

Descriptors: coregulation, romantic partners, respiratory sinus arrhythmia

Affectionate touch is associated with physiological regulation and, among romantic partners, with physiological co-regulation. We investigated whether affectionate touch was associated with smaller reductions in respiratory sinus arrhythmia (RSA) in response to stress tasks (speech preparation and delivery). Given the links between physical affection, attachment during infancy, and physiological indicators of emotion regulation, we also tested whether these gains (smaller reductions in RSA) were offset by adult attachment anxiety or avoidance. Participants were 186 married couples randomly assigned to either have an emotionally positive conversation, touch (hug) after sitting quietly, both (talk then hug), or neither (sit quietly). Participants then completed the speech task, and we examined the effects of the touch/talk manipulation on RSA in response to the speech. We found that among wives, attachment anxiety interacted significantly with condition: for wives high in reported attachment anxiety, RSA showed increases in the talk conditions and decreases in the no-talk conditions. In addition, for both husbands and wives, attachment anxiety significantly positively predicted baseline RSA before the touch and talk activities. There was no significant interaction of anxiety with the touch condition, nor were there any effects of adult attachment avoidance. Thus, spouses with higher attachment anxiety may be recruiting greater regulatory effort (evidenced by RSA increases), even during a positive marital conversation.

Poster 4-2**CONSUMMATORY AND ANTICIPATORY EMOTIONAL DEFICITS IN DEPRESSION**

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University of Nevada, Las Vegas

Descriptors: depression, postauricular reflex, event-related potentials

Anhedonia in depression is marked by deficits in both consummatory and anticipatory emotional processing. In a sample of depressed community members and undergraduate controls, we used postauricular and startle blink reflexes along with the late positive potential (LPP) and startle probe P3 event-related potentials to characterize these deficits. Depressed participants displayed reduced postauricular reflex magnitude during pleasant pictures compared to neutral pictures, whereas control participants showed postauricular reflex potentiation during pleasant vs. neutral pictures. Both depressed and control participants displayed an attenuation of the startle blink reflex during pleasant pictures when compared to neutral, and they exhibited potentiation of the startle blink reflex during aversive stimuli. When compared to control participants, depressed participants showed lower mean P3 amplitude during cues representing pleasant anticipatory processes. Both control and depressed participants displayed larger LPP amplitude during pleasant and aversive pictures compared to neutral pictures, but depressed participants exhibited significantly lower LPP amplitude to pleasant and aversive pictures when compared to controls. Our results regarding depressive symptomatology, the postauricular reflex, and P3 indicate that depression is characterized by low anticipatory and consummatory positive emotion. The blunted LPP amplitude to pleasant and aversive pictures in depressed participants provided evidence for consummatory emotion context insensitivity.

This study was funded by NIMH grant R21 MH093692.

Poster 4-3**ELECTROPHYSIOLOGICAL RESPONSES TO AFFECTIVE PICTURES DURING THE ANTICIPATION AND PERCEPTION OF RESPIRATORY THREAT**Georgiana Juravle¹, Philipp Reicherts², Mirjam Liv Weinstein-Riechmann¹, Matthias Wieser², & Andreas von Leupoldt³¹University of Hamburg, ²University of Würzburg, ³University of Leuven*Descriptors: anticipation, respiration, emotion*

Recent research documents emotional processes to have an impact on the anticipation and perception of bodily threat sensations, such as breathlessness. However, little is known about the reverse influence of breathlessness on emotional processes or its modulation by anxiety. Here we investigated by means of visually-evoked brain potentials how the perception vs. anticipation of resistive-load-induced breathlessness (RLIB) influences affective processing. High and low anxious participants viewed pictures of positive, neutral, or negative content under conditions of perceived RLIB, anticipated RLIB, or an unloaded baseline. Overall, the picture-evoked P1 was significantly more positive in high as compared to low anxious individuals. Furthermore, the early LPP (300–500 ms) was significantly less positive during both RLIB conditions, as compared to baseline. Across conditions, the late LPP (600–1000 ms) indicated the expected results (i.e., a more positive response for positive and negative pictures as opposed to neutral ones) for the low anxious group. In turn, for the high anxious group only the positive pictures elicited the typical more positive LPP. Importantly, a group effect was found for the late LPP anticipatory RLIB condition, with the highly anxious participants demonstrating more positive LPPs for neutral pictures, as compared to the low anxious group. Taken together, these results highlight the impact respiratory threat has on the neural processing of emotional picture stimuli, as well as its modulation by intrinsic anxiety levels.

DFG: SFB TRR/B05.

Poster 4-4**N2 ACTIVATION MODERATES THE ASSOCIATION BETWEEN ATTENTIONAL CONTROL AND HOSTILITY**Eric L Rawls, Moody N Shannin, Mejdy M Jabr, & Connie Lamm
University of New Orleans*Descriptors: affect, cognition, attention*

Emotion regulation (ER) is a key executive function for social interactions. Individuals high in aggression tend to have poor ER, often resulting in interpersonal deficits. Neural mechanisms underlying ER are associated with activity in prefrontal cortical regions, suggesting that people with aggressive tendencies may lack sufficient neurocognitive control to inhibit aggressive responses, leading to poor social outcomes. Frontal cortical activity can be measured using ERPs. In particular, the N2 is a mediofrontally-generated component that is related to cognitive control. The N2 is reliably measured in tasks requiring effortful control over attention, and it has been particularly linked with ER during the presence of negative emotional stimuli. We collected ERP data during a response switching task with an emotional component. More specifically, participants had to execute either preplanned action strategies or alter action strategies based on last minute information in the context of more or less negative emotion. Additionally, we administered questionnaires to measure levels of attentional control and aggression. Results revealed that the association between attentional control deficits and hostility was moderated by N2 activation. More specifically, participants who showed both poor attentional control and high (more negative) N2 activation had high levels of hostility. These results suggest that inefficient ER-related neural processing contributes to hostile behavior, and thus training up these mechanisms might reduce the social consequences of this behavior.

Poster 4-5**LOW P3 ACTIVATION MODERATES THE ASSOCIATION BETWEEN VIDEO GAMING AND ANGER**Mejdy M Jabr, Greg Denke, Eric L Rawls, & Connie Lamm
University of New Orleans*Descriptors: attention, anger, cognition*

Since video games achieved mainstream popularity in the 1980's, the effects of game play on aggression and violence has been of great scientific and popular interest. This study examined the relationship between game play and aggression, as well as how it is influenced by attentional control processes and working mem-

ory. Participants (undergraduate students) were split into 2 groups: avid gamers – who played, on average, more than 30 minutes of video games per day – and non-gamers, who did not play video games. The Buss-Perry Aggression Questionnaire was administered to participants to measure levels of aggression. ERP data was collected while participants played an attentional blink paradigm – a rapid serial visual presentation task in which one event (target 1) triggers a gap in attention, preventing the detection of a second event (target 2). The task utilized negative and neutral images. Results revealed that game play significantly predicted levels of anger and aggression. The significant association between gaming and anger was moderated by low levels of P3 activation – an ERP associated with context updating in working memory. More specifically, this moderator effect was observed only in the context of negatively charged images that preceded inaccurately detected target 2 images. Thus, avid gamers may have difficulty shifting their attention away from negative images, resulting in ineffective encoding of subsequent information in working memory. This emotion induced attentional “blink” may be a neural mechanism underlying the association between gaming and violence.

Poster 4-6**ATTENTIONAL BIASES TO PICTURES OF OVERWEIGHT BODIES: AN ERP STUDY**Elisa Berdica, Georg W Alpers, Anne S Dyer, & Florian Bublitzky
University of Mannheim*Descriptors: body image, attention, event-related potentials*

Body-related stigmatization is thought to be closely linked to attentional biases. In the present study event-related brain potentials were used to assess attentional processes while viewing body pictures. 24 healthy participants viewed schematic drawings of under-, medium, and overweight male and female bodies, presented in a rapid continuous picture stream (1s each). In order to compare perceptual from more cognitive processes, drawings were overlaid with either congruent or incongruent body-related adjectives (thin or fat) in a second condition. Preliminary results from the first 15 participants revealed an early posterior negativity over visual processing areas (EPN, 160–280ms) especially pronounced for male obese bodies relative to medium-weight shapes. Later stimulus processing was characterized by pronounced late positive potentials (LPP, 400–700ms) for incongruent compared to congruent drawing-adjective combinations regardless of body size (i.e., under- or overweight). These findings suggest that there is an early implicit processing bias specifically for obese body drawings; however, evaluative processing stages (LPP) do not seem to differentiate under- or overweight body shapes.

Poster 4-7**VARIATIONS OF SOCIAL RELEVANCE IN FACE PROCESSING: STARTLE RESPONSES IN HIGH AND LOW SOCIALLY ANXIOUS INDIVIDUALS**Florian Bublitzky, Fatih C Kavcioglu, Antje BM Gerdes, & Georg W Alpers
University of Mannheim*Descriptors: social anxiety, anticipation, startle*

The anticipation of social situations, such as getting in contact with an unknown person or the expectation of being evaluated by someone, evokes fear in socially anxious individuals. The present study compared fear of interaction or being evaluated in individuals with different levels of social anxiety. To this end, psychophysiological responding was recorded during viewing face pictures of people with whom a future interaction or an evaluation situation was anticipated. Sixty-six participants were informed that they would meet a particular person (meet condition), or would be evaluated by another person (evaluation condition). In both conditions, happy, neutral, and angry facial expressions of the two relevant persons and of two non-relevant control persons were randomly presented in a 6s picture presentation paradigm. The startle reflex was evoked by auditory probes (95dB), on average in every third trial (i.e., 24). Orbicularis EMG revealed potentiated startle responses to emotional compared to neutral facial expressions. This pattern was particularly pronounced during the evaluation condition. A subsample of individuals with diagnosed social anxiety disorder (N = 12) revealed reflex potentiation specifically for happy faces when a meeting or an evaluation was anticipated with these persons. These data emphasize the important role of social anticipation in person perception. In patients, even happy facial expressions can provoke defensive reflex priming.

Poster 4-8**EFFECTS OF SELF-AFFIRMATION ON LATE POSITIVE POTENTIALS DURING EMOTIONAL PICTURE VIEWING**

Adrienne Crowell, & Brandon J Schmeichel
Texas A&M University

Descriptors: self-affirmation, late positive potential, behavioral inhibition, behavioral activation

Self-affirmation reduces defensive responding to threatening stimuli (see Cohen & Sherman, 2014). We designed an event-related potential (ERP) study to test the hypothesis that self-affirmation affects neural responding to emotional stimuli more generally. Specifically, we were interested in the extent to which self-affirmation affects the late positive potential (LPP), an ERP that is sensitive to motivational significance of affective stimuli (e.g., Codispoti, Ferrari, & Bradley, 2006). We included individual differences in behavioral inhibition system (BIS) and behavioral activation system (BAS) sensitivities as potential moderators due to their relationship with LPPs during emotional image viewing (e.g., Balconi, Falbo, & Conte, 2012). Ninety-four participants completed the BIS/BAS scales (Carver & White, 1994). Participants next ranked a list of values and wrote an essay on the importance of their top-ranked value (self-affirmation condition) or on the importance of a lower-ranked value to other people (no affirmation condition). Then, participants passively viewed positive, negative, and neutral images while electroencephalographic activity was recorded. Results revealed that self-affirmation increased the magnitude of the LPP to positive images for those who were high in BIS sensitivity. The results suggest that for individuals high in BIS sensitivity, self-affirmation can enhance the motivational significance of rewarding visual stimuli.

Poster 4-9**EFFECTS OF GLUCOSE ON LPPS DURING EMOTIONAL PICTURE VIEWING**

Anna J Finley, David Tang, & Brandon J Schmeichel
Texas A&M University

Descriptors: affect, ego-depletion, glucose

The effects of glucose on self-regulation have been scrutinized in recent years, especially the evidence that consuming glucose reverses the ego depletion effect. Indeed, some studies have found that merely swishing glucose and spitting it out reverses ego depletion, which suggests that metabolizing glucose and thereby increasing energy stores is not necessary to restore self-regulatory resources. However, no prior studies have directly compared the effects of consuming versus swishing glucose, and very few studies have examined the effects of consuming or swishing glucose on event-related potentials. The current experiment tested the hypothesis that glucose consumption and glucose swishing influence emotional processes as revealed by the late positive potential (LPP). We gave depleted participants either an aspartame-sweetened beverage to drink, a glucose-sweetened beverage to drink, or a glucose solution to swish. Subsequently, neural responses to emotional images were recorded using EEG. We found that, relative to aspartame consumption, glucose consumption and glucose swishing both reduced LPP magnitudes during negative picture viewing. Thus, glucose, either consumed or swished, reduced neural sensitivity to negative emotional stimuli. The glucose effects were similar but weaker for positive picture viewing. These results suggest that glucose may influence self-regulation by reducing neural responsiveness to aversive stimuli.

Poster 4-10**STIMULUS INTENSITY IMPACTS EMOTION REGULATION STRATEGY CHOICE AND MEMORY ACCURACY**

Stacia N Gessner, William Murphy, Ellen Gregory, Mark Poirier, Joan McDowd, & Diane Filion
University of Missouri-Kansas City

Descriptors: emotion regulation, attention, memory

This study investigated the effect of stimulus intensity on emotion regulation strategy choice, attentional deployment, and autonomic responding in the processing of emotional pictures. Participants were asked to view a series of high and low intensity negatively valenced IAPS pictures and to choose either distraction or reappraisal to reduce the emotional impact of each picture. Consistent with the findings of Scheppes et al. (2011), we found that distraction was chosen more frequently for the high intensity pictures than the low intensity pictures, with distraction chosen 64% of the time for high intensity pictures and only 27% of the time for low intensity pictures. The high intensity pictures for which the strategy of

distraction was selected were associated with higher SCRs, shorter viewing times in the high emotion areas of the pictures, and poorer memory for picture details compared to high intensity pictures for which reappraisal was selected. Response patterns were similar for the low intensity pictures, except that SCR did not differ as a function of strategy. These results suggest that although participants who selected distraction as their emotion regulation strategy of choice for viewing high intensity negative pictures spent significantly less time viewing the high emotion areas of those pictures, they exhibited a higher level of arousal during picture viewing and remembered the pictures less well. Overall, strategy of distraction appears to have been less beneficial to emotion regulation, despite being selected on over two-thirds of the trials.

Poster 4-11**THE EFFECT OF VIOLENT VIDEO GAME EXPOSURE ON EMOTION MODULATION OF STARTLE AND AGGRESSION**

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Descriptors: emotion, aggression, video game

Building on previous research examining other forms of media, a growing body of literature suggests a connection between violent video game exposure and increased aggression, although the mechanisms are still unclear. The present study used emotion modulated startle (EMS) to assess the effects of both chronic and acute violent video game exposure (VVGE) by comparing baseline and pre-post gameplay (violent, nonviolent) EMS for participants with high and low VVGE. A modified Taylor Competitive Reaction Time Task was used after completing the post-gameplay EMS session to assess aggression. Emotion modulated startle assesses emotional state through either potentiation or inhibition of the startle response. Because the startle response is a negative-defensive response, a negative emotional state enhances the startle response through priming, whereas a positive emotional state diminishes the startle response. In the context of VVGE, if priming is the primary route to increased aggression startle should be potentiated while viewing violent-negative images after exposure reflecting an enhanced emotional response. If desensitization is the primary route, startle responses should be diminished reflecting startle inhibition. The results, based on 47 participants, suggest that desensitization is the primary route to increased aggression with decreased EMS responses to violent negative images associated with chronic and acute VVGE. An increase in aggression was also found after acute VVGE, but only for those with high chronic VVGE.

Poster 4-12**COGNITIVE TRAINING CHANGES THALAMOCORTICAL CONNECTIVITY IN SCHIZOPHRENIA: A PLACEBO-CONTROLLED TRIAL**

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Descriptors: schizophrenia, cognitive remediation, connectivity

Background: Thalamic projections to the prefrontal cortex are found to be critical for cognition, and have been found to be disrupted in schizophrenia. Cognitive remediation training (CRT) is an emerging class of behavioral interventions that holds modest promise for improving cognition and functioning in schizophrenia. This study examined whether thalamocortical connections were sufficiently plastic to be affected by the experience of CRT. We also examined whether changes in these functional circuits generalized to untrained measures of cognition. Methods: 26 patients were randomized to undergo a working memory-focused CRT (N = 14) or an active placebo control condition (N = 12). Before and after treatment, patients completed a resting state fMRI scan as well as neurocognitive testing. Analyses examined intrinsic functional connections between the thalamus and regions of interest in the anterior cingulate cortex (ACC) and middle frontal gyrus (MFG) and how these changes related to the MATRICS Cognitive Consensus Battery (MCCB). Results: Greater change in intrinsic connectivity was observed in the right MFG and ACC for the CRT group. Furthermore, increases in connectivity between the thalamus and right MFG significantly correlated with improvements on the MCCB overall score. Conclusions: CRT for schizophrenia affected intrinsic neural connectivity in thalamocortical circuits even when the circuit was not being utilized, suggesting a robust signature of CRT treatment and a mechanism that might underlie generalization.

Support: VA Merit Award to T. Nienow and an NRSA to I. Ramsay.

Poster 4-13**CHANGE IN RESPIRATORY SINUS ARRHYTHMIA OVER TIME DURING AN EXPRESSIVE WRITING TASK**

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Descriptors: heart rate variability, expressive writing

Expressive writing has been shown to enhance physiological reactivity as compared to neutral writing, and is associated with physical and psychological benefits. Higher respiratory sinus arrhythmia (RSA), an index of vagal control of the heart, is thought to represent adaptive emotion regulation. Given that the nature of RSA change over time is not fully understood, the aim of this study was to further explore the pattern of changes within and across sessions in a group of unscreened college students who wrote about a personal traumatic event ($n = 83$) or a neutral event ($n = 98$). Participants wrote for 20 minutes on three occasions within a two-week period, with EKG recorded at sessions one and three during a baseline and writing phase. RSA was examined as the linear trend in change from baseline in 2.5 minute segments across the 20 minute writing period. Overall, RSA decreased from baseline to the writing period. In session 1, RSA continued to decrease across the 20 minute writing period, whereas in session 3, after an initial decrease, RSA increased across the writing period, Segment \times Session ($F(1, 175) = 15.1, p < .001$). Changes in RSA across the writing period were more pronounced in neutral writers than expressive writers ($F(1, 125) = 3.96, p = .05$). These findings suggest maintenance of adaptive emotion regulation during expressive writing and are consistent with RSA as an index of adaptive emotional responding. Future work is needed to better understand the nuances of this process and moderators of this effect during a trauma-writing task.

Poster 4-14**THE INTERACTIVE EFFECT OF PARASYMPATHETIC ACTIVITY, SYMPATHETIC ACTIVITY, AND ANXIETY SENSITIVITY ON HEART RATE DURING 7.5% CO₂ CHALLENGE**

David J Rothman, Shannon Hahn, Jeremy Cornelissen, Laura Hazlett, Roxann Roberson-Nay, & Scott R Vrana
 Virginia Commonwealth University

Descriptors: CO₂ challenge, anxiety sensitivity, autonomic balance

The sympathetic and parasympathetic branches of the autonomic nervous system are often characterized as operating in balance, especially when controlling increases and decreases in heart rate (HR). Despite this characterization, certain psychological risk factors may alter how these two branches operate in concert. For example, anxiety sensitivity, the fear of stimuli associated with anxiety, may change the way that physiological symptoms are interpreted. In this study, participants ($N = 231$) breathed a steady state 7.5% CO₂ gas mixture (21% oxygen with balance nitrogen) for 8 minutes; this task is a well-validated measure of panic liability. CO₂ inhalation was preceded and followed by 5-minute periods of breathing room air. Participants were blind to both the initiation and completion of the CO₂ breathing. Measures of sympathetic activity, parasympathetic activity, and heart rate were derived from interbeat intervals. Increased sympathetic activity and decreased parasympathetic activity during CO₂ inhalation were associated with increases in HR. However, the effect of sympathetic and parasympathetic activity on HR depended on anxiety sensitivity: people with low anxiety sensitivity exhibited a stronger relationship between greater sympathetic activity and increased HR, whereas people with high anxiety sensitivity exhibited a stronger relationship between lower parasympathetic activity and increased HR. These findings suggest that people higher in anxiety sensitivity are more sensitive to parasympathetic withdrawal, at least under certain circumstances.

Poster 4-15**AN ERP STUDY OF PRESENTATION DURATION AND EMOTION DURING CONFLICT RESOLUTION**

Gladys M Hester¹, & Aminda J O'Hare²
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Descriptors: emotion, conflict, decision-making

In this study participants responded to a color word flanker task with emotional and neutral word stimuli in which the word stimuli were flanked with either congruently or incongruently colored flanking words. Participant's task was to indicate the color of the target word and ignore the flankers. Arousal level and presentation duration of the stimuli were manipulated. Additionally, high-density event-related potentials (ERPs) were recorded. Participants were prone to increased errors on incongruent trials, especially when the word stimuli were negative compared to neutral. These findings suggest emotional content is distracting and interfering with cognitive processing. As predicted, a significant congruency effect was also found for reaction time, such that incongruent trials were slower than congruent trials. However, no effects of word valence, arousal or presentation duration were found on reaction times. The N2 ERP component was found to be larger for incongruent compared to congruent trials and larger for long versus short presentation durations. The P3 ERP component was smaller for incongruent compared to congruent trials and smaller for long versus short presentation durations. Although emotional content appears to interfere with cognitive processing by increasing the likelihood that an error will be made, it does not seem to interfere with the speed of conflict resolution in which the cognitive decision-making processes occur.

Poster 4-16**TRAIT MINDFULNESS AND AFFECTIVE REACTIVITY: PSYCHOPHYSIOLOGICAL AND SELF-REPORTED RESPONSES TO EMOTIONAL PICTURES**

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¹University of Oregon, ²Stockholm University

Descriptors: affective reactivity, mindfulness, individual differences

As a form of attention, mindfulness is qualitatively receptive and non-reactive, and is thought to facilitate adaptive emotional responding. One suggested mechanism is that mindfulness facilitates disengagement, which in turn decreases affective reactivity. We used a multi-method approach to study the relationship between individual differences in self-reported trait mindfulness and various psychophysiological and self-reported responses to emotional pictures. While participants ($N = 51$) passively viewed pleasant, neutral, and unpleasant IAPS pictures, we recorded high-density electrocortical, electrodermal, and electromyographic data to the pictures as well as to acoustic startle probes presented during the pictures. Afterwards, participants rated their subjective valence and arousal while viewing the pictures again. If trait mindfulness reduces emotional reactivity, then for individuals reporting high versus low mindfulness, response differences between emotional and neutral pictures would show decreased early posterior negativity (EPN) and late positive potential (LPP) amplitudes, skin conductance responses, and subjective ratings for valence and arousal. High mindfulness would also be associated with decreased emotional modulation of startle eyeblink and P3 amplitudes. Although results showed clear effects of emotion on the dependent measures, in general, mindfulness did not moderate these effects. These data do not support the hypothesis that individual differences in self-reported trait mindfulness are related to spontaneous emotional responses during picture viewing.

Poster 4-17**DIFFERENTIAL STRATEGIES IN CHILDREN AND ADULTS DURING A VISUAL GO-NOGO TASK ACROSS TWO SESSIONS**

Brittany K Taylor, Patricia L Davies, & William J Gavin
Colorado State University

Descriptors: development, strategy, contingent negative variation

The contingent negative variation (CNV) is a slow negative drift in ERPs between two stimuli resulting from attentional anticipation generated in prefrontal cortex. The CNV can be measured as three components: O-wave, E-wave, and total CNV. Studies have shown that CNV amplitudes tend to become larger from childhood to adulthood. However, these studies have only examined a single session of data. The present study examined developmental trends in CNV amplitudes across two sessions scheduled one-to-two weeks apart. EEG data were collected from 32 adults [19–29 yrs, $M = 23.28$, $SD = 2.31$] and 51 children [7–13 yrs, $M = 10.37$, $SD = 1.59$] while they performed a simple visual Go-NoGo task during two sessions (S1 and S2). Correlations between amplitude and age among children showed significant developmental trends in the expected direction for the O-wave [S1: $r = -.47$; S2: $r = -.45$] and total CNV [S1: $r = -.39$; S2: $r = -.31$], and approached significance for the E-wave [S1: $r = -.28$; S2: $r = -.24$]. Three 2 (Group) \times 2 (Session) ANOVAs were used to test differences between children's and adults' CNV amplitudes. Adults consistently showed larger amplitudes than children. The O-wave [$F(1, 81) = 6.80$, $p = .011$] and E-wave [$F(1, 81) = 5.12$, $p = .026$] showed significant Group \times Session interactions. Adults' amplitudes became smaller across sessions, whereas children's amplitudes became larger. These findings may indicate that each group employed differential strategies for task performance across the two sessions.

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Poster 4-18**SENSORY GATING IN CHILDREN WITH HIGH FUNCTIONING AUTISM**

Sidney Dungan, Jewel E Crasta, Patricia L Davies, & William J Gavin
Colorado State University

Descriptors: Autism spectrum, sensory gating, neural biomarker

Sensory gating is a neurological filtering mechanism that inhibits brain responses to irrelevant incoming sensory stimuli, thereby preventing sensory overload. Results in previous research regarding gating abilities in children with high functioning autism (HFA) compared to typically developing (TD) age-matched peers are mixed. Though most children with autism exhibit difficulty in processing sensory information, the neurophysiological evidence of sensory gating for this population remains unclear. This study compared sensory gating in 19 children with HFA with 19 age- and gender-matched, TD peers. EEG data were recorded while participants heard paired click stimuli. A paired t-test comparing the peak-to-peak P50 amplitudes of the paired clicks in TD children showed that the P50 was larger to the conditioning click than to the test click, $t(18) = 2.84$, $p = .011$. In contrast, no significant difference was found between the P50 amplitudes to the conditioning and test clicks in children with HFA, $t(18) = -.093$, $p = .927$, suggesting that gating occurs in TD children but not in children with HFA. An independent t-test comparing P50 amplitude difference scores (test click minus conditioning click) between groups showed that TD children had significantly better gating than children with HFA, $t(36) = -1.749$, $p = .018$. Contrary to previous literature, these results show that children with HFA have impaired gating. These findings hold noteworthy implications for the identification of a specific neural biomarker that could differentiate TD children from children with HFA.

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Poster 4-19**NEURAL ATTENUATION OF POSITIVELY AND NEGATIVELY CONTINGENT VISUAL STIMULI**

Noelia Do Carmo Blanco, Angèle Brunellière, & Jeremie Jozefowicz
Université de Lille

Descriptors: contingency, prediction, event-related potentials

Detecting relationships between stimuli in our environment allows the expectation (or not) of an outcome on the basis of a cue. Fundamental to human behav-

ior, this learning process is widely accepted to be prediction driven. Predictive mechanisms have also been suggested to be at the core of brain functioning, namely as in predictive coding theories, where neural signals are related to internal predictions and goals rather than exclusively to stimulus. In the search for the electrophysiological correlates of associative learning, we aimed to study how expectancy influences perceptual processing of the same visual stimuli. Participants were repeatedly exposed to rapid streams of visual cues and outcomes, at the end of which they were asked to judge the contingency between a cue and an outcome. We manipulated the frequency of the outcome in the presence versus the absence of the cue, creating positive, negative and null contingency flows, while keeping constant the probability of the stimuli. We found that processing of the cue-outcome sequence in non-contingent streams lead to increased event-related potentials amplitude compared to the negative and the positive contingency condition. These findings support a predictive coding framework, as it shows a modulation of neural activity as a function of the predictive relation existing between the cue and the outcome. Compared to the non-contingent conditions, we observed neural attenuation of positively contingent stimuli but also, for the first time to our knowledge, of negatively contingent stimuli.

Collège doctoral Lille Nord de France.

Poster 4-20**PARENTING STYLE IS REFLECTED IN PARENTS' ELECTROPHYSIOLOGICAL RESPONSE TO ADOLESCENTS' GAINS AND LOSSES IN A LABORATORY GAMBLING TASK**

Amanda Levinson, Brittany C Speed, Brady D Nelson, Jennifer N Bress, & Greg Hajcak
Stony Brook University

Descriptors: parenting, empathy, oFN

Parenting style can have a significant impact on children's mental and physical health, but the processes contributing to parenting behaviors are not well understood. The current study examined the relationship between self-reported parenting style and parents' neural response to observing their children winning and losing money in a laboratory gambling task. Studies of the electrophysiological response to gains versus losses focus on a negative-going potential peaking around 300ms after losses compared to gains (i.e., the Feedback Negativity, FN). A similar relative negativity is observed when participants view others' losses compared to gains—and this potential has been dubbed the observed feedback negativity (oFN). In the current study, we examined EEG data from 44 parents who engaged in a gambling task with their adolescent, in which they viewed feedback about their own as well as their adolescent's gains and losses. We sought to determine whether parents' FN and oFN would relate to self-reported parenting style. Using multiple linear regression analyses, we found that the amplitude of parents' oFN was associated with authoritarian parenting style, a harsh parenting style linked to negative health outcomes for the child. This association was independent of the sex of both the parent and the child, parents' depressive symptoms, and, most importantly, parents' FN to their own outcomes. This preliminary data suggests that authoritarian parenting is related to reduced neural sensitivity to adolescents' outcomes, perhaps reflecting decreased empathy toward their children.

Poster 4-21**A MULTIMODAL ASSESSMENT OF INHIBITORY PROCESSING: INFLUENCE OF PUBERTAL DEVELOPMENT AND RISK FOR PATHOLOGY**Colin L Sauder¹, Alexandria Meyer², & Greg Hajcak²¹University of Texas Health Science Center, San Antonio, ²Stony Brook University*Descriptors: inhibition, event-related potentials, fMRI*

fMRI studies of inhibitory processing implicate a network that includes parietal and premotor areas, the dorsolateral prefrontal cortex, cingulate (anterior and posterior), and striatum. Neural activity in this network, in particular within the cingulate, is thought to give rise to two ERP components that have been consistently associated with inhibitory processing: the N2 and P3. Importantly, there is evidence to suggest that both ERP and fMRI biomarkers of inhibitory processing change throughout adolescence. Furthermore, these biomarkers are sensitive to individual differences in inhibitory processing (i.e. differentiate children with low [e.g., ADHD] and high [e.g., anxiety/depressive disorders] behavioral inhibition). In the current study, adolescent girls aged 9–14 completed a go/no-go task in both fMRI and EEG. Successful inhibition was associated with greater activity within the DLPFC, insula, and premotor/parietal areas; and with decreased activation within the PCC. Among these regions, only PCC deactivation was associated with N2 and P3 amplitude, and only when controlling for age. When controlling for age, pubertal development was associated with increased N2 amplitude and greater decreases in PCC activity during no-go trials, but decreased P3 activity. Among these measures, when controlling for age, decreases in PCC activity were associated with greater symptoms of depression and anxiety. Implications of these findings within the context of pubertal development, developmental psychopathology, and the role of PCC in the default mode network will be discussed.

Poster 4-22**NEURAL RESPONSE TO MONETARY LOSS DIFFERENTIATES BOYS AT HIGH AND LOW RISK FOR DEPRESSION**Jennifer N Bress¹, Zachary P Infantolino², Felicia Jackson¹, Brandon Gibb³, & Greg Hajcak¹¹Stony Brook University, ²University of Delaware, ³Binghamton University*Descriptors: reward, risk, depression*

The reward positivity (RewP) is an ERP elicited by feedback indicating monetary gain versus loss. Although the RewP appears to consist of a negative deflection in the ERP waveform that is larger in response to losses than gains, several studies in adult samples suggest that it may be more aptly characterized as a positivity in response to monetary gains that is reduced for losses. The RewP has been associated with variation in concurrent depressive symptomatology and risk for depression in developmental samples; however, existing studies have used small sample sizes or restricted age ranges. In the current study, the RewP was measured using a standard guessing task in a sample of 218 7- to 17-year-olds with or without a parental history of depression. The ERP data were subjected to a temporospatial principal components analysis (PCA), which revealed an underlying positivity resembling the RewP in both timing and topographical distribution. Consistent with studies in adult samples, this positivity was larger for monetary wins than losses. Further analysis of the PCA-derived positivity produced an interaction between parental depression and the child's gender in the monetary loss condition, such that high-risk boys had a smaller positivity than low-risk boys in response to losses, but high- and low-risk girls did not differ. These results suggest that a reduced neural reward response when losing money may constitute a risk factor for depression in boys. Furthermore, the results of the PCA suggest that the components underlying the RewP are comparable across a range of ages.

Poster 4-23**ELECTROPHYSIOLOGICAL CORRELATES OF RULE LEARNING IN A DIGIT ENTERING TASK**Johannes S Hewig¹, Michael GH Coles², Holger Hecht³, & Wolfgang HR Miltner³¹University of Würzburg, ²University of Illinois at Urbana-Champaign, ³Friedrich Schiller University Jena*Descriptors: rule learning, event-related potentials, implicit*

The present study examined electrophysiological correlates of implicit rule learning in the context of skill learning and repetition priming. 16 right-handed participants (8 females) completed four sessions of 960 trials of a digit-entering-task while EEG was recorded. The participants were asked to enter 5 digits into a number pad. The 5 digit sequences followed a pre-specified rule with the restriction that a certain digit had to be followed by other digits (e.g. 5 was only followed by 4,7,2,9). First, there were unique items presented once, and repeated items presented 24 times in a session. Furthermore, in session 3 special unique items were introduced that followed a different rule (new-rule-uniques). Participants showed strong improvements in skill. In particular, their performance was best for repeated and unique items that followed the rule, whereas new-rule-uniques led to increased response latencies. Moreover, these new-rule-uniques elicited a left lateralized parietal negativity upon presentation that was larger in those participants who showed larger behavioral differences in rule acquisition.

Poster 4-24**HEART RATE RESPONSES TO NEAR OUTCOMES IN GAMBLING IN RELATION TO GAMBLING SEVERITY**Natalie Ulrich¹, Wolfgang Ambach², & Johannes Hewig¹¹University of Würzburg, ²Institute for Frontier Areas of Psychology and Mental Health, Freiburg*Descriptors: gambling, near outcome, heart rate*

Near outcomes in gambling refer to wins and misses where the current trial would have almost resulted in the opposite outcome. Previous studies on near-misses have found greater physiological responses relative to full-misses, measured via heart rate and skin conductance. So far, no study investigated peripheral physiological responses to near-wins. Participants gambled on a wheel of fortune which, following a deceleration phase, delivered full-wins, full-misses, near-wins, and near-misses. We assessed initial decrease and subsequent increase of the phasic heart rate as well as skin conductance response for each trial. Furthermore, the relation between gambling severity, measured via the South Oaks Gambling Screen (SOGS), and physiological responses was analyzed. Initial heart rate decrease depended interactively on outcome (win vs. miss) and closeness (near vs. full). Subsequent heart rate increase showed a main effect for outcome, as well as an interaction of outcome and closeness. Scores on the SOGS correlated negatively with the heart rate increase. In general, subjects exhibited strong responses in phasic heart rate after all types of outcomes. However, the observed interactions do not replicate the main effect of closeness on event-related potentials we found in previous studies, which might be due to the characteristics of deceleration of the wheel of fortune differing between studies. The negative correlation between SOGS scores and heart rate increase fits with several previous studies showing blunted responses to gambling outcomes in pathological gamblers.

Natalie Ulrich is supported by a Research Scholarship from the Elite Network of Bavaria. This work was supported by a Neuroscience Research Award awarded to Natalie Ulrich from the Graduate School of Life Sciences of the University of Würzburg.

Poster 4-25**CHARTING THE TIME COURSE OF EMOTION WITH SERIAL POST-AURICULAR REFLEXES**

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Descriptors: postauricular reflex, emotion, startle

Modulation of post-auricular reflexes (PARs) to serial probes may be a useful means for studying the time course of emotion (Aaron & Benning, 2012). The response is potentiated during positive emotions and resistant to habituation and refraction. In addition to exploring this possibility, we also tested a theory regarding why this component of startle is enhanced by positive rather than negative affect (Johnson, Valle-Inclan, Geary & Hackley, 2012). The Nursing Hypothesis predicts that the PAR should be enhanced during positive states related to nursing (food, breasts, and female faces) but not, for example, when cartoons or photos of landscapes are viewed. Photographs were in 14 thematic categories (non-IAPS) were presented for 10 s each. Beginning 3 s after picture onset, 13 white noise bursts were presented with an inter-stimulus interval of 500 ms. Results for the first 37 subjects suggest that the serial probe method does track within-trial variations of affect. For example, potentiation during funny cartoons was delayed relative to breasts or food, presumably because it took time to get the joke. Evidence regarding the Nursing Hypothesis was mixed. Food and breast photos did yield the largest potentiation relative to neutral pictures (household objects). However, contaminated food and cancerous breasts were just as effective as delicious food and beautiful breasts. These and other valence-nonspecific effects implicate arousal or attention.

Poster 4-26**NEURAL MECHANISMS UNDERLYING INDIVIDUAL DIFFERENCES IN PERSONALITY ASSOCIATED WITH ANTERIOR CINGULATE CORTEX FUNCTION: IMPLICATION FOR UNDERSTANDING DEPRESSION**

Akina Umamoto, & Clay B Holroyd
 University of Victoria

Descriptors: individual differences, cognitive control, anterior cingulate cortex

A recent proposal of anterior cingulate cortex (ACC) function holds that ACC integrates reward values over time to motivate the selection and execution of extended, goal-directed behaviors (Holroyd & Yeung, 2012). Furthermore, depression is characterized by reduced reward sensitivity and motivation, and associated with compromised ACC function. Here we examined whether certain personality traits provide a link between normal ACC function and abnormal function observed in depression. Among several components of event-related potential (ERP), we assessed the reward positivity (RewP) - which is proposed to reflect modulation of midbrain dopamine reward signals of ACC activity - from sixty-six college students engaged in a probabilistic trial-and-error learning task. Participants were administered several personality questionnaires related to motivation, reward sensitivity and depression. We found that higher depression scores were associated with reduced RewP amplitude, especially when the reward outcomes were most expected. Further, lower consummatory anhedonia was associated with larger RewPs, and higher persistence and reward responsiveness scores were associated with larger RewPs in the first half of the task only. Individuals with higher persistence scores also performed the task with greater accuracy. Our results implicate the proposed role of ACC in motivating extended behaviors with individual differences in personality and depression.

Poster 4-27**INCREASE OF EEG FUNCTIONAL CONNECTIVITY DURING EMOTIONAL PICTURE PROCESSING**

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 Istanbul Kultur University

Descriptors: electroencephalography, emotion, brain oscillations

Studies on EEG brain dynamics of affective picture processing are rapidly increasing. Event-related EEG coherence is one of the essential methods used to analyze functional connectivity. In this study long distance connectivity between different electrode pairs during affective picture viewing was analyzed by means of event-related coherence analysis. EEG of twenty-eight healthy subjects (14 female) was recorded at 32 locations. The participants passively viewed 120 emo-

tional pictures (IAPS, unpleasant, pleasant, neutral) in a block design. Long-distance intra-hemispheric event-related coherence was analyzed for delta (1–3.5 Hz), theta (4–7.5 Hz), alpha (8–13 Hz), beta (15–30 Hz) frequency ranges for (F3-T7, F4-T8, F3-TP7, F4-TP8, F3-P3, F4-P4, F3-O1, F4-O2, C3-O1, C4-O2) electrode pairs. Unpleasant pictures elicited significantly higher delta coherence values than neutral pictures, ($p = 0.023$) over fronto-parietal, fronto-occipital and centro-occipital electrode pairs. Furthermore, pleasant ($p = 0.011$) and unpleasant ($p = 0.04$) pictures elicited higher beta coherence values than neutral pictures over the right hemisphere. Females had higher coherence values than males in delta ($p = 0.027$), theta ($p = 0.008$) and alpha ($p = 0.046$) frequency ranges. This study showed that the brain connectivity between fronto-parietal, fronto-occipital and centro-occipital electrodes is higher during emotional pictures than neutral pictures. Furthermore, females had higher connectivity between different parts of the brain than males during emotional processes.

Poster 4-28**REDUCED RESPONSIVENESS TO BOTH VISUAL SENSORY AND COGNITIVE STIMULI IN NON-DEMENTED PARKINSON'S DISEASE PATIENTS**

Derya Durusu Emek-Savas¹, Gulin Ozmus¹, Beril Donmez Colakoglu¹, Raif Cakmur¹, Bahar Guntekin², Erol Basar², & Gorsev G Yener¹
¹Dokuz Eylul University, ²Istanbul Kultur University

Descriptors: electroencephalography, Parkinson's, event-related oscillations
 Parkinson's disease (PD) is the second most common progressive neurodegenerative disorder characterized with both motor and cognitive deficits. The current study investigated sensory evoked oscillations (SEO) and event-related oscillations (ERO) of visual modality in non-demented PD patients and healthy controls. Sixteen PD and 16 matched control subjects participated. Simple light flashes were used for SEO, and a classical visual oddball paradigm was used for target ERO. Oscillatory responses in delta frequency range (0.5–3.5 Hz) were examined. Significant differences were found between groups on the maximum peak-to-peak amplitudes of both delta ERO and SEO responses [$F_{1,27} = 7.792$, $p = 0.010$; $F_{1,27} = 6.496$, $p = 0.017$, respectively], indicating significantly lower delta responses in PD than healthy controls. Delta ERO responses were decreased in all frontal, central and parietal locations, whereas delta SEO responses were decreased over mid and right central locations in PD ($p < 0.05$). PD patients showed reduced target delta ERO and SEO responses. ERO is considered to reflect the activity of cognitive networks, while SEO reflects the activity of sensory networks. These results indicate that non-demented PD patients have impairments in both visual networks consistent with anatomical and functional findings. Brain oscillatory responses have the potential to be used as biomarkers for visual cognitive and sensory status of PD.

Poster 4-29**SOCIAL INFLUENCE MODULATES ELECTROPHYSIOLOGICAL RESPONSE TO UNPLEASANT STIMULI**

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 College of William and Mary

Descriptors: social influence, emotion, late-positive potential

Social information can profoundly influence behavior, perceptual and evaluative judgments, and even physiological responses to pain. Yet, few studies have looked at its influence on emotion experience, a construct that is inherently social. Here, we describe a study that investigated the effect of others' emotion ratings on subjective emotional experience and the late positive potential component of the event-related potential. The results indicate that social information can influence subjective emotional experience to pleasant and unpleasant picture stimuli. Social information also modulated the late positive potential in response to unpleasant picture stimuli, providing support for a modulated encoding mechanism of social influence on emotion.

Poster 4-30**SEEING UNCERTAINTY: INVESTIGATING THE ROLE OF VISIBILITY IN THE PROCESSING OF DISABILITY**

C. Kit Kaiser, Davi Kallman, & Rachel L Bailey
Washington State University

Descriptors: emotion, disability, aversive motivation

Nearly 20 percent of individuals in the United States have a physical, psychological or social disability. These disabilities range from severe impairments to functional limitations and are displayed with a wide degree of visibility. For many social, cultural, and biological reasons, social interactions with persons with disabilities can be uncomfortably novel and uncertain. The uncertainty that is created may make interactions with persons with disabilities feel more risky and aversive, especially when the display of a disability is more overt. Understanding how the visibility of disability alters this uncertainty and its concomitant aversiveness is crucial to understanding the formation of prejudice and stigma. Participants (N = 71) viewed 15 still images of individuals that varied in the display of their disabilities (low, moderate, high visibility). Facial electromyography, heart rate, and skin conductance levels were collected for five seconds during exposure. Images with the highest degree of visibility of disability elicited more negative and intense emotions over time than those with lesser visibility, indicated by greater corrugator supercillii activity ($F = 3.39, p < .001$) and greater skin conductance level ($F = 1.88, p < .06$). This suggests that the uncertainty that is created by more visible disabilities does create more aversive emotional responses.

Poster 4-31**ADVERTISEMENTS FEATURING SAME-SEX COUPLES AFFECT ATTENTIONAL, BUT NOT EMOTIONAL, RESPONDING**

Glenna L Read, Irene I van Driel, & Robert F Potter
Indiana University

Descriptors: heart rate, facial EMG

Research indicates psychophysiological measures may be more accurate indicators of attitudes towards stigmatized groups than self-report (Stewart et al., 2013). This study examines both types of measures in response to advertisements featuring gay couples. Participants (n = 94) watched 10 television ads for common items while corrugator activity and heart rate (HR) were recorded, time-locked to the stimuli. Half of the ads featured gay couples, the others heterosexual couples. The gender composition of the couple was revealed toward the middle of each ad. After seeing each ad, participants answered questions about their attitudes and affective responses. After all ads, participants completed the Sexuality Implicit Attitudes Test (IAT; Greenwald et al., 1998), with scores used to divide participants into high- and low-bias groups. Results show none of the self-report measures were affected by level of implicit anti-gay bias. However, the high-bias group showed significantly less deceleration in HR over the 10 seconds following the reveal of the same-sex couples versus the heterosexual couples. There were no differences in corrugator activity following the reveal of couple orientation, perhaps due to less attention paid to gay couples by those high in implicit bias. We conclude those high in anti-gay bias may attempt to ignore messages featuring couples they consider objectionable. However, because of social desirability concerns, these differences are not reflected when subjects are asked about attitudes towards these commercials. Thus, HR is a better index than self-report.

Poster 4-32**CUE THE DISGUST: THE IMPACT OF TOBACCO CUES AND DISGUSTING IMAGES IN ANTI-TOBACCO ADS ON TOBACCO SMOKERS' MESSAGE PROCESSING**

Russell B Clayton¹, Glenn Leshner², Paul Bolls³, Esther Thorson³, Tom Piasecki³, & Tim Trull³

¹Florida State University, ²University of Oklahoma, ³University of Missouri-Columbia

Descriptors: anti-tobacco ads, tobacco cues, disgust images

This study examined how smokers process anti-tobacco ads that vary in presence/absence of tobacco cues and high/low ratings of disgust. A 2 (tobacco cues: present/absent) \times 2 (disgust: high/low) \times 3 (ads) \times 4 (order) mixed model repeated measures experiment was conducted. Participants (N = 50 adult smokers) viewed 12, 30 second ads in one of four random orders. Heart rate, skin conductance, and facial EMG activity were collected for a five second baseline prior to each ad and

were time-locked during ad exposure. Participants also completed an audio recognition test. A significant tobacco cues \times disgust \times time interaction was found for heart rate deceleration from baseline. The strongest heart rate deceleration occurred during exposure to absent tobacco cues/low disgust ads while the least heart rate deceleration was observed during exposure to present tobacco cues/high disgust ads. There was also a significant tobacco cues \times disgust interaction on audio recognition, self-report smoking urges, and intent to quit smoking. Participants were most accurate recognizing content from absent tobacco cues/high disgust ads and least accurate for content from present tobacco cues/high disgust ads. Participants also reported fewer smoking urges and intentions to quit for present tobacco cues/high disgust ads relative to ads present in tobacco cues or high in disgust. This pattern of results suggest that ads present in tobacco cues and high in disgust may lead smokers to experience cognitive dissonance between urges to smoke and intent to quit resulting in defensive message processing.

Poster 4-33**SENSITIVE DEPENDENCE ON INITIAL CONDITIONS OF MEDIATED MESSAGE PROCESSING**

Jingjing Han, Anthony Almond, & Annie Lang
Indiana University

Descriptors: dynamic systems, message processing, emotion

Dynamic system theory argues that small changes in initial conditions can lead to large differences in later events or behaviors. Dynamic human-centered communication systems theory (DHCCST) points out that human interaction with messages is also operated in a dynamic way. As such, in mediated message processing, various initial conditions may lead to different processing patterns while people process subsequent messages over time. To test this hypothesis, 17 participants watched 32 negative public service announcements (PSAs) on four different topics (i.e., AIDS, unsafe driving, drug, and smoking prevention). Initial conditions were manipulated by showing either a pleasant calm video (i.e., fire-place, beach, or forest) or a black screen for 6 seconds before each PSA. Messages and preceding pleasant calm videos were randomly presented. It was expected that the calm positive videos would create more similar initial conditions amongst subjects compared to black screens and result in less variation across messages over time. Corrugator supercillii activity was measured during viewing. Results showed a smaller range of corrugator activity over time for messages that followed pleasant calm videos compared to those following a black screen. The range increased over time for both conditions but the increase was smaller for the calm positive condition. This suggests that humans are sensitive to initial conditions during message processing and different initial conditions are able to lead to qualitatively different trajectories of message processing.

Poster 4-34**RESTING RSA SUPPORTS CHILDREN'S CHALLENGE APPRAISALS IN NEGATIVE EMOTION CONTEXTS**

Angela A Sillars, & Elizabeth L Davis
University of California, Riverside

Descriptors: respiratory sinus arrhythmia, emotion, appraisal

Children's initial perception of negative events as either challenging or threatening has implications for subsequent emotion regulation processes. Children's parasympathetic regulation (e.g., higher resting respiratory sinus arrhythmia; RSA) has also been linked to better emotion regulatory capabilities (Calkins & Keane, 2004), but little is known about the relations between resting RSA and challenge/threat appraisals in response to negative emotions. 133 children (ages 4–11; 66 girls) were asked to recall and describe a recent time when they felt very sad, very scared and very angry (separate phases), and for each emotion reported whether they viewed it as something they could handle (a challenge appraisal) or something that was too much (a threat appraisal). Results showed that the link between children's appraisals and their resting RSA varied by emotion context. Challenge appraisals were associated with higher resting RSA compared to threat appraisals in response to fear, $t(131) = -2.00, p = .047, r = .17$, but there was no difference for sadness or anger. The ambiguity of fear-eliciting situations can lead to either approach or avoidance behaviors; this contrasts with sadness, which elicits a quieting response pattern, and anger, which elicits activation and approach. Our results suggest that higher resting RSA may help children to perceive ambiguous fearful situations as a challenge, supporting adaptive fear regulation.

Poster 4-35**PARENTAL DYSREGULATION RELATES TO CHILDREN'S PARASYMPATHETIC REGULATION DIFFERENTLY AMONG LOW AND HIGH INCOME FAMILIES**

Laura E Quinones-Camacho, & Elizabeth L Davis
University of California, Riverside

Descriptors: respiratory sinus arrhythmia, childhood, parenting

Low socioeconomic status has been consistently associated with problems in children's self-regulation. Previous research suggests that this is due in part to other risks associated with low income (such as parental psychopathology or poor self-regulation), but parents' physiological regulation may also play a role and has not been studied. We examined whether parents' depressive symptoms and emotion dysregulation interacted with their physiological regulation to predict children's RSA reactivity to a fearful situation among lower and higher income families. 135 children (age 4–11; 70 girls) participated in a lab study on emotion development. Based on a median split, high (>\$40,000) and low (<\$39,999) income groups were created. Parents reported on their emotion dysregulation and depressive symptoms using well-known questionnaires (DERS; CES-D). RSA was acquired during a resting baseline (mother and child) and a fear-eliciting task (child; reactivity = task – baseline). Children's resting RSA was covaried in analyses. For higher income families, parent emotion dysregulation predicted child fear reactivity ($b = -.04$, $t = 2.86$, $p = .01$). In lower income families, parent depressive symptoms predicted child reactivity ($b = .05$, $t = 2.73$, $p = .01$), but this was qualified by an interaction between parental depressive symptoms and resting RSA ($b = -.05$, $t = 2.44$, $p = .02$). Results suggest that children from lower-income families may be buffered against the effects of parental depressive symptoms on fear regulation if the parent is physiologically well-regulated (has higher resting RSA).

Poster 4-36**CHILDREN'S RSA RECOVERY AS AN INDEX OF EFFECTIVE EMOTION REGULATION STRATEGY USE: EFFECTS OF AGE & DISCRETE EMOTION CONTEXT**

Parisa Parsafar, & Elizabeth L Davis
University of California, Riverside

Descriptors: emotion regulation, respiratory sinus arrhythmia, childhood

Respiratory sinus arrhythmia (RSA) has been utilized as a psychophysiological marker of children's emotion regulation (ER). What remains unknown is whether patterns of RSA recovery (change from an evocative task to a later baseline) can index effective ER use. Recent studies have demonstrated RSA augmentation to film stimuli (Kreibig, 2010), but less is known about how RSA continues to change after watching an emotionally evocative film. We examined whether instructed ER strategies related to children's RSA recovery after a sad or scary film, and whether this recovery was qualified by age or discrete emotion context. 159 4-11-year-olds participated ($Mage = 7.12$, 84 girls). After random assignment to one of 3 ER instruction conditions (reappraisal, distraction, control) and a sad or scary film context, RSA was derived from ECG collected while they watched the film/regulated and during a later baseline. RSA recovery was calculated as film task minus post-film baseline. The sad and scary film groups were analyzed separately. No effects of age or ER condition on RSA recovery were found for those who saw the sad film. For the scary film, age and ER strategy interacted to predict recovery, $F(2,63) = 4.541$, $p = .014$, $\eta^2 = .126$. No differences emerged for younger children (4–7yrs). But, older children (8–11 years) instructed to use distraction showed less RSA recovery (a flatter slope) after the film relative to the other groups. Thus, distraction from fear-eliciting stimuli may promote a less-adaptive pattern of parasympathetic regulation in middle childhood.

Poster 4-37**THE EEG PATTERN IN CHILDREN WITH ADHD**

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& Victor MV Maloletnev²

¹Iliia State University ²Centre of Exp Biomedicine

Descriptors: ADHD, electroencephalography, children

Purpose: Characterization of the distinctive topographic EEG profiles of children with ADHD should have predictive value. The study aimed to examine EEG characteristics in children with ADHD using qEEG analysis Methods: The EEG

of 28 ADHD children aged 6 to 9 years (14 boys and 14 girls) and 20 healthy children of the same age and gender was studied. EEG signals were digitally recorded using a set of 19 scalp electrodes according to the International 10–20 system. Absolute (AP) and relative power (RP) estimates for the delta, theta, alpha and beta bands were selected for analysis. Summary: The data analysis revealed elimination of AP in the low frequency bands in all cortical areas. RP increased in the low frequency range only in the fronto-central area ($p < 0.05$). Beta band power was higher in the occipital regions for the control group, and this difference manifested both in AP and RP indices. In girls, AP indices of beta frequency were higher in the control group ($p < 0.05$). RP analysis also displayed higher beta activity in fronto-central and right temporal recordings in the control group. The fact that both boys and girls with ADHD had a decline in AP and RP activity in the beta range deserves special attention. Conclusions: The results showed an increase of AP in slow-wave activity (theta) and a decrease of RP in the fast (beta) domain in ADHD children. The comparison of maturation of different EEG rhythms in normal children and children with ADHD can help identify the most vulnerable links in pathogenic mechanisms of the syndrome.

Poster 4-38**MARITAL CONFLICT AND CHILD ADJUSTMENT: ASSOCIATIONS WITH NEUROPHYSIOLOGICAL CORRELATES OF PROCESSING IRRELEVANT PROBES DURING SIMULATED MARITAL INTERACTIONS**

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Lincoln

Descriptors: event-related potentials, interparental conflict, child psychopathology

Interparental conflict predicts children's adjustment problems (Cummings & Davies, 2010), but very little is known about neural mechanisms that may underlie these associations. The current study builds on previous research by examining the neurophysiological and behavioral correlates of children's processing of simulated interparental interactions. Specifically, 24 children aged 9 to 11 years (13 males, 11 females) viewed 15 video segments portraying actors pretending to be a couple depicting simulated conflict. Task-irrelevant auditory probes were presented at varying intervals, and event-related potential (ERP) components generated to the probes were measured. Children and their mothers completed questionnaires assessing interparental conflict. As hypothesized, greater interparental conflict exposure predicted smaller P2 ERPs to the probes ($\beta = -0.46$, $t = -2.14$, $p < .05$), consistent with the idea that interparental conflict exposure was associated with attending more to the conflict stimuli and diverting fewer attentional resources to the probes. Additionally, smaller N2 ERPs predicted more child externalizing behavior ($\beta = 0.58$, $t = 2.51$, $p < .05$). No evidence of ERP components mediating interparental conflict-child adjustment associations was observed, but associations between the N2 and child internalizing symptoms were moderated by exposure to interparental conflict. Results will be interpreted in terms of implications for children's processing of interparental conflict.

Poster 4-39**NEUROPHYSIOLOGICAL MARKERS OF CONFLICT-MONITORING AS INDICATORS OF TEMPERAMENTAL EFFORTFUL CONTROL AND FEAR PRONENESS IN YOUNG CHILDREN**Sharon L. Lo, C. Emily Durbin, & Jason S Moser
Michigan State University*Descriptors: child temperament, effortful control, error-related negativity, N2*

Early differences in emotional reactivity and regulation, known as temperament, are thought to predict important life outcomes. Empirical support for contemporary models of temperament has largely relied on parent-report. Few have used affective/cognitive neuroscience methods to further expand the measurement and, ultimately, the understanding of the neurophysiological mechanisms that underlie temperament (e.g., Caspi et al., 2002; Rothbart, 2004). Our study examined how behavioral indicators of effortful control (EC) and fear-proneness (FP), two fundamental temperament dimensions, relate to neurophysiological markers of conflict-monitoring thought to represent core components of EC. Children between ages 3–7 years ($N = 277$) completed tasks from the Laboratory Temperament Assessment Battery (Goldsmith et al., 1995), and a subset ($N = 60$) completed a child-friendly version of the Go/Nogo task (Grammer et al., 2014) to measure the error-related negativity (ERN) and N2. Behavioral indicators of EC and FP were derived from a validated global coding system (Durbin et al., 2005). Results suggested that a reduced ERN was associated with higher coded FP, consistent with findings reported in other young samples. The ERN and coded EC were not associated. However, a larger N2 was associated with higher coded EC, but was not associated with coded FP. These results suggest that multimethod approaches to the study of EC and FP will reveal nuances of the constructs themselves and of neural measures typically construed as reflecting purely EC functions.

Poster 4-40**USING ELECTROENCEPHALOGRAPHY TO ASSESS RISK-TAKING BEHAVIOR IN VARYING LEVELS OF CONGRUENCY**John FL Pinner, & James F Cavanagh
University of New Mexico*Descriptors: electroencephalography, theta, risk*

EEG is an often-used tool of assessment to measure the electrical activity of populations of neurons. Here, we used EEG in conjunction with a computer-based amalgamation of two common behavioral assessments: The Eriksen Flanker Task and the Balloon Analogue Risk Task to assess how varying levels of congruency modulate risky behavior (pumps). We recruited 36 participants from the UNM Psychology research pool (Female = 26; Mean Age = 21.28). In this task, participants selected the direction of the 'arrow in the center' from a line of five characters '<<<<< or >>>>>' (congruent) and '<<<<< or >>>>>' (incongruent). We presented these stimuli in trials of 10, 30, 50, 70, and 90% congruency. By picking the correct direction of the stimuli, participants inflated a virtual balloon for each selection until the balloon popped or they cashed out on the points earned in each trial. In this study, we aim to show how likely humans are to exhibit risky behavior in varying levels of congruency, and to assess brain activity characteristics during this decision-making process. We found no significant relationship between pumps and increasing levels of congruency ($RHO = -0.09$, $p = 0.58$). However, we did find a difference ($p \leq 0.01$) in theta power between congruent and incongruent cues, and that this difference correlated with pumps ($RHO = 0.34$, $p = 0.04$). Together, these findings suggest while increasing congruency is not associated with increased risky behavior across all participants, individual differences in theta band power reflects differing tendencies toward risky behavior.

Poster 4-41**ATTENTION-RELATED MODULATION OF THE SENSORY CORTICES**Sephira G Ryman¹, Andrew B Dodd², Josef Ling², Faith M Hanlon², James F Cavanagh², Ronald A Yeo², & Andrew R Mayer²
¹University of New Mexico, ²The Mind Research Network*Descriptors: attention, cognitive control, fMRI*

Cognitive control mechanisms facilitate performance through perceptual selection, response biasing, and maintenance of contextual information directly at uni-sensory cortex. Sixty-four healthy right-handed adults underwent fMRI while performing a multimodal numerical Stroop task requiring participants to ignore a cross-modal distracter that was either congruent or incongruent under two conditions of cognitive load (stimulation rate). A $2 \times 2 \times 2$ [Modality (attend-visual; AV, attend-auditory; AA) \times Congruency (incongruent, congruent) \times Frequency (low, high)] repeated measures ANOVA was performed on the behavioral reaction (RT) time and voxel-wise on the fMRI task data. Faster RTs were observed for congruent relative to incongruent trials, high relative to low frequency trials and AV relative to AA trials. Incongruent trials resulted in increased activation of dorsal and lateral prefrontal cortex (PFC), parietal areas and heteromodal cortex. In spite of identical perceptual load, functional activation was greater in AA conditions in left auditory cortex and in AV conditions in bilateral dorsal/ventral visual streams and primary visual cortex. Within the cognitive control network, greater activation during AV trials was found in lateral PFC and inferior parietal cortex whereas dorsal anterior cingulate and superior frontal gyrus were more active during AA trials. Overall, the cognitive control network was differentially activated based on the modality for focused attention, with relatively greater modulation of the relevant sensory cortices for AV trials relative to AA trials.

Poster 4-42**DOES BODY MASS INDEX AND NOCTURNAL HEART RATE VARIABILITY PREDICT PRO-INFLAMMATORY BIOMARKERS?**Kimberly A Bell¹, Ihori Kobayashi², & Thomas A Mellman²
¹University of the District of Columbia, ²Howard University College of Medicine*Descriptors: heart rate variability, sleep, immune system activity*

Compromised sleep is associated with increased risks for obesity, diabetes, cardiovascular disease, and early mortality, conditions that disproportionately affect African Americans. Heightened nocturnal autonomic nervous system (ANS) arousal (i.e., dominance of sympathetic nervous system, SNS, over parasympathetic nervous system) may contribute to this association. Recently, SNS activity has been linked to immune activation; however, there has been little research on nocturnal ANS activity and cytokine activity. This study examined relationships between pro-inflammatory biomarkers, specifically interleukin-6 (IL6) and C-reactive protein (CRP) and nocturnal ANS activity in healthy African Americans (age 18–35). Ninety-four participants completed two overnight polysomnography sleep recordings with an electrocardiogram channel and blood drawing in the morning after the second sleep recording. Ratios of the low frequency to the high frequency components (LF/HF) of heart rate variability (HRV), which is considered an index of SNS activity were computed for 5-minute epochs during pre-sleep, the last and first rapid-eye-movement (REM) and non-REM (NREM) sleep periods. Hierarchical regression analyses were run to predict IL6 and CRP from LF/HF controlling for body mass index. Results indicate pre-sleep LF/HF, first REM and NREM LF/HF significantly predicted IL6, ($\Delta R^2 = .063$, $p = .019$, $\Delta R^2 = .040$, $p = .044$, $\Delta R^2 = .067$, $p = .010$) respectively. Findings of this study show that nocturnal SNS activity is related to morning levels of pro-inflammatory cytokines.

This research was supported by National Heart, Lung, and Blood Institute grant R01HL087995 to Dr. Mellman and National Center for Advancing Translational Sciences grant UL1RR031975 for the Georgetown-Howard Universities Center for Clinical and Translational Science.

Poster 4-43**GENDER DIFFERENCES IN ASYMMETRY OF EEG POWER WITHIN VERBAL AND SPATIAL TASKS SOLVING**

Kseniya I Grishina, & Yuri G Pavlov
Ural Federal University

Descriptors: sex differences, verbal cognition, spatial cognition

Several previous studies revealed sex differences in brain activity generated by verbal and spatial cognitive tasks. Women demonstrated less pronounced differences in brain asymmetry than men. But, there are several differences between biological sex and gender. The aim of this study was to investigate gender differences in EEG power during the solving of verbal, imaginative and spatial tasks. 35 (17 males, mean age = 20.67, SD = 1.15) students participated in this study. EEG was recorded at 19 standard sites according to the 10–20 system. Gender type was measured by the Bem Sex Role Inventory. 17 participants were classified as more feminine type and 14 participants as more masculine type. We did not reveal any significant differences in the scores of gender for any of the tasks. In addition, differences in EEG rhythm power asymmetry also were not found. At the same time expected suppression of alpha activity in the left hemisphere in all groups was demonstrated for the verbal task. Solving of the imaginative and spatial tasks evoked decreased alpha power in the parietal-occipital area and increased alpha power in left frontal-temporal area. Results show that verbal and spatial task solving does not affect notable changes in brain asymmetry for participants with different gender types.

Study was supported by Russian Foundation for Basic Research (grant no. 13-06-96028) and through the “Young scientists UrFU” competition.

Poster 4-44**BRAIN ACTIVITY RELATED TO ENCODING AND RETRIEVAL OF THE IMAGES OF HUMAN FACES IN WORKING MEMORY**

Maria M Pyasik, Alexander V Vartanov, Stanislav A Kozlovskiy, Andrey A Kiselnikov, Janna M Glozman, & Julia A Marakshina
Lomonosov Moscow State University

Descriptors: working memory, event-related potentials

This study investigates brain activity related to encoding and retrieving images of human faces in working memory. 58 subjects (20.9 ± 5.1 years old) participated in two parts of the test. First part: in each trial subjects memorized a shortly presented face and, upon consequent presentation of a pair of faces, indicated if the memorized face was on the left/right/absent. Second part: subjects memorized a pair of faces and responded to a single face (same choices). ERPs (21 channels, monopolar) were registered for a single face presentation in both parts. We calculated averaged ERPs for encoding and recognition. ERPs were presented as equivalent dipole sources (2-dipole model, coefficient > 0.95). Amount of dipoles in each brain structure (Talairach Atlas) was calculated for 0–500 ms post stimulus. We compared brain activity related to faces encoding and recognition. Right orbitofrontal cortex (OFC) was activated stronger in 0–150 ms interval in encoding and from 300 to 500 ms in recognition. Encoding showed stronger activation of prefrontal cortex (PFC) in both hemispheres (0–500 ms) and right parahippocampal gyrus (150–500 ms). Recognition was related to higher activation of left hippocampus (0–500 ms) and middle temporal gyrus (MTG) (100–500 ms). Findings correspond with previously reported activation of MTG in recognition of familiar faces. Higher activation of PFC in faces encoding can be related to higher demands on working memory central executive compared to faces recognition. Later OFC activation in recognition can be explained by longer decision-making in this task.

The study was partially funded by Russian Foundation for Humanities project # 13-06-00570.

Poster 4-45**THE ROLE OF BRAIN FUNCTION LATERALIZATION IN A COGNITIVE CONTROL TASK WITH CONFLICT-INDUCED CONDITIONS**

Julia A Marakshina, Alexander V Vartanov, Andrey A Kiselnikov, Stanislav A Kozlovskiy, Maria M Pyasik, & Janna M Glozman
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Descriptors: cognitive control, lateralization

The present study investigates brain activity related to cognitive control (specifically, cognitive inhibition). 30 people (18–35 years old) participated in ‘stop-sig-

nal-task’. Stimuli consisted of vowel and consonant letters in green or red. Subjects had to distinguish between green vowels and consonants, red letters had to be ignored. ERPs (21 channels, monopolar) were registered for a ‘green’ and a ‘red’ stimulus. ERPs were presented as equivalent dipole sources (2-dipole model, reliability coefficient > 0.95). The amount of dipoles in each brain structure (Talairach Atlas) was calculated for 0–500 ms post stimulus. There were significant differences (t-test, $p < 0.05$) in following brain structures: left BA 20 (50–100 ms), right BA 9 (150 ms), left middle frontal gyrus (150 ms), left inferior temporal gyrus (150 ms), left BA 19 (200 ms), left BA 30 (250 ms), left subcallosal gyrus (300 ms), right medial frontal gyrus (300 ms), right inferior parietal lobule (350 ms), right BA 30 (350 ms). These areas of the brain are involved in the executive functions such as working memory, cognitive flexibility, planning, and inhibition. It is shown that the areas of the left hemisphere are activated mainly in the early time periods, while the areas of the right hemisphere showed more responses later. We noted the simultaneous activation of the left subcallosal gyrus and the right medial frontal gyrus. Decision-making during the inhibition of involuntary reactions is supported by the occurrence of positive motivation which is based on the activation of the left subcallosal gyrus.

The study was partially funded by Russian Foundation for Humanities project # 13-06-00570.

Poster 4-46**FEEDBACK RELATED NEGATIVITY: REWARD PREDICTION ERROR OR SALIENCE PREDICTION ERROR?**

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University of Victoria

Descriptors: reinforcement learning, reward positivity, reward prediction error

The reward positivity (RewP) is a component of the human event-related brain potential (ERP) elicited by feedback stimuli in trial-and-error learning and guessing tasks. A prominent theory holds that the RewP reflects a reward prediction error signal that is sensitive to outcome valence, being larger for unexpected positive events relative to unexpected negative events. Although the theory has found substantial empirical support, most of these studies have utilized either monetary or performance feedback to test the hypothesis. However, in apparent contradiction to the theory, a recent study found that unexpected physical punishments also elicit the RewP. The authors of this report argued that the RewP reflects a salience prediction error rather than a reward prediction error. To investigate this finding further, in the present study participants navigated a virtual T-maze and received feedback on each trial under two conditions. In a reward condition the feedback indicated that they would either receive a monetary reward or not and in a punishment condition the feedback indicated that they would receive a small shock or not for their performance on that trial. We found that the feedback stimuli elicited a typical RewP in the reward condition and an apparently delayed RewP in the punishment condition. Importantly, this signal was more positive to the stimuli that predicted the omission of a possible punishment relative to stimuli that predicted a forthcoming punishment, which is inconsistent with the salience hypothesis.

Poster 4-47**SHORT MINDFULNESS INSTRUCTION INCREASES PREPULSE FACILITATION**

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Descriptors: startle, prepulse inhibition/facilitation, mindfulness
Mindfulness is intentional focus of one's attention on emotions, thoughts or sensations occurring in the present moment. Recently there has been increased interest in the effects of mindfulness practice on psychological processes such as concentration, focus and perception. In the present study a prepulse inhibition (PPI) paradigm was employed to investigate the effect of mindfulness on attention. PPI is used to assess sensorimotor gating and occurs when a relatively weak prepulse (e.g. a tone) is presented 30–500 ms before a startle-inducing stimulus, and reduces the magnitude of the startle response. Prepulse facilitation (PPF) is the increase in startle magnitude when the prepulse is presented 500 ms or more before the startle-eliciting stimulus. In the present study the effect of a 20-minute mindfulness instruction on PPI and PPF was investigated. Participants listened to either mindfulness instruction (mindfulness group) or relaxing music (control group). In a PPI/PPF pre- and posttest, where the task was to count the number of prepulses (i.e. tones), startle-eliciting noise was presented at lead intervals of 60, 120 and 2000 ms following prepulse onset. Preliminary results indicate that mindfulness instruction increased participants' startle at the 2000 ms lead interval in the posttest compared to the pretest. Amount of PPI did not differ between tests. Increased prepulse facilitation in the mindfulness group implies that even a short mindfulness instruction may improve sustained attention.

Poster 4-48**GOAL RELEVANCE INFLUENCES PERFORMANCE MONITORING AT THE LEVEL OF THE FRN COMPONENT**

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¹Jagiellonian University, ²Ghent University, ³KU Leuven

Descriptors: performance monitoring, goal relevance, feedback-related negativity

The feedback-related negativity (FRN) provides a reliable ERP marker of performance monitoring (PM). It is usually larger for negative compared to positive feedback, or unexpected relative to expected ones during PM. In this study, we assessed if this effect could be modulated by goal relevance, defined as feedback's informativeness and/or impact on a person's goals. 64-channel EEG was recorded while 30 participants performed a speeded Go/NoGo task across different blocks where the feedback on task performance was deemed either real or fictional. Manipulation checks confirmed that these two contexts were perceived as different regarding feedback's informativeness. At the ERP level, the FRN component was larger for negative compared to positive feedback, when the context was perceived as real only. Moreover, the P300 component was larger for feedback shown in the real than the fictional context, regardless of its valence. These results were replicated in a second study where positive and negative feedback had a similar probability. These ERP findings suggest that goal relevance influences feedback processing during PM, with two non-overlapping neurophysiological effects: first, it gates reward prediction error brain mechanisms (FRN effect), before enhancing subsequent motivational processes associated with PM (P300 effect).

Poster 4-49**FEEDBACK-RELATED NEGATIVITY PREDICTS GENERALIZATION OF A NEWLY LEARNED MOTOR SKILL**

Kirk F Grand¹, Alessandro T Bruzi², Ford B Dyke¹, Maurice M Godwin¹, Amber M Leiker¹, Andrew G Thompson¹, Taylor L Buchanan¹, Marcos Z Daou¹, Keith R Lohse¹, & Matthew W Miller¹
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Descriptors: motor learning, event-related potentials, feedback-related negativity

The feedback-related negativity (FRN) component of the event-related potential (ERP) has been associated with performance improvement in several motor learning paradigms, but never in a 24 h-delay-retention/transfer test paradigm, which is the gold standard of motor learning. To address this shortcoming, we recorded electroencephalography from 28 right-handed participants using their left arm to practice 60 beanbag tosses towards a target with a bull's eye 300 cm away. Par-

ticipants' view of the target was occluded, and they received feedback after approximately two-thirds of their tosses (as part of a larger study, half of the participants received feedback per their request, and half received feedback per experimenter discretion; results were not significantly affected by whether participants controlled when they received feedback). Feedback was presented on a computer monitor as a rectangle, the color of which corresponded with how close participants' tosses came to the target's bull's eye. FRN mean amplitude was derived from ERPs time-locked to feedback onset. To index skill acquisition, participants resumed the study 24 h later and completed 12 retention tosses (from 300 cm) and 12 transfer tosses (from 200 cm), all with no feedback. Linear regressions revealed FRN amplitude predicted performance on the transfer test ($\beta = 0.958$, $R^2 = .194$, $p = .024$), but not the retention test ($\beta = 0.457$, $R^2 = .02$, $p = .490$). Results suggest that enhanced feedback processing during the acquisition of a motor skill is associated with one's ability to generalize the newly learned skill.

A. T. B. was awarded funding from the Brazilian government to come to Auburn University to work on the study. This funding was through the Coordination for the Improvement of Higher Education Personnel program.

Poster 4-50**EFFECTS OF POSITIVE EMOTION ON PHYSIOLOGICAL RESPONSES AND THOUGHT-ACTION REPERTORIES REGARDING HELPFUL BEHAVIOR**

Shunya Omori, Keiko Otake, & Jun'ichi Katayama
Kwansei Gakuin University

Descriptors: heart rate, positive emotion, broaden-and-build theory

This study investigates the effects of positive emotion on self-focused and other-focused repertoire tasks regarding helpful behavior and the change in heart rate during the task. The experiment involved two emotion-induction conditions (happy and neutral) and two repertoire task conditions (self-focused and other-focused) in a within-subject design. Thirty-four participants were asked to watch movie segments that were "happy" or "neutral," to evaluate the movie (valence), and to undertake repertoire tasks. Evaluations of positive emotions were higher after the happy-movie than neutral. Heart rate was lower during watching the happy movie than neutral. These results confirm our manipulation of positive emotion induction. The number of sentences produced by the repertoire task was larger in the other-focused repertoire task after the happy movie, as the broaden-and-build theory predicts. Heart rate was decreased during the task only in this condition. Lower heart rate during watching happy movies indicates increased attention for the movie. Decreased heart rate during the other-focused repertoire task after happy movies, shows that the increased sentences produced in this condition was caused by the increased concentration to the task induced by positive emotion.

Poster 4-51**EFFECTS OF ATTRACTIVENESS OF OPPOSITE SEX PICTURES ON PHYSIOLOGICAL RESPONSES**Kohei Fuseda¹, Yuichiro Nagan², & Takefumi Kobayashi²
¹Kwansei Gakuin University, ²Bunkyo Gakuin University*Descriptors: autonomic activity, attractiveness, picture*

The attractiveness of opposite sex pictures is generally measured through questionnaires. This study investigated the physiological responses associated with subjective ratings obtained through such questionnaires. A total of 18 male students viewed 10 pictures of the opposite sex. Each picture was presented for 15 seconds, and presentations were separated by 30-second rest periods. Heart rate, skin conductance change, finger blood flow, and number of eye fixations were measured while participants rated the subjective attractiveness of the pictures using a 100mm visual analog scale. Heart rate for the first and second highest rated pictures was significantly lower than that for the first and second lowest rated pictures during the picture presentation period. While the number of eye fixations for high-rated pictures was significantly higher than that for low-rated pictures during the presentation period, time series analysis showed that the difference in heart rate appeared approximately 5 seconds prior to the difference in the number of eye fixations. We found no significant difference in finger blood flow and skin conductance change. These results indicate that the heart rate response to opposite sex pictures is (1) related to subjective ratings on the questionnaire; and (2) reflects not only attention to but also the subjective attractiveness of those pictures. Thus, measuring physiological responses may be advantageous for studying psychological processes in human attractiveness judgments.

Poster 4-52**TRANSCRANIAL DIRECT CURRENT STIMULATION OF THE MEDIAL PREFRONTAL CORTEX MODULATES APPETITIVE-AVERSIVE PICTURE PROCESSING BIAS: MAGNETOENCEPHALOGRAPHIC EVIDENCE**Constantin Winker¹, Maimu Rehbein¹, Dean Sabatinelli², & Markus Junghöfer¹
¹University of Münster, ²University of Georgia*Descriptors: emotion*

Functional imaging studies have linked activation of human reward structures, including nucleus accumbens and medial prefrontal cortex (mPFC), to the perception of pleasant emotional stimuli. Here we tested the hypothesis that a stimulation of the mPFC via transcranial current stimulation (tDCS) alters the proportions of appetitive versus aversive stimulus reactivity. TDCS electrode placement optimally targeting mPFC areas was calculated via computer simulations based on anisotropic finite element head modeling. Thirty-three participants viewed a random series of pleasant and aversive pictures before (baseline) after cathodal (inhibitory) and after anodal (excitatory) tDCS-mPFC stimulation while event-related magnetic fields were measured by whole head magnetoencephalography (MEG). TDCS sessions were separated by 2 hours and stimulation order was balanced across subjects. Inverse modeling of event-related neural activity revealed an enhanced pleasant-to-unpleasant picture processing ratio after anodal and a reduced ratio after cathodal stimulation especially at right occipito-temporal visual regions within the time intervals of the Early Posterior Negativity (EPN; 120–300 ms) and the Late Positive Potential (LPP, 300 – 600 ms). Ongoing research now tests whether a series of anodal mPFC stimulations reduces the ‘negativity bias’ and ‘positive attenuation’ effects in major depressive disorder (MDD) potentially providing an add-on therapy to common MDD treatments.

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Poster 4-53**PARASYMPATHETIC FLEXIBILITY ENHANCES SUCCESS OF SPONTANEOUS EMOTION REGULATION OF SADNESS**Jonathan P Stange¹, Jessica L Hamilton¹, David M Fresco², & Lauren B Alloy¹
¹Temple University, ²Kent State University*Descriptors: respiratory sinus arrhythmia, emotion regulation, affect*

The ability of the parasympathetic nervous system to flexibly adapt to changes in environmental context is thought to serve as a physiological indicator of emotion regulation capacity, and deficits in parasympathetic flexibility (attenuated vagal withdrawal to environmental challenges) appear to characterize affective disorders such as depression. However, few studies have evaluated the extent to which parasympathetic flexibility may enhance adaptive regulation of dysphoric emotion. In the present study of 178 undergraduate students, we evaluated whether parasympathetic reactivity to, or recovery from, a dysphoric emotion induction would enhance the ability for spontaneous emotion regulation strategies to improve affect during a two-minute uninstructed recovery period following the induction. Parasympathetic reactivity and recovery were indexed by fluctuations in respiratory sinus arrhythmia (RSA). Cognitive reappraisal and distraction were effective in attenuating negative affect and improving positive affect, and these effects were amplified by RSA reactivity and recovery. Individuals who exhibited either greater vagal withdrawal during the induction, or greater vagal augmentation during recovery, demonstrated greater improvements in affect during recovery. These results suggest that contextually-appropriate parasympathetic reactivity and recovery may facilitate the success of adaptive emotion regulation strategies. Impairments in parasympathetic flexibility could confer risk for affective disorders due to attenuated capacity for effective self-regulation.

This research was supported by grants to Jonathan P. Stange from the National Institute of Mental Health (F31MH099761), the Association for Psychological Science, and the American Psychological Foundation. Jessica L. Hamilton was supported by NIMH grant F31MH106184.

Poster 4-54**PROLONGED PARASYMPATHETIC REACTIVITY TO MOOD INDUCTION CONTRIBUTES TO GREATER PROSPECTIVE LEVELS OF STRESSFUL LIFE EVENTS**Jessica L Hamilton¹, Jonathan P Stange¹, David M Fresco², & Lauren B Alloy¹
¹Temple University, ²Kent State University*Descriptors: stress, respiratory sinus arrhythmia*

Parasympathetic withdrawal to environmental challenges is thought to be adaptive for individuals to cope with emotional or life stressors (Graziano et al., 2007), and is indicated by greater reductions in respiratory sinus arrhythmia (RSA) to challenging states and increases in RSA after environmental challenges. Thus, individuals with attenuated RSA reactivity and recovery may be at risk for a range of maladaptive outcomes, including externalizing and internalizing disorders, but few studies have evaluated potential mechanisms of this risk. Thus, the present study sought to investigate whether individuals with maladaptive physiological responses to stress experience a greater number of stressful events in their lives, which may heighten the risk of subsequent disorder. In the present study of 178 late adolescents, we evaluated whether parasympathetic reactivity and recovery (as indexed by RSA) from a negative mood induction would prospectively predict a greater number of stressful life events over four follow-up assessments. Hierarchical linear modeling indicated that RSA reactivity did not predict average level of stressors. However, individuals who demonstrated less RSA recovery experienced greater prospective levels of stressors, beyond the effects of depressive symptoms. These findings highlight the importance of examining RSA recovery in maladaptive functioning. Specifically, prolonged parasympathetic recovery from sad mood could heighten the risk for generating stressful life events, which are potent predictors of a range of physical and mental health outcomes.

Poster 4-55**EEG WAVE STRUCTURE DEVELOPMENT IN CHILDREN AND ADOLESCENTS LIVING IN THE NORTH OF EUROPEAN RUSSIA**

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I.M. Sechenov Institute of Evolutionary Physiology and Biochemistry Russian Academy of Sciences

Descriptors: brain development, EEG waves structure, longitudinal study

We aimed to explore the development of EEG structure in children living in the north of European Russia. We conducted a longitudinal study of 9 girls and 6 boys who were observed annually from age 8 to 17 years old. EEG was registered monopolarly from 21 sites, collected at rest with eyes closed. The electroencephalogram was transformed to a sequence of waves, each of which concerns to one of six EEG frequency bands. Conditional probabilities of mutual transitions of waves between the six EEG frequency bands were estimated. For the numerical description of inter-wave transition probabilities the theory of flows were used. The indicator of "flow" in each of the analyzed EEG bands was used to explore age dynamics of EEG structure with linear regression analysis. Averaged value of "flow" was calculated for frontal, central, parietal, temporal and occipital zones. The general feature for boys and girls was the reduction of inter-waves transitions probability to low frequency EEG bands - delta and theta, and increase of wave components transition probability from all frequency bands to alpha2 band with the age. Girls also showed an increase of inter-wave transitions probability to beta1 band. It was shown that the alpha1 band ceases to play a role in the organization of EEG structure in girls while in boys throughout the entire period of observations alpha1 band played the important role in the organization of EEG pattern. The main stages of EEG wave structure reorganization in girls occur earlier than in boys.

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Poster 4-56**EEG ASYMMETRY AND ERN: TEMPERAMENTAL OUTCOMES IN PRESCHOOLERS**

John P Begnoche¹, Rebecca J Brooker¹, Matthew K Vess¹, & Kristin A Buss²

¹Montana State University, ²The Pennsylvania State University

Descriptors: preschoolers, temperament, joint-subsystems

Work by Nash, Inzlicht, & McGregor (2012) found that approach-related neural activity predicted reduced error sensitivity outcomes in adults. However, this association has not been tested in children. We examined this relation and its association with childhood outcomes in a group of preschoolers. Approach-related neural activity was quantified using electroencephalography (EEG) as asymmetric activation in the left hemisphere during a resting baseline. Sensitivity to error was quantified as amplitudes of error-related negativity (ERN), an event-related potential associated with error sensitivity (Falkenstein et al., 1991), during a developmentally-appropriate flanker task (Rueda et al., 2005). Child outcomes included ADHD symptoms and parent-reported social inhibition, an early risk factor for anxiety problems, six months later (Health and Behavior Questionnaire; Essex et al., 2002). Results suggested that greater left asymmetry was correlated with reduced ERN amplitude ($r = .125, p < 0.05$), providing empirical evidence of a link between approach-related neural activity and sensitivity to error in preschoolers. ERN amplitude and EEG asymmetry did not predict ADHD symptoms ($\beta = 0.61, p < 0.10$), but did interact to predict social inhibition ($\beta = -0.92, p = 0.01$), such that when ERN was greater, less left asymmetry was associated with higher levels of social inhibition. This work has implications for understanding the development of the overlap in neural systems of approach motivation and error sensitivity and their effects on socio-emotional outcomes in preschoolers.

Poster 4-57**EEG ALPHA ACTIVITY IN NOVICE AND ADVANCED PRACTITIONERS BEFORE AND AFTER A SIX-WEEK QIGONG INTERVENTION**

Diana Henz, Martin Harbauer, & Wolfgang I Schöllhorn
University of Mainz

Descriptors: Qigong, electroencephalography

In recent years, several electroencephalogram (EEG) studies have reported changes in spectral band frequencies during Qigong meditation indicating a relaxed state of mind. Much less is reported systematically on alterations of brain activation patterns induced by Qigong techniques involving bodily movement during the time course of Qigong interventions. In the present study we tested whether (1) physical Qigong training alters EEG alpha activation after a six-week intervention, (2) differences in brain activation patterns occur in novice compared to advanced practitioners, and (3) high frequency training leads to increased alpha activation in novice practitioners. Two beginner groups (two and five training sessions per week) and one advanced group (two training sessions per week) underwent a six-week Qigong intervention practicing the technique "Wu Qin Xi". Spontaneous resting EEG was recorded before and immediately after each 15-minute exercise in the first and sixth week. Increased alpha power was obtained in frontal and central regions in advanced practitioners after Qigong exercise in pre- and post-test. A high frequency training schedule did not increase alpha activity in beginners. Results indicate that alterations of brain activation patterns induced by acute Qigong exercise are promoted by a long-term training process.

Poster 4-58**TEMPORAL DYNAMICS IN EEG THETA AND ALPHA ACTIVITY IN STATIC AND DYNAMIC HEALTH QIGONG**

Diana Henz, & Wolfgang I Schöllhorn
University of Mainz

Descriptors: Qigong, electroencephalography

Health Qigong is a common technique of Traditional Chinese Medicine applied to strengthen mental and physical health. Several studies report increases in EEG theta and alpha activity after Health Qigong exercise indicating a relaxed state of mind. In the current study, we compared effects of two Health Qigong techniques on EEG theta and alpha activity. Subjects performed the techniques "Wu Qin Xi" (dynamic Qigong) and "Liu Zi Jue" (static Qigong) in a within-subjects design. Eyes-open and eyes-closed resting EEG was recorded before and immediately after each 15-minute exercise block. Results show a decrease in alpha activity after 15 minutes, followed by an increase after 30 minutes in static Qigong. Theta activity was decreased after 15 minutes, followed by an increase after 30 minutes in dynamic Qigong. Our results demonstrate different temporal dynamics in theta and alpha activity for static and dynamic Qigong. We hypothesize that the found brain activation patterns result from different attentional focusing styles performed during static and dynamic Qigong exercise.

Poster 4-59**FOLLOW THE EYES - INFLUENCE OF EMOTIONAL EXPRESSION ON VISUOSPATIAL ATTENTION**

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Descriptors: emotion, attention, gaze cuing

Perceived gaze direction has been shown to introduce shifts in visuospatial attention. The present study investigated reaction times (RTs) and event-related potentials (ERPs) during those gaze-cued shifts. Participants had to conduct a letter detection task, where letters were presented on the left or right side of a screen. Prior to the target presentation, a cue stimulus was displayed at central fixation. The cue consisted of various faces, gazing straight ahead, to the left, or to the right. Additionally, the facial expression varied and was either neutral, angry, or fearful. Behavioral results show that participants were faster when the cue-gaze was directed towards the target position, and slower when the gaze was directed away from the target. RTs were further influenced by facial expression such that participants responded fastest when confronted with angry expressions. Electrophysiological results show that the N170 component, time-locked to cue onset, was modulated by facial expression. Here, fearful expressions elicited a larger N170 compared to neutral and angry expressions. Moreover, the N170 response to angry faces was marginally larger than the one for neutral faces. The N2pc component, an ERP associated with spatial shifts in attention, showed no significant modifications. To conclude, the behavioral data indicate that gaze direction and facial expression influence visuospatial attention independently. Furthermore, results of electrophysiological analysis show influences of emotional expressions, but no alteration of visuospatial attention processes.

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Poster 4-60**EARLY CARDIOVASCULAR DYSREGULATION IN YOUNG HEALTHY BINGE DRINKERS**

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Descriptors: alcohol, cardiovascular system

Acute alcohol intoxication invokes multiple adaptive and reversible cardiovascular responses. Over time, however, alcohol use may destabilize cardiovascular regulation. This study compared cardiovascular parameters in young healthy non-drinkers (ND), social drinkers (SD), and binge drinkers (BD). ECG and beat-to-beat blood pressure were collected in 72 participants (24 per group) at baseline and during rhythmical stimulation of the cardiovascular system using 0.02, 0.033, and 0.067 Hz paced sighing and 0.1 Hz paced breathing. Systolic and diastolic arterial pressure, high frequency heart rate variability, and heart rate and vascular tone baroreflex gain were significantly lower in the BD versus SD and ND groups; peripheral resistance trended in the same direction. Heart rate and pulse transit time tended to be higher in the BD versus SD and ND groups. Evidence for decreased baroreflex activity and shifting autonomic balance towards sympathetic dominance in the BD group was noteworthy because the average age of the BD group was 20.4 years (+/- 1.8, range 18–24 years; there were no group differences in age) and they had drunk for an average of only 4.0 years (+/- 1.6, range 1–9 years). This suggests that repeated binge drinking may quickly disrupt normal cardiovascular functioning. A significant negative relationship of vascular tone baroreflex gain with drinking duration in the BD group further suggests that even short-term binge drinking, which is normative during the college years, can have substantive adverse effects on the cardiovascular system.

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Poster 4-61**EMOTIONAL MODULATION OF CARDIOVASCULAR FUNCTIONS**

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Rutgers, The State University of New Jersey

Descriptors: emotions, heart rate variability

The ability to impose oscillations in cardiovascular functions can be beneficial because variability participates in restoring autonomic balance and neural inhibition-excitation balance. Paced muscle tension and breathing are known to trigger 0.1 Hz resonance oscillations in the cardiovascular system (CVS). The goal of this study was to assess whether paced emotional stimulation also could impose such oscillation. ECG, beat-to-beat blood pressure (BP), and respiration were recorded in 30 young healthy participants during a baseline task, emotionally negative (Ng) and neutral (Nt) picture presentations paced at 0.05, 0.1, and 0.2 Hz, and a paced 0.1 Hz breathing task. Beat-to-beat RRI, systolic arterial BP (SAP), pulse transit time (PTT), and stroke volume (SV) were assessed. Paced emotional picture cues caused considerable oscillation in all recorded functions. Spectral analysis revealed that power peaks corresponded with the stimulation frequency. Ng cues caused significantly higher oscillation than Nt cues in all functions and at all frequencies suggesting that the CVS was modulated by emotions. RRI oscillation at 0.1 Hz in response to negative pictures was significantly higher than at 0.05 Hz and 0.2 Hz, suggesting that 0.1 Hz resonance participates in emotional stimulation. The highest oscillation in SAP, PTT, and SV was imposed at 0.2 Hz, probably due to the effects of respiration. Oscillations caused by emotional stimulation were ~20 fold less than 0.1 Hz paced breathing oscillations, yet may be important to further investigate them due to potential clinical utility.

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Poster 4-62**ERROR PROCESSING AND EXTERNALIZING TENDENCIES ACROSS GO/NOGO AND FLANKER TASKS**

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Universitat Jaume I

Descriptors: error-related negativity, externalizing, Go/NoGo, flanker

The aim of this study was to examine the relationship between Error-Related Negativity (ERN) amplitude and externalizing tendencies across two tasks related to different error types. EEG data from a 256-channel dense array were recorded from 130 participants (37 males) —assessed by the Externalizing Spectrum Inventory brief form (ESI-bf) — that performed both a Go/NoGo task (1200 trials, 80% Go) and an arrowhead version of the Flanker task (576 trials, 50% congruent). The ERN was defined as the mean amplitude between 0–100 ms after error responses over 2 clusters of 8–9 midline electrodes (FCz and Cz). The zero-order correlation between the number of errors across tasks was moderate ($r = .30$, $p < .001$), and correlations between the ERN across tasks and clusters were high (FCz: $r = .46$; Cz: $r = .54$; $ps < .0001$). Moreover, ESI-bf scores were significantly related to more errors ($r = .18$, $p < .05$), and to diminished ERN amplitudes (FCz: $r = .19$; Cz: $r = .17$, $ps < .05$) in the Go/NoGo task but, interestingly, not in the arrowhead Flanker task (all $ps > .08$). The fact that the same high-externalizing participants showed a reduced error-processing (i.e., higher number of errors and diminished ERN amplitudes) only in the Go/NoGo task, but not in the Flanker task, suggests that externalizing-related deficits in error monitoring are more easily observed in tasks involving response inhibition errors rather than choice errors. Our data highlight the importance of taking into account task-related dissociations in error processing in externalizing studies.

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Poster 4-63**LANGUAGE-SPECIFIC CHARACTERISTICS OF EEG IN BILINGUALS**

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National Taras Shevchenko University of Kyiv

Descriptors: electroencephalography, bilinguals, γ -band

Language-specific characteristics of electric activity of human brain are not properly identified. The purpose of this study was to evaluate psychophysiological changes during the exposure to verbal information in different languages. We recorded EEG activity in 24 healthy students, exposed to a series of poetic passages of Shakespeare in English, Russian and Ukrainian. All participants were early bilinguals in Russian and Ukrainian with English acquired later. We analyzed the coherence of EEG during the rest state and while listening to the poetry. Significant differences were observed in the range of γ -band. Increasing synchronization of γ -band and communication between two hemispheres were present in the association regions of left hemisphere for Russian. The increase of synchronization in the left hemisphere was observed only for English and Ukrainian. Increase of coherence was shown in the left lateral and medial supplementary motor area for Russian in comparison to Ukrainian. Decrease of coherence for Russian in comparison to Ukrainian was present in angular gyrus and superior parietal lobule. This could indicate lesser involvement of memory and attention for Russian in comparison to Ukrainian. The association areas of both hemispheres are involved in perception of native languages, while the perception of the one learned later in life mainly affects the primary auditory and association areas of the left hemisphere. An emotional response may not depend on the language proficiency but rather on its phonetic structure and prosody.

Poster 4-64**TRAIN TO BE THE BEST IN SPACE! THE IMPACT OF HRV BIOFEEDBACK AND NEUROFEEDBACK TRAINING ON PILOT SKILLS ACQUISITION**

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Descriptors: biofeedback, performance, pilot skill

This study investigated the impact of a combined HRV biofeedback and neurofeedback (HRV/NFB) training on the learning curve during simulator courses. Simulators are an important tool in astronauts' training to improve flight performance. However, instruments to directly measure mental processes underlying flight tasks are not yet available. In this study, we measured flight performance in an ecologically valid environment with a multimodal task set by using a Soyuz spaceflight simulator with an attached data logging and performance evaluation tool. 14 German students from the University of Stuttgart participated in the study. They were trained on the simulator during the Soyuz classes. The HRV/NFB training took place at the start of the simulator training. Participants had 8–10 training sessions of HRV/NFB training distributed over 6 weeks. One week before the first and one week after the last HRV/NFB training, participants completed questionnaires (VAS, STAI and PSQI) and computerized psychomotor-cognitive tests (Osparn and Vienna Test system). They were tested on the simulator one week after the final HRV/NFB session and again 6 weeks after. A control group of students received HRV/NFB training but did not attend the same simulator training classes. The results showed no significant difference for the pre-test between both groups statistically significant improvements in the psychomotor-cognitive testing and also on the simulator test flights. In conclusion, the combination of the HRV/NFB training may have an impact on the learning process of pilot skills.

Poster 4-65**NEURONAL OSCILLATORY PATTERNS DURING SUSTAINED VISUAL ATTENTION TASK IN SCHIZOPHRENIA AND HIGH/LOW COGNITIVE CONTROL**

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Descriptors: schizophrenia, attention, cognition

Cognitive control (CC) is an extensively tested top-down process that can be utilized in multiple sensory domains. CC can distinguish psychological pathologies and even be used to detect significant heterogeneity within diagnostic criteria. Persons with schizophrenia (SZ) exhibit deficits in early visual processing and this nuanced dysfunctional processing can be elucidated by imposing control over covertly attended locations. This project sought to determine how neuronal oscillatory activations in early visual processing varied as a function of CC in healthy individuals and those with SZ. Healthy participants were divided into the top and bottom quartiles for performance on a working memory SPAN task and compared to those with SZ during a sustained visual attention and target detection task. Dense array EEG (211 channels) data were recorded during the task. Visual stimuli were presented as a grating of vertical bars, each flickering at a different frequency (6.67, 7.14Hz, etc.) and across three optical densities (.5, 1, 2 deg of visual angle). A fast Fourier Transform at .01Hz resolution was utilized to compare stimulus specific oscillatory activity, as well as non-specific cortical activities across groups. Results indicate that non-specific activity is increased in SZ patients, and to a lesser degree in non-pathological low cognitive control individuals. An interaction was found between optical stimulus density and attended location for non-specific brain activity, suggesting a difference in overall gain as a function of task difficulty.

NIH Grant MH094172.

Poster 4-66**AGENTIC AND AFFILIATIVE EXTRAVERSION DIFFERENTIALLY MODULATE THE EFFECTS OF TWO SOCIAL CONTEXTS ON ELECTROPHYSIOLOGICAL MEASURES OF OUTCOME MONITORING**

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Descriptors: outcome monitoring, extraversion, social context

The ability to internally monitor cues is a crucial precondition for adjusting behavior towards favorable outcomes. In social contexts, individuals also rely on other people's experiences and on the evaluation of external feedback to perform tasks efficiently. However, little is known about the mechanisms that underlie individual differences in these processes during social interaction. In particular, achievement orientation and social motivation were expected to interact with contextual demands and modulate reinforcement learning. We examined the effects of the personality traits agentic and affiliative extraversion on midfrontal electrophysiological brain activity (midfrontal theta) following performance errors (error-related negativity; ERN) and negative feedback (feedback-related negativity; FRN) in a rewarded Flanker task while embedded in one of two social contexts (competition vs. cooperation). As expected, ERN amplitudes were significantly elevated in the competitive context. Contrary to our assumptions, high agentic extraverts showed increased ERNs compared to participants low in agency solely under cooperative conditions. Unpredicted negative feedback aligned to error commission by a simulated actor elicited most negative FRNs. As hypothesized, high affiliative extraverts showed increased FRNs compared to low affiliative extraverts. Results indicate a differential evaluation of external and internal information regarding own and other's performance as well as its susceptibility to individuals' personality traits and characteristics of an interactional context.

Poster 4-67**HOW DO RANDOM EFFECTS STRUCTURES IMPACT LMER OUTCOMES IN AN ERP STUDY?**

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Binghamton University

Descriptors: linear mixed effects modeling, event-related potentials, reading development

Linear mixed effects regression (LMER) modeling is growing in popularity in the psychophysiological literature, but no clear guidelines exist for specifying model structures, especially for ERP data. Recommendations often conflict regarding how to specify random effects structures (Barr, et al., 2013), whether fixed effects should be chosen through hypothesis testing or model building, and how to proceed when models fail to converge. We ask, from a practical standpoint, how different random effects structures and factor input order affect actual model outcomes in an ERP dataset. We present data from The Binghamton University Reading Brain Project, a large scale longitudinal/cross-sectional ERP study of developing readers, including both experimental factors (i.e., item repetition) and individual difference measures (i.e., vocabulary) from over 150 participants. We used LMER modeling to examine the relationship between ERP component amplitude and individual difference measures using a range of random effects structures, and found that model outcomes were nearly identical in random intercepts-only versus random slopes models. Findings suggest that ERP datasets with tens or hundreds of thousands of observations may be less susceptible to false outcomes due to slight changes in random effects structures than behavioral studies with far fewer observations. We recommend that researchers should strive for parsimony and choose model structures based on theoretical relevance, but that a consensus does need to be reached as to the best practices for applying LMER to ERP data.

Poster 4-68**THE EFFECTIVENESS OF BUPROPION ON DEPRESSIVE SYMPTOMS IN SMOKERS: AN EEG STUDY**

Jian Zhu, Ryan Coppens, & David Gilbert
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Descriptors: EEG asymmetry, depression, bupropion

Bupropion (BUP) is an efficacious treatment for both clinical depression and for smoking cessation, but little is known about the effects of BUP on brain activity and virtually nothing is known of its effects on brain networks supporting visuo-spatial functioning and task performance. In the spirit of the NIMH's Research Domain Criteria (RDoC) project, we used EEG parietal alpha asymmetry as a dimensional neuropsychological marker of depressive symptoms (i.e., the more depressed, the higher alpha power in the right vs. left parietal lobe during visuo-spatial tasks [Davidson et al., 1997; Rabe et al., 2005]). Subjects, all of whom were smokers and none of whom were clinically depressed, were randomly assigned to the BUP group (N = 32) or to a placebo (PLA) group (N = 82) in a double blind study. EEG data during the performance of a visuospatial task were collected prior to and after 14 days on BUP or PLA pills. BUP significantly reduced the right vs. left parietal alpha power asymmetry whereas PLA did not, suggesting BUP may alleviate depressive symptoms through direct and/or indirect actions on the right parietal region.

This study was supported by NIH grants DA012289 awarded to the last author. The authors declare no conflicts of interest.

Poster 4-69**SYNCHRONIZING RESPIRATION AND CARDIAC RHYTHMS - MECHANISMS OF INTRA- AND INTERPERSONAL COORDINATION IN THE PHYSIOLOGICAL DOMAIN**

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Descriptors: physiological alignment, joint action, social coordination

A central question within joint action research has been how and why people synchronize their bodily rhythms. It is now well established that people synchronize their movements intentionally and unintentionally, and that behavioral synchronization can support social bonding. Recently, synchronization has also been reported between brains and physiologies of people interacting. These mechanisms are less well understood. In order to examine the role of physiological coupling, we investigated interpersonal coordination of physiological signals. Participants were asked to synchronize their breathing-rates in 2 conditions: bidirectional interaction, given real-time feedback of each other's respiration; or a confederate's respiration in a unidirectional interaction, whilst their respiration and ECG were monitored. We analyzed phase-synchronization between their respiratory signals, and intrapersonal cardiorespiratory coupling. Participants achieved in-phase synchronization of respiration signals during bidirectional interaction, but lagged behind in the unidirectional condition. Interestingly, their within-personal cardiorespiratory coupling was decreased in the bidirectional condition, but not unidirectional, in relation to their baseline. This study extends mechanisms of behavioral coordination to the physiological domain, showing that people synchronize better when interaction is reciprocal. Moreover, our results suggest that physiological within-personal feedback loops are weakened at the expense of between-personal coupling, in order for people to become a coupled unit.

Danish Council for Independent Research - Technology and Production Sciences

Poster 4-70**VIEWER RESPONSES TO MASSIVE IMMERSIVE ENVIRONMENT: LESSONS FOR CONSUMER PSYCHOLOGY BASED ON PHYSIOLOGICAL DATA**

Byungho Park, Shinyoung Park, Sinyoung Kang, Tae Hwan Lim, & Hyunjin Jung
KAIST

Descriptors: neuromarketing, communication technology, ScreenX

Creation of an immersive environment is one of the goals virtual reality pursues. For example, CAVE, a virtual reality system that employs surround projection display was introduced in the early '90s. This technology has gone to the next

level when ScreenX was announced. ScreenX is a technology that converts a movie theater to a huge immersive environment by using both sides of walls as screens. The interaction between the effect of a technology and structural features in the mediated message is also a topic that has been investigated in the context of immersive environment. Based on the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP; Lang, 2006), this study used twelve 30-second advertisements, either fast or slow in pacing. Self-reported questionnaires including attitude towards ad and brand, as well as physiological data were collected from the subjects (N = 60). Study using an Immersive Environment (2) × Pace (2) × Repeat (6) factorial design revealed that statistically significant main effect of pacing on attention, arousal, recognition memory, and other self-reported measures. There was main effect of viewing condition (use of immersive environment) on physiological responses, such as cardiac deceleration and corrugator muscle group activation, along with other self-reported measures of advertising effectiveness. Advertisements shown under an immersive environment were capable of getting more attention, attenuating negative emotions, and being more effective as an advertising vehicle in terms of attitude towards ad, brand, and purchase intent.

KAIST College of Business (Seoul, Korea) and CJ CGV, Inc. (Seoul, Korea) have partially funded this study.

Poster 4-71**NEUROMARKETING IN THE FIELD: INSIGHTS EARNED FROM THE USE OF PSYCHOPHYSIOLOGY ON TESTING NEW TECHNOLOGY**

Byungho Park, Shinyoung Park, Sinyoung Kang, & Tae Hwan Lim
KAIST

Descriptors: neuromarketing, ScreenX, immersive environment

This study used a small sample (N = 39) to study individual responses to a newly-developed, surrounded projection technology for movie theaters named ScreenX, and compare that to the traditional screening technology. To do this, a small movie theater was used for an experiment, accepting one subject at a time, collecting self-reported data and measuring physiological responses. Though most self-reported measures failed to reach statistical significance (likely due to the small sample size for a study using between subjects design), one physiological response produced results that were statistically significant. The difference in cardiac deceleration magnitude suggests that the new technology (ScreenX) did get more attention and induced stronger emotion than the traditional technology. When other physiological responses are laid down on time axis, these charts also revealed that this new screening technology is capable of inducing more frowning (negative emotion), with a potential of reaching statistical significance if few more subjects were added. This is in line with the virtual reality literature. Though these cognitive and emotional responses indexed by physiological measures were promising, memory test results did not show any difference between the traditional and new technology. This is explained in the context of the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP; Lang, 2006).

KAIST College of Business and CJ CGV Inc. have partially funded this study.

Poster 4-72**A MORE EFFICIENT DEPLOYMENT OF ATTENTION PREDICTS FASTER REACTION TIMES: EVIDENCE FROM THE N2PC AND OSCILLATORY BRAIN ACTIVITY**Brandi Lee Drisdelle, Gregory West, & Pierre Jolicoeur
Université de Montréal*Descriptors: event-related potentials, event-related spectral perturbation*

We related the efficiency of attentional deployment and memory encoding with the downstream processing of an attended target using electrophysiology. Specifically, event-related potential (ERP) components (N2pc, P3) and event-related spectral perturbation of alpha oscillatory activity (decrease in alpha amplitude) were analyzed based on reaction times (RT) in a simple visual search task. The N2pc, an ERP component characterized by a larger negative deflection contralateral to the visual field where a target is presented, is observed when attention must be deployed to the target to perform the task. If target processing is facilitated by a more efficient attentional deployment, RTs should be shorter. Furthermore, more efficient processing should also lead to an earlier encoding in working memory, and thus an earlier P3 onset. Results confirmed these predictions: An increase in N2pc amplitude (reflecting a more energetic deployment of attention) and a decrease in P3 latency both predicted shorter RTs. Moreover, we also found a larger decrease in the amplitude of posterior alpha oscillations for shorter RTs, consistent with the notion that a larger decrease in alpha amplitude is associated with a stronger attentional response. Together, these results demonstrate strong links between the strength of attentional engagement on a visual target (via N2pc and event-related spectral perturbation in the alpha band), the speed of memory encoding (P3 latency), and ultimately the speed of overt motor responses.

Natural Sciences and Engineering Research Council of Canada (NSERC).

Poster 4-73**ENCODING, ATTENTION, AND MASKING IN THE ATTENTIONAL BLINK**Talia Losier¹, Christine Lefebvre¹, Mattia Doro², Roberto Dell'Acqua², & Pierre Jolicoeur¹
¹Université de Montréal, ²University of Padova*Descriptors: attentional blink, masking, attention*

Recent models attempting to explain the AB have suggested that encoding targets into working memory (WM) reduces attentional capacity available for the processing of subsequent targets, explaining part of the AB. In this electrophysiological study, costs of encoding into WM were manipulated by having to report two or three targets. The last target was presented laterally in order to measure the N2pc component, which reflects the deployment of visual attention. If mechanisms occupied by a higher encoding load overlap with those mediating the deployment of attention to the last target, then N2pc amplitude for the last target should be reduced and possibly delayed when three targets are to be reported as opposed to two. The last target was not masked by a following distractor in order to also measure the P3b component, which represents context updating in WM. This experiment replicated previous work showing an interaction between the encoding load and lag for the P3b latency and amplitude. We extended earlier work by showing that the N2pc however was not affected by lag nor encoding load. This unexpected result might be a consequence of not masking the last target, and suggests the mask could play an important role in the AB by hindering attentional engagement on a target, affecting subsequent processing. This hypothesis was tested in a new experiment designed to understand the role of backward masking on attentional deployment.

Poster 4-74**REDUCED MISMATCH NEGATIVITY TO PAIRED-TONE DEVIANTS IN SCHIZOPHRENIA**Alexis G McCathern, Sarah M Haigh, Brian A Coffman, Timothy K Murphy, Kayla L Ward, & Dean F Salisbury
University of Pittsburgh*Descriptors: schizophrenia, mismatch negativity, paired tones*

Mismatch negativity (MMN) is an event-related potential arising in response to a deviant stimulus among standard stimuli. Patients with chronic schizophrenia show reliably smaller MMN to pitch and duration deviants compared to healthy controls. First psychotic episode patients do not. Deviants to complex patterns

also produce an MMN. This study used a tone pairs pattern to analyze deficits complex MMN in schizophrenia. Tones were presented in pairs. The standard tone pair was played 87.5% of the time, with the second tone three semitones above the first. The deviant tone pair was played 12.5% of the time, with the second tone three semitones below the first. All tones were 50 ms long with 330 ms between tones, and an inter-pair interval of 450 ms. All deviant second tones were also used as standards. The control group (N = 19) produced a significantly larger MMN response compared to the schizophrenia patients (N = 16; $p = .007$). Patients with chronic schizophrenia have impairments in detecting deviants in complex patterns, even for a simple relation between two tones. An inability to form perceptual groupings may contribute to the impaired auditory processing and even social impairments in schizophrenia. Complex pattern MMN may be sensitive enough to reveal processing abnormalities early in the course of schizophrenia. If so, paired-tone deviant detection may be a useful indicator for identifying those at-risk for schizophrenia.

NIH MH094328.

Poster 4-75**IMPAIRED LEFT HEMISPHERE SYLLABLE PROCESSING IN SCHIZOPHRENIA**Samantha Lipko, Sarah M Haigh, Brian A Coffman, Timothy K Murphy, Kayla L Ward, & Dean F Salisbury
University of Pittsburgh*Descriptors: schizophrenia, syllable, mismatch negativity*

Mismatch negativity (MMN) amplitude increases with the degree of difference from a standard stimulus. Patients with chronic schizophrenia have smaller MMN responses for syllable deviants, suggesting impairment in late language-specific processing. We used artificial syllables varying in voice onset times (VOT) along the Ba-Pa continuum to test categorical versus linear detection of syllable differences. Subjects were presented with 75% standard stimuli sounding like a strong "ba" (VOT = 0 ms), 8.3% deviant stimuli with a 15 ms VOT (weak "ba"), 20 ms VOT (ambiguous syllable), or 40ms VOT (strong "pa"). Subjects watched a silent video as syllables were presented. Both groups showed linear perception of the VOT changes; there was a significant main effect of VOT ($p = .002$), with larger MMNs as VOT increased. There was a significant interaction between group, VOT, and hemisphere ($p = .004$). Controls (N = 14) produced a significant hemisphere by VOT interaction ($p = .039$), due to the MMN being larger in the left compared to right hemisphere for the 40ms VOT only. The individuals with schizophrenia (N = 15) did not produce a significant VOT by hemisphere interaction ($p = .174$), suggesting no hemispheric difference in MMN. These results indicate that patients are able to detect deviant syllables, but unlike controls, do not show the lateralization typically seen in language processing. Abnormal language processing at a relatively early perceptual level may be related to later abnormalities in language and thought disorder typical in schizophrenia.

NIH MH094328.

Poster 4-76**EVENT-RELATED POTENTIALS DEMONSTRATE DEFICITS IN AUDITORY GESTALT FORMATION IN SCHIZOPHRENIA**

Brian A Coffman, Sarah M Haigh, Tim K Murphy, Kayla L Ward, Christian Andreaggi, & Dean F Salisbury
University of Pittsburgh

Descriptors: set formation, auditory, schizophrenia

Grouping of auditory percepts is necessary for interpretation of patterns. Schizophrenia patients have blunted responses to deviance from an established norm, such as reduced mismatch negativity (MMN). Here we compared auditory event-related potential (ERP) responses to complex patterns between schizophrenia patients (SZ; N = 25) and matched healthy controls (HC; N = 23). ERPs were measured in an auditory pattern in which the first 6 tones increased in pitch in 500 Hz steps, from 1.5–4 kHz, and the last 6 tones decreased in pitch (4–1.5 kHz). In 8% of trials, the last 6 tones repeated the increasing pitch pattern of the first 6 tones. Here we focused the analysis only upon the frequent tone pattern (616 trials; 50 ms duration; SOA = 330 ms; ITI = 800 ms). Stimuli were presented while participants watched a silent video. We observed a large sustained negativity (SN) throughout the entire duration of each group that returned to baseline following completion of the trial. Relationship between SN and ordinal stimulus position was compared between SZ and HC. SN was sensitive to ordinal stimulus position ($p < 0.01$), with largest responses to first and final tones. HC had greater SN than SZ across the entire trial, though differences were greatest for first and final tones ($p < 0.001$). These results suggest stronger set formation in HC than SZ. Deficits in auditory pattern processing may be relevant to clinical issues in SZ, such as conceptual disorganization. Future studies will examine relationships between SN and clinical measures.

NIH MH094328 (PI: Dean Salisbury, PhD).

Poster 4-77**EVENT-RELATED POTENTIALS ELICITED BY THE MISMATCH BETWEEN FASHION ITEMS**

Erika Yoshimori, & Hiroshi Nittono
Hiroshima University

Descriptors: mismatch, fashion coordinate, N400

In daily life, intuitive judgments are made about matching fashion items, such as clothing and shoes, according to social conventions. To elucidate the cognitive process underlying this evaluation, event-related potentials (ERPs) were recorded in response to the combination of bottoms (skirts or pants) and pairs of shoes. Combining the gender (men's or women's) and the dress code (formal or casual) of the items, three conditions were made: match (both gender and dress code of the items were matched), mismatch (neither gender nor dress code was matched), and intermediate (other combinations). Twenty-two university students performed implicit and explicit evaluation tasks, in which pictures of bottoms-shoes combinations were presented for 100 ms with an interstimulus interval of 1,500 ms. In the implicit task, the participants were asked to press a button whenever they found a target stimulus (i.e., a designated picture of a bottoms-shoes combination) embedded in the stimulus sequence. In the explicit task, the participants judged whether the two items on a picture were matched or mismatched by pressing one of two buttons. ERP waveforms were more positive for the matched items than for the mismatched items, from 300 ms after the stimulus onset; the ERP waveforms for the intermediate items were in between. The amplitude differences were statistically significant in the explicit task alone. The findings suggest that mismatched items elicit a larger N400 and a smaller late positive component and that this process occurs only when the participants explicitly process the mismatch.

Poster 4-78**MIDFRONTAL THETA TO GOAL UNCERTAINTY: VARIABILITY RELATED TO INDIVIDUAL DIFFERENCES IN ANXIETY AND COGNITIVE CONTROL EFFICIENCY**

Frini Karayanidis, Patrick S Cooper, Aaron S Wong, Montana Hunter, Jaime Rennie, William R Fulham, & Patricia T Michie
University of Newcastle

Descriptors: midfrontal theta, cognitive control, anxiety

Theta oscillatory activity over the midline frontal scalp (midfrontal theta; MFT) has been linked to the need for cognitive control and communicating this need

across frontal networks. MFT is increased in tasks that require cognitive control to detect conflict and resolve contextual uncertainty. MFT has also been shown to vary with level of dispositional anxiety. In this study, we examine whether MFT elicited under goal uncertainty varies as a function of individual differences in cognitive control ability and anxiety in late adolescence and young adulthood. Two-hundred and fifteen participants aged 15–25y (98 male) completed a cued task-switching paradigm (Karayanidis et al., 2009, CABN 9, 202–215) with both behavioral and EEG measures, as well as a comprehensive psychometric and neuropsychological assessment. Anxiety level was quantified using the Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995, Behav Res & Ther 33, 335–343). Cognitive control ability was quantified using RT mixing cost – the behavioral cost of completing a task alone or in a mixed task block. Preliminary analyses show that MFT varied with increasing goal-conflict. Cognitive control ability and anxiety level showed interactive effects on MFT power: high cognitive control ability was associated with greater MFT power than low cognitive control, but only among people with high anxiety. We examine the relationship to patterns of adaptive/maladaptive outcome behaviors and discuss implications for theories of adaptive control.

This research is funded by an Australian Research Council Discovery Project.

Poster 4-79**FEARLESS VS FEARFUL DRIVERS: ASSOCIATION BETWEEN DEFENSIVE MOTIVATION AS MEASURED BY THE STARTLE REFLEX, DRIVING ABERRATIONS, AND REACTIONS TO EMOTIONAL SCENES**

Androula Kepola, Chrysanthi Leonidou, Maria Panteli, Dora Georgiou, Marios Theodorou, & Georgia Panayiotou
University of Cyprus

Descriptors: driving violations, defensive motivation, emotional imagery

Low sense of fear is an important risk factor for aggressive driving (Panayiotou, 2015); fearless individuals are less distressed by potential negative consequences of their behavior. This study examines the subjective and physiological reactions of drivers in response to a tone-cued emotional imagery experiment during which participants had to imagine, for 8-second periods, normative scenarios describing joy, fear, sadness and relaxation. Startle reflex and facial EMG were assessed during imagery and resting ITIs. Seventy-two participants were classified as fearful or fearless based on their startle potentiation to fear scenes in relation to the relatively neutral pleasant relaxation scenes. Drivers' behavior was measured with the Drivers Behavior Questionnaire, which assess mistakes and aggressive and non-aggressive violations. As expected, fearless drivers (i.e. those showing little or no startle potentiation by fear) reported more aggressive violations but fewer unintentional driving mistakes, compared to fearful drivers. Fearless drivers also displayed larger zygomatic responses across emotions, suggestive of more pleasant emotion during the experiment. They also self-reported more positive emotions during unpleasant scenarios, but more negative emotions following pleasant scenarios. Findings are in line with previous research suggesting that fearlessness is a trait that characterizes drivers who exhibit aggressive driving behavior. In combination, findings suggest that both defensive and approach motivation systems are related to driving behavior outcomes.

Poster 4-80**ASSOCIATIONS BETWEEN PERSONALITY AND PHYSIOLOGICAL INDICES OF VALENCE: THE MODERATING ROLE OF DEPRESSION**

Christiana Theodorou, Elena Charalambous, Maria Koushiou, Dora Georgiou, Elena Costantinou, & Georgia Panayiotou
University of Cyprus

Descriptors: personality, depression

Previous research indicated that specific personality factors (e.g. neuroticism) predict individual differences in physiological reactions (e.g. fear startle reflex). This study examined the relationship between the Big-five dimensions of personality and psychophysiological measures of valence, and the moderating role of depression. Eighty-nine community participants in Cyprus (47 female; age range: 18–47 years old) completed a tone-cued affective imagery experiment where they imagined sadness, relaxation, fear, joy scenes in 8 second trials. The NEO-FFI and Psychiatric Disorders Screening Questionnaire were administered to assess the five personality factors and depressive symptoms, respectively. Corrugator and Zygomatic activity and startle eye blink were measured during emotional imagery. Regression analyses indicated that openness to experience significantly predicted corrugator responses during sadness ($b = .328, p = .014$) and fear imagery ($b = .422, p = .002$). In the next step, depressive symptoms were added as a moderator in the analyses, for a sub-sample of participants, showing a significant interaction only with neuroticism, $b = .01, 95\% \text{ CI } [0.00, 0.02], t = 3, p = .01$: When depressive symptoms are low, there is a significant negative relationship between neuroticism and corrugator activity during sadness, $b = -.05, 95\% \text{ CI } [-0.10, -0.01], t = -2.58, p = .02$. Results suggest that personality modulates the degree of responses to affective valence, supports a connection between neuroticism and depression, and is a potential blunting effect of depression on physiological reactivity.

Poster 4-81**THE RELEVANCE OF FAMILIARITY FOR EFFECTS OF SELF-RESEMBLANCE ON THE PROCESSING OF EMOTIONAL PICTURES**

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Descriptors: startle, self-resemblance, affective pictures

Recent evidence suggests that responses to emotional stimuli may be affected by subtle cues of self-relatedness, such as similarity to the self. Here we report two experiments on the processing of self-resemblance in the context of affective pictures, as indexed by startle modulation. In the first experiment, we presented participants ($N = 21$; 9 women) with pictures of dyadic social interactions (threat scenes or erotic couples). In each, the face of one of two people (gazing at the observer) was digitally manipulated to resemble either the participants themselves or an unknown person. Thus, a self- or other-resembling individual was depicted as being either a victim of physical threat or involved in an erotic encounter. To control for familiarity, the face of a friend was used in the second experiment ($N = 14$ men). Startle responses were elicited by white noise (50 ms, 105 dB) at SOA of 300 ms, and recorded at the orbicularis oculi via EMG. The results of the first experiment indicated a context-specific effect of self-resemblance on startle modulation: higher levels of startle inhibition for threatening pictures and less attenuation in the context of erotica. With morphed faces of familiar people, however, this pattern disappeared. Overall, our findings suggest that visual cues of general motivational significance and of self-relatedness and can be integrated in a fast, presumably automatic manner. The results are furthermore discussed with respect to the impact of familiarity as well as subjective similarity and emotional closeness to oneself.

Poster 4-82**THE ROLE OF TRAIT WORRY IN TEMPORAL DYNAMICS OF THE EVOKED CARDIAC RESPONSE TO AFFECTIVE IMAGES**

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Descriptors: emotion, worry, electrocardiography

Heightened detection of threat is suggested to precipitate the continued use of worry in service of cognitive avoidance. Vigilance-avoidance in generalized anxiety

disorder has been demonstrated using methods with high temporal resolution such as event-related potentials, but seldom using evoked cardiac responses (ECRs) despite the wealth of literature on cardiac vagal control in perseverative cognition and anxiety. The ECR is a biphasic pattern of heart rate deceleration and acceleration elicited by motivationally-relevant stimuli. Participants ($n = 60$ undergraduates) viewed affiliative, erotic, threat, mutilation, and neutral images. Using the Matlab software KARDIA (Perakakis et al., 2010) we obtained inter-beat intervals from the electrocardiogram in half-second epochs over each five-second trial. A 5x11 MANOVA found cubic effects for image type and time period, as well as an image \times time interaction, $ps < .027$. Using scores on the Penn State Worry Questionnaire as a between-subjects factor yielded a three-way interaction such that the image \times time interaction varied across levels of worry, $p = .064$. Worry also predicted ECRs to threat, $\beta = .824, t(59) = 4.173, p < .001$, explaining a proportion of variance, $R\text{-square} = .329, p < .001$, even after controlling for neuroticism and anxiety symptoms. The ECR may thus capture both increased orienting and defense (suggested to reflect cognitive avoidance) responses to threat in the context of trait worry. Further, worry specifically may relate to vagal activation and withdrawal patterns even on a relatively small timescale.

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Poster 4-83**SEXUAL CONCORDANCE: ASSESSING THE RELATIONSHIP BETWEEN GENITAL AND SELF-REPORTED SEXUAL AROUSAL USING A BOGUS PIPELINE PARADIGM**

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Descriptors: sexual arousal, genital responses

Sexual concordance (SC) is the relationship between physiological (genital) and psychological (self-reported) aspects of sexual arousal. Women exhibit lower SC than men, possibly because social norms dictate that women be sexually demure. Assessing sexual responses in conditions that discourage conformity to such norms (a bogus pipeline paradigm) may increase women's SC. We examined genital and self-reported sexual arousal in 50 women and 50 men. Participants reported their feelings of sexual arousal during a sexual film while their genital (penile circumference, vaginal and clitoral vasocongestion), heart rate (HR), and galvanic skin (GS) responses were recorded. Half of the participants were instructed that their self-reported sexual arousal was being monitored for veracity using their HR and GS responses (bogus pipeline condition; BPC); the remaining participants were told that these measures were recorded for a comprehensive measure of sexual response (typical testing condition; TTC). Preliminary results suggest that participants in the BPC reported significantly higher sexual arousal than those in the TTC. Genital responses did not vary with testing condition. Using within-subjects Pearson's correlations to estimate SC, there was a small main effect of testing condition on SC (partial eta squared = .03). Women's SC was greater in the BPC ($r(22) = .42$) versus TTC ($r(23) = .20$); men's SC was more similar between conditions ($r(23) = .81$ for the TTC and $r(23) = .87$ for the BPC). This study is the first to apply social psychological methodologies to the study of SC.

Social Sciences and Humanities Research Council of Canada; Canadian Foundation for Innovation; Queen's University.

Poster 4-84**IMPAIRING MIMICRY OF EMOTIONAL EXPRESSIONS INDUCES SEMANTIC PROCESSING COSTS IN THE BRAIN**

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Descriptors: emotion, embodiment, event-related potentials

Theories of embodied emotion recognition suggest that mimicking an emotional expression facilitates its understanding. If so, impairing mimicry ought to induce online neural processing costs associated with understanding emotional expressions. The current research addressed this hypothesis by having participants evaluate the valence of emotional expressions (happiness, surprise, disgust, and anger) and manipulating participants' ability to smile. Online processing costs were assessed using the N400 event-related brain potential, associated with semantic retrieval from long-term memory. Smiling was impaired by having participants hold a chopstick horizontally between their teeth with their mouths closed around it. In the control, participants also held a chopstick horizontally in their mouths but in front of their teeth, using the front of their lips, which afforded the opportunity to smile. The experimental and control manipulations alternated between blocks. The effectiveness of these manipulations was assessed by electromyography (EMG) at the cheek, nose and brow regions. EMG results validated that the experimental manipulation selectively impaired smiling (at the cheek) but not other facial actions (at the nose and brow) relative to the control. This selective impairment of smiling in turn selectively induced larger N400 processing costs for expressions of happiness but not surprise, disgust or anger. In contrast, the valence ratings were not affected by the mimicry manipulation but only by the emotional expression being evaluated.

Poster 4-85**FLIPPING THE PIC: EMOTIONAL REACTIONS TO INTACT AND INVERTED SCENES**

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Descriptors: emotional reactivity, picture perception, startle

Emotional reactions were measured when pictures of natural scenes were presented in either an intact (upright) orientation or inverted (upside down) to determine how features may mediate affect. Upright and inverted emotional and neutral pictures (that were either figure-ground or scenes in perceptual composition) were shown to participants in a free viewing paradigm which included acoustic startle probes. Dense array EEG (129 sensors) and startle reflex blinks were measured. To the extent that features, which are easily identified even for inverted scenes, are sufficient to prompt an emotional response, we expected no difference in affective reactions when pictures were presented upright or inverted. Results indicated that, replicating previous studies, intact scenes elicited an enhanced late positive potential (LPP) when viewing emotional (either pleasant or unpleasant), compared to neutral, pictures, and that, compared to neutral scenes, the startle reflex was potentiated when viewing unpleasant pictures and attenuated during pleasant picture viewing. For inverted scenes, although the same pattern of modulation was found for the LPP and the startle when viewing pleasant scenes, unpleasant pictures that were inverted did not prompt an enhanced late positive potential or startle potentiation. These data suggest that specific features of pleasant scenes are more likely to prompt affective engagement, as inverting the scene did not change emotional reactivity, whereas defensive reactions were not reliably engaged when scenes were inverted.

Poster 4-86**THE FACE OF MISTAKES: ERROR-RELATED ACTIVATION OF THE CORRUGATOR SUPERCILII PREDICTS INCREASED NEURAL MONITORING**

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University of Toronto

Descriptors: electromyography, affect, control

Performance monitoring processes feature prominently in the everyday life of the modern human, and a growing body of research in affective neuroscience has implicated a role for negative affect in performance monitoring. No study, however, has investigated whether facial electromyography (EMG) over the corrugator supercilii—a psychophysiological measure associated with negative emotions—is related to neural performance monitoring. In one study, we

explored these potential relationships by simultaneously measuring the error-related negativity (ERN), error positivity (Pe), and facial EMG over the corrugator supercilii muscle during a punished, performance-monitoring task. We found evidence for increased facial EMG activity over the corrugator immediately following error responses, and that this activity was positively correlated with the Pe, but not with the ERN. These results are consistent with the idea that early affective processes are involved in performance monitoring, and that such processes may reflect or facilitate the emergence of error awareness, orienting towards errors more generally, or both.

Natural Sciences and Engineering Research Council of Canada.

Poster 4-87**HOW ACHIEVEMENT MOTIVATION INFLUENCES STRESS RESILIENCE AND SELF-REGULATION ABILITIES**

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Institute of Molecular Biology and Biophysics

Descriptors: biofeedback game, self-regulation strategy, physiological cost

We studied the interrelations of achievement motivation and physiological cost of solving 2 opposing tasks: 1) to keep a high level of concentration and 2) to control/reduce heart rate (HR) in the psycho-physiological model of stress (based on the biofeedback car racing game "Rally" where the speed of players inversely depends on their HR, and they have to react quickly to random objects). Previous studies showed that there are 6 strategies of self-regulation, each differs in its efficiency (Mazhirina, Jafarova, 2012). The so-called non-integrated strategy (NIS) in which one could fulfill only one of the tasks to control either reaction time (RT) or HR was defined as ineffective and difficult to be improved by training. 90 students took part in playing the Rally game, and the behavior of 14 of them resembled NIS mentioned above (9 subjects who controlled RT formed group 1, 5 subjects who controlled HR formed group 2). These groups were significantly different on level of achievement motivation (group 1 had extremely high level in contrast to group 2 with low level). As expected, level of ambiguity tolerance was not high in both groups, but in Gr.1 it was higher than in Gr.2. It was revealed that HR even increased in Gr.1 suggesting excessive expenditure of physiological resources in order to achieve the goal. These groups conducted 7 sessions of Rally biofeedback self-regulation training. It was shown that the strategy when one controlled only RT could be improved. Major changes may take place due to active use of the biofeedback cognitive components.

Poster 4-88**UNIVARIATE AUTONOMIC RESPONSES TO DISCRETE EMOTION MANIPULATIONS CONTINUE TO VARY ACROSS DIFFERENT METHODS OF MANIPULATION**

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Descriptors: emotion, autonomic nervous system

Research on autonomic specificity of emotion has yielded varying results in support of a discrete emotions approach. Although some studies have employed multiple methods for emotion elicitation, few have directly compared univariate autonomic responses for the same emotion across different modes of elicitation. The current study contained three types of emotion inductions (i.e., film, personal recall, and standardized imagery) for four targeted emotions (i.e., fear, contentment, sadness, and amusement), which were administered to 50 undergraduates (30 male). Skin conductance (SC) and self-reported affect were recorded. Repeated measure ANOVA was used to compare dependent variables. Although each manipulation was reported to elicit the target emotions ($p < .001$), there was inconsistency in the SC responses. Of all the manipulations included, only the sadness imagery, fear film, and contentment imagery demonstrated significant SC changes ($p < .01$). The findings lend further support to the need for multivariate techniques in exploring the autonomic correlates of discrete emotion inductions. Indeed, it has recently been advised that all future studies in this area employ multivariate pattern classification techniques (Kragel & LaBar, 2014). The findings also draw further attention to coherence issues between self-report and autonomic changes that plague emotion research. The addition of cardiovascular and respiratory variables in pursuit of multivariate approaches is further considered.

Poster 4-89**“HOW WE GET THERE. . .” BLOOD PRESSURE RESPONSES IN MĀORI AND NEW ZEALAND EUROPEAN/PĀKEHĀ**Natalie J Walmsley¹, Jordan GN Pearse¹, LaBarron K Hill², & John J Sollers III¹¹University of Auckland, ²Duke University Medical Center*Descriptors: health disparities, orthostasis, Māori*

Chronically elevated blood pressure (i.e. hypertension) poses a significant challenge to public health, both globally and within Aotearoa/New Zealand. Importantly, not all ethnic groups are equally affected as rates of hypertension are higher among the native Māori population compared to New Zealand Europeans (i.e., Pākehā). In the present study, we investigated differences in blood pressure responses to a standard physical stressor in a sample of self-identified Māori (n = 21; 10 women) and New Zealand European/Pākehā participants (n = 22; 12 women). Blood pressure (BP) was measured continuously as participants completed a simple orthostatic challenge (i.e. sit, standing, sit). Each period was five minutes in length and self-reported mood data was collected after each time point. While results indicated that there were no significant between-group differences in measures of arterial BP, there were differences in the regulatory mechanisms. In particular, analysis of underlying hemodynamic parameters (Cardiac Output, stroke volume, etc.) indicated that Māori participants exhibited greater centrally-mediated blood pressure regulation following the stressor ($p < .05$). Interestingly, relationships between Body Mass Index (BMI) and mood were also noted, but only for Māori participants. Our results provide the groundwork for future research examining differences in blood pressure regulation within ethnic minority populations in Aotearoa/New Zealand and further underscore the importance of considering BMI in research on cardiovascular health disparities.

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Poster 4-90**DETECTING ERRORS IN OTHERS' SPEECH: AN ERP INVESTIGATION**Adithya Chandregowda¹, Yael Arbel², Samantha Lucchio¹, Christine Manasterski¹, & Emanuel Donchin¹¹University of South Florida, ²Massachusetts General Hospital Institute of Health Professions*Descriptors: speech errors, error-related negativity, P300*

Previous research has shown that the Error Related Negativity (ERN) is elicited both for manual and verbal errors. The ERN is also reported to be elicited when one observes another person commit manual errors. In this study, we investigated whether the ERN is also triggered by the processing of speech errors committed by others, using a novel experimental paradigm and subjecting the data to principal component analysis (PCA). Ten healthy participants looked at a series of pictures and listened to audio recordings of a female adult speaker who named the pictures correctly on some occasions (65 trials) and erroneously on other occasions (22 trials). There was a one second interval between the onset of the picture and the audio recording. The speech errors were phonemic (e.g., “doat” for “coat”, “wock” for “lock”). Participants were instructed to count the number of times they saw a picture of an animal (no speech errors were associated with these pictures which were randomly presented on 20 trials). When briefed after completion of the task, participants reported noticing errors in the speech they heard through the headphone on some trials. No ERN was detected in association with speech errors; instead, a P300 with larger amplitude for erroneous speech trials compared to correct trials was found. The results are in line with the well-established notion that the P300 amplitude is sensitive to the rarity and saliency of the eliciting event.

Poster 4-91**REARRANGING TEMPORAL SEQUENCE OF EVENTS: AN ERP STUDY**George Spanoudis, & Andri Agathocleous
University of Cyprus*Descriptors: language, comprehension of temporal connectives, memory*

Temporal connectives allow us to describe a sequence of events in different linguistic orders. It has been demonstrated that sentences starting with the temporal connective “before” were processed differently from sentences beginning with

“after”. Two specific issues regarding the processing of sentences with temporal connectives must be resolved: (i) whether “before” sentences are more difficult than “after” sentences, and (ii) if the answer in (i) is positive, whether this is caused by the chronological order of the events described in the sentence or by other factors. We administered a temporal connectives task (TCT) and two working memory tasks. TCT was a reading time experiment in which participants read sentences presented word by word for comprehension. Working memory was assessed using a forward digit span task and a visual pattern test. Twenty five native speakers of Greek (12 female; mean age 21years, age range 18–30) were administered four sets of 70 sentences. All 4/70 experimental sentences were plausible as determined by two expert raters. TCT was used to obtain ERPs. Data analysis yielded two important results: (i) “before” sentences are actually easier to process than “after” sentences, and (ii) ERP analyses showed that sentences that are more demanding of working memory are linked with greater negativity over frontal and parietal regions than those that are less demanding. These differences are consistent with previous studies proposing the involvement of the frontal regions in working memory processes and the superiority of good comprehenders.

Cyprus Research Promotion Foundation.

Poster 4-92**PARASYMPATHETIC UNDERPINNINGS OF DELAY DISCOUNTING OF REWARD IN ADHD**Rachel B Tenenbaum¹, Erica D Musser¹, Sarah L Karalunas², & Joel T Nigg²¹Florida International University, ²Oregon Health and Science University*Descriptors: reward, autonomic reactivity, ADHD*

Introduction: Attention deficit/hyperactivity disorder (ADHD) is associated with emotion dysregulation, high external reward sensitivity and inability to delay gratification. Delay discounting has been assessed to index both sensitivity and ability to delay rewards in children with ADHD. However, few studies have utilized a multi-method approach (i.e., behavioral and biological) to examine these constructs to identify potential underlying etiological mechanisms of ADHD. Methods: 271 children (185 ADHD, M age = 9.01, SD = 1.31, 63% male) were recruited and assessed using “gold-standard” diagnostic procedures. A Delay Discounting Task was completed by all children while electro-and impedance cardiogram were collected to index respiratory sinus arrhythmia (RSA; i.e., parasympathetic-based regulation) and cardiac pre-ejection period (PEP; i.e., sympathetic-based reward sensitivity). ANOVA with covariates including relevant demographics, stimulant medication use, and comorbid diagnoses were completed to address all research questions. Results: ADHD was uniquely associated with parasympathetic-based dysregulation (i.e., excessive RSA withdrawal, $F(1,261) = 4.9, p = .03$). However, no significant differences were observed with respect to sympathetic-based indexes ($F(1,244) = 0.2, p = .66$). Discussion: Regulatory deficits may underlie observed impairments in reward sensitivity and delay of gratification of ADHD. Understanding etiological mechanisms that contribute to ADHD will help to understand heterogeneity in the disorder and to aid in the design of person-centered interventions.

Poster 4-93**POOR RSA RECOVERY FROM STRESS PREDICTS SELF-INJURIOUS THOUGHTS AND BEHAVIORS AMONG ADOLESCENTS**Amy H Mezulis¹, Madeline D Wielgus¹, Jaclyn T Aldrich¹, & Sheila E Crowell²¹Seattle Pacific University, ²University of Utah*Descriptors: respiratory sinus arrhythmia, self-injurious thoughts and behaviors, adolescents*

Self-injurious thoughts and behaviors (SITB) include suicidal ideation, suicide threat, and non-suicidal self-injury and have been associated with physical injury, poor emotion regulation, depression and suicide. Respiratory sinus arrhythmia (RSA), an index of vagal control, serves as a biomarker of emotion regulatory capacity. Low baseline RSA has been linked to depression and SITB. RSA reactivity indexes flexible engagement with and attentional deployment to environmental demands in stressor tasks. Poor RSA recovery to stress may indicate difficulty disengaging from stressors and increase risk for SITB. Previous research has shown a link between poor RSA recovery and depression among youth, but no studies have investigated RSA recovery in relation to SITB. This study investigated the prospective relationship between basal RSA, RSA reactivity, and RSA recovery and SITB among 108 adolescents (mean age = 12.82, SD = .82; 53.7% female). RSA was assessed during a 4-minute resting baseline, 6-minute failure task, and 3-minute recovery. Youth and parents completed measures and were interviewed regarding SITB at baseline and 6 months. Controlling for baseline depressive symptoms and SITB history, poor RSA recovery significantly predicted engagement in SITB six months later ($\beta = 10.08$ (4.21); Wald = 5.724; $p = .017$). Basal RSA and RSA reactivity were not associated with SITB. This study indicates that youth who engage in SITB may have difficulty physiologically recovering from stressors and continue allocating attention to negative events, increasing risk for future SITB.

National Institute of Mental Health R15MH098294-01A1 (PI: Mezulis).

Poster 4-94**THE EFFECT OF PEER-VICTIMIZATION ON THE PROCESSING OF SOCIAL-THREATENING STIMULI IN SUBJECTS WITH MAJOR DEPRESSIVE DISORDER**Benjamin Iffland, Fabian Klein, & Frank Neuner
Bielefeld University*Descriptors: depression, child maltreatment*

Background: Recently, a subtype of major depressive disorder (MDD) has been identified that is related to child maltreatment. Child maltreatment includes physical and emotional forms of abuse and neglect as well as peer-victimization. The goal of this study was to identify neurobiological correlates of this subtype of MDD in the processing of maltreatment-related visual stimuli. Methods: Four groups of participants, i.e. depressive patients with and without a history of peer-victimization and healthy subjects with and without a history of peer-victimization, were compared. A conditioning paradigm was used to pair neutral faces with social-threatening and neutral videos. Processing of the neutral faces was examined using event-related EEG potentials. Results: ERP analysis demonstrated a modulation of the evoked potentials by valence of the stimuli and diagnosis of depression at the N170 stage and an enhancing effect of negative valence on the late positive potential. Peer-victimization was correlated with ERP responses on the N170 and LPP stage with subjects with a history of peer-victimization showing less pronounced ERPs. Conclusion: The results indicate that a history of peer-victimization influences the processing of social stimuli in depressive subjects. Activation of an associative memory network may account for the differences in the processing of emotional stimuli in depressive subjects with and without a history of peer-victimization.

Poster 4-95**THE INFLUENCE OF PHYSICALLY AND SOCIALLY THREATENING CONTEXT INFORMATION ON THE PROCESSING OF INHERENTLY NEUTRAL FACES**Fabian Klein, Benjamin Iffland, Sebastian Schindler, & Frank Neuner
Bielefeld University*Descriptors: context, faces, event-related potentials*

Perceptual processing of human faces is affected by context information, such as previous experiences and information about the person represented by the facial

expression or other features of the person's body. In the present study, we investigated the impact of verbally presented information about the person that varied with respect to affect (neutral, physically threatening or socially threatening sentences) and self-reference (self-referred vs. other-referred) on the processing of faces with an inherently neutral facial expression. Stimuli were presented in a randomized presentation paradigm. ERP analyses demonstrated a modulation of the evoked potentials by reference at the EPN and LPP stage and an enhancing effect of affective valence on the late positive potential (700–1000 ms) with socially threatening context information leading to most pronounced LPP amplitudes. We also found an interaction between reference and valence with self-related neutral context information leading to more pronounced LPP than other-related neutral context information. Our results indicate an impact of self-reference on early, presumably automatic processing stages and also a strong impact of valence on later stages. Using a randomized presentation paradigm, this study confirms that context information affects the visual processing of faces, ruling out possible confounding factors such as facial configuration or conditional learning effects.

Poster 4-96**BODY OR CUP? ALTERATIONS IN FEATURAL AND CONFIGURAL BODY IMAGE PROCESSING IN ANOREXIA NERVOSA**Annika PC Lutz¹, Cornelia Herbert², André Schulz¹, Ulrich Voderholzer³, Stefan Koch^{3,4}, & Claus Vögele¹¹University of Luxembourg, ²University of Ulm, ³Schoen Klinik Roseneck Prien, ⁴Paracelsus Medical University Salzburg*Descriptors: anorexia nervosa, event-related potentials, visual body image processing*

Anorexia nervosa (AN) is a mental disorder characterized by strict fasting, low body weight, and body image distortion. Structural and functional alterations of brain areas crucial for visual body shape processing, such as the extrastriate body area (EBA), provide a neuronal basis for altered visual body perception. Yet, it remains unclear at which time point in the visual processing stream these alterations become apparent. Of special interest is if these neuronal alterations are reflected in changes in the featural and configural processing of body shapes, as reflected by early event-related brain potential (ERP) components. We investigated ERPs elicited by pictures of the participant's own body, of another person's body (matched for body mass index), of the participant's own cup and of another person's cup in 20 women with AN and 20 healthy control women. Participants with AN showed reduced differentiation between self-body and self-cup in the P1 component (105–160 ms), indicating reduced featural processing of their own body. In contrast, configural body processing was enhanced in AN patients, as indicated by an increased differentiation between pictures of bodies and cups in the N1 component (160–225 ms), compared with healthy controls. These results demonstrate profound changes in the visual processing of body images in AN during the earliest ERPs for which category-specific modulation effects have been established. The possible significance of these alterations for etiology and treatment of AN is discussed.

The present project is supported by the National Research Fund Luxembourg (FNR).

Poster 4-97**EFFECTS OF ALCOHOL ABUSE AND DEPRESSIVE SYMPTOMS ON BEHAVIORAL AND ELECTROCORTICAL RESPONSES IN A SOCIAL JUDGMENT TASK**Frederik M van der Veen, & Ingmar H Franken
Erasmus University Rotterdam*Descriptors: alcohol addiction, depression, social judgment*

This study examined how alcohol addiction and depressive symptoms affected behavioral and electro-cortical responses in a social judgment task. A group of 23 abstinent alcohol dependent patients in treatment for their alcohol addiction and a group of 23 matched controls performed a social judgment task. In this task, they had to predict whether a virtual peer presented on a computer screen liked them or not. After the prediction, the actual judgment was shown and behavioral and electro-cortical responses to this judgment were measured. The group of abstinent alcohol patients showed a more negative bias in the task, resulting in more predictions that are negative. Moreover, patients showed more depressive symptoms as measured with self-report questionnaires and these symptoms were positively correlated with the more negative bias. In line with previous studies it was found that the FRN was largest for incongruent (unpredicted) judgments and P300 was largest for predicted 'like' judgments. Unexpectedly, both FRN and P300 amplitude did not differ between groups and were not affected by depressive symptoms. Possibly ERP components were affected by overlapping processes which were differentially affected by depression and alcohol addiction. It was concluded that alcohol addiction leads to negative bias in social interaction and that this effect is mediated by the effect of addiction on depressive symptoms.

Poster 4-98**COMPARISONS OF SEMANTIC VERSUS EPISODIC INFORMATION, SINGLE VERSUS FOUR PROBES IN THE P300-BASED COMPLEX TRIAL PROTOCOL FOR DETECTION OF CONCEALED INFORMATION**Elena Labkovsky, J Peter Rosenfeld, Elena Davydova, & Samuel Tullman
Northwestern University*Descriptors: concealed information test, P300, complex trial protocol, event-related potentials*

We showed (2008) Complex Trial Protocol (CTP) with semantic stimuli (Birth-dates) to be >90% accurate with 1 probe and 4 irrelevant. In the CTP a rare Probe (P) or frequent Irrelevant (I) stimulus appears on screen, followed by either a target or non-target stimulus later in the same trial. Three new studies are reported here: 1) we compared P300s evoked by presentation of semantic vs. 2) episodic stimuli. 3) We tested 4 vs. 1 probe runs in a CTP. In each group, n = 12 and 4 irrelevant were used. Subjects in one group (SG) were exposed to semantic stimuli (words). Subject's birthdate was the probe and 4 irrelevant were non-birth dates. In two other groups (E1, E4) the episodic stimuli were pictures of objects. The probes were presented on cards before the EEG tests; irrelevant were novel unseen images. E1 had one probe and E4 had 4 probes. Each of the two "episodic" groups had 4 irrelevant. Results: (1) A 3x2 (Group by Stimulus Type) ANOVA revealed group effect $F(2,33) = 16.9, p < .0001$, Stimulus Type effect $F(1,33) = 55.1, p < .0001$, and significant interaction $F(2,33) = 26.24, p < .0001$. (2) Follow up analysis: SG vs. combined E1 and E2, 2x2 (Group by Stimulus Type) ANOVA revealed significant group effect $F(1,34) = 15.3, p < .001$, SG > E1 & E4; Stimulus Type effect $F(1,34) = 90.4, p < .0001$, and interaction $F(1,34) = 52.0, p < .0001$. (3) E1 vs. E4 x stimulus type ANOVA showed group effect $F(1,22) = 18.6, p < .0001$ (E1 > E4), Stimulus Type effect $F(1,22) = 7.0, p < .015$, and no interaction; $p > .9$. Semantic items are better detected than episodic. Too many probes are bad for P-I discrimination.

Poster 4-99**EMOTIONAL INTENSITY INFLUENCES PRE-IMPLEMENTATION AND IMPLEMENTATION OF DISTRACTION AND REAPPRAISAL**Roni Shafir¹, Naama Schwartz¹, Jens Blechert², & Gal Sheppes¹
¹Tel Aviv University, ²University of Salzburg*Descriptors: emotion, regulation, event-related potentials*

While emotional intensity challenges regulatory strategies, its influence remains largely unexplored in affective-neuroscience. This study addressed the moderating role of emotional intensity in two regulatory stages – implementation (during

regulation) and pre-implementation (prior to regulation), of two cognitive regulatory strategies – distraction and reappraisal. According to our framework, since distraction implementation involves early attentional disengagement from emotional information before it gathers force, in high-intensity it should be more effective in the short-term, relative to reappraisal, which modulates emotional processing only at a late semantic meaning phase. Supporting findings showed that in high (but not low) intensity, distraction implementation resulted in stronger modulation of negative experience, reduced neural emotional processing (centro-parietal Late Positive Potential, LPP), with suggestive evidence for less cognitive effort (frontal-LPP), relative to reappraisal. Related pre-implementation findings confirmed that anticipating regulation of high-intensity stimuli resulted in distraction (over reappraisal) preference. By contrast, anticipating regulation of low-intensity stimuli resulted in reappraisal (over distraction) preference, which is most beneficial for long-term adaptation. Furthermore, anticipating cognitively demanding regulation, either in cases of regulating counter to these preferences or via the more effortful strategy of reappraisal, enhanced neural attentional resource allocation (Stimulus Preceding Negativity, SPN).

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Poster 4-100**COGNITIVE REGULATION OF LOVE FEELINGS: AN EVENT-RELATED POTENTIAL STUDY**Sandra JE Langeslag¹, & Jan W Van Strien²
¹University of Missouri-St. Louis, ²Erasmus University Rotterdam*Descriptors: love, regulation*

Love may be unreciprocated or forbidden, and love feelings declining over time pose a threat to romantic relationships. It would be helpful if we could up- and down-regulate love feelings at will, but it has not yet been examined whether people are able to do this. In this study, 20 participants (19–25 yrs, 10 men) who were involved in a romantic relationship, and 18 participants (20–26 yrs, 10 men) who had recently experienced a romantic break-up completed a love regulation task while their electroencephalogram (EEG) was recorded. Up-regulation of love increased feelings of attachment, while down-regulation decreased feelings of infatuation and attachment, and made people feel less positive. As expected, up-regulation of love was associated with a more positive waveform between 300–450 ms at central and parietal electrodes than passive viewing of beloved pictures. This effect correlated positively with the score on the reappraisal scale of the Emotion Regulation Questionnaire, as well as with the up-regulation effect in valence ratings. Unexpectedly, also down-regulation was associated with a more positive waveform between 300–450 ms at central electrodes than passive viewing of beloved pictures, which may reflect the attentional resources for the selection of down-regulation strategies. These effects did not differ between the relationship and break-up groups. Thus, both love up- and down-regulation seem feasible, although more research is needed. Love regulation may increase the positive effects and decrease the negative effects of love on individuals and on society.

Poster 4-101**THE EFFECT OF REAPPRAISAL IS INFLUENCED BY A CONCURRENT ATTENTIONAL TASK**

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Descriptors: emotional control, reappraisal, attention

Emotional regulation is the ability to modulate the intensity of responses to emotional events. The reinterpretation of the stimulus meaning (reappraisal) is known to influence the late positive potential (LPP). Little is known on how additional tasks during reappraisal could interfere with these regulatory effects. 93 subjects identified a small, supraliminally presented letter against the standardized, emotional pictures (negative, neutral or scrambled images). Three attentional conditions were possible, signaled by a cue before each trial: identify the letter in expected location, identify the letter in unexpected location or ignore the letter. We assigned subjects to one of the two groups: the reappraisal (with instruction to reinterpret the images if they become unpleasant) or the control one. The LPP evoked by negative pictures was significantly decreased in the reappraisal compared to the control group. Importantly, this attenuation was similar irrespective of the picture type and affected also neutral and scrambled images. This lack of specificity may suggest more general, tonic attenuation of picture processing. Moreover, the attentional conditions significantly altered the latency of the reappraisal effect (0.5s for the ignore condition, 2s for the unexpected and 2.5s for expected location). This interference shows that both tasks compete for cognitive resources and are based on serial processing. As long as the voluntary attention is oriented towards concurrent stimuli, the regulatory effects are abolished.

The study was supported by a grant from the National Centre of Science (decision DEC-2013/09/B/HS6/02662).

Poster 4-102**EEG AND EDA MEASURES OF STRESS REDUCTION IN RESPONSE TO MUSIC INTERVENTION**

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Descriptors: stress, music, electroencephalography, electrodermal activity

Research suggests that music listening can affect mood (McGregor et al. 2011) and physiological states (Thoma et al. 2013). Much of this research has focused on self-report and on music listening (as opposed to music playing). The purpose of this study was to expand the previous work in two major ways. Firstly, we wanted to compare the stress reducing effects of music listening versus music playing. Secondly, we utilized psychophysiological measures (EEG and EDA) in addition to self-report measures of stress. Participants were assigned to one of three "recovery" conditions; Control, Music Listening, or Music Playing. All participants we exposed to a stressor task (a modified version of the Trier Social Stress Test; Kirschbaum et al. 1993). After the stressor task was complete participants in the Control condition rested quietly for several minutes while participants in the Music Listening condition listened to music and participants in the Music Playing group were encouraged to interact with a xylophone. Baseline measures of EEG and EDA were obtained before the stressor task and recordings were collected during the stressor task and during the "recovery" period. The Music Listening group exhibited a significant reduction in the Skin Conductance response while the Music Playing group did not. Further, EEG exhibited decreased activity at frontal and parietal sites for both Music conditions. These results replicate previous findings regarding the stress reduction effects of music listening and provide mixed support for the stress-reduction effects of music playing.

Portions of this project were funded by Salisbury University's Faculty Mini-Grant Program.

Poster 4-103**ASSOCIATIONS AMONG PERCEIVED DISCRIMINATION, PERSEVERATIVE COGNITION AND RESTING HEART RATE VARIABILITY IN AFRICAN AMERICANS**

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Descriptors: perceived discrimination, perseverative cognition, heart rate variability

Racial/ethnic discrimination is associated with greater hypertension risk in African Americans. Recent research has further linked discrimination with lower vagally-mediated heart rate variability (HRV), an important marker of cardiovascular and overall health. Researchers have further posited that discrimination may be characterized by perseverative cognition (PC), a pervasive pattern of worrisome and ruminative thinking that has also been linked to lower HRV. Despite these indications, few studies have empirically tested these relationships. In the present research, we examined associations among discrimination, perseverative cognition and resting HRV in a sample (N = 65, 44% male) of young (mean age = 20.00 ± 2.83), healthy African Americans. Resting heart rate data was obtained via EKG and discrimination was assessed using the Perceived Ethnic Discrimination Questionnaire (PEDQ). Components of PC were assessed using the Penn State Worry Questionnaire (PSWQ) and the Ruminative Responses Scale (RRS). Discrimination was significantly correlated with rumination ($r = .36, p = .003$), but not worry ($r = .16, p > .10$), and was only marginally associated with HRV ($r = -.23, p = .06$). Regression analyses further revealed evidence of moderation, such that increasing discrimination was associated with a steeper decline in HRV among individuals with low and average levels of rumination ($p = .02$). The present results suggest that perseverative cognition may be a key factor linking discrimination to HRV in African Americans – an effect which may extend to other minority groups.

This research was supported by funding from The Ohio State University (OSU) Office of Diversity & Inclusion, The Todd Anthony Bell National Resource Center on the African American Male, The OSU Graduate School & College of Social, Behavioral and Economic Sciences to L.K.H. L.K.H is supported by a National Institute of Aging grant (5T32AG000029-38).

Poster 4-104**ENHANCED ACQUISITION OF CONDITIONED EYEBLINKS IN ANXIETY VULNERABLE INDIVIDUALS IS DISRUPTED BY US-ALONE TRIALS WHEN PRE-EXPOSED BEFORE CS-US TRAINING, BUT NOT WHEN INTERPOLATED DURING TRAINING**

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Descriptors: eyeblink conditioning, anxiety, pre-exposure

Behavioral inhibition (BI), defined as a temperamental tendency to withdraw from or avoid novel social and non-social situations, produces enhanced conditioned eyeblink responding (CRs). Previously, acquisition of CRs did not differ between a partial reinforcement protocol with 50% US alone (corneal air puff) trials as compared to 100% CS-US (tone-air puff) trials. This was surprising given the reduction in paired trials in the 50% US alone protocol and the finding that US alone pre-exposures disrupt subsequent acquisition. Previously, Kimble et al. (1955) tested a protocol with an interpolated block of 20 US alone trials during CS-US training and reported that CRs did not differ from those receiving 100% paired trials. We sought to extend this work to include behavioral inhibition. One hundred thirty undergraduates completed personality inventories. All participants received 60 acquisition trials. Acquisition consisted of either 100% CS-US training, 50% partial US training, 20 CS-US trials followed by 20 US alone trials, followed by 20 more CS-US trials or 30 US alone pre-exposures followed by 30 CS-US trials. The US alone effect, the BI facilitation effect from 50% US alone training, and the US pre-exposure effect were all replicated. The interpolated US alone trials did not disrupt CRs. BI individuals exhibited more CRs than non-inhibited individuals in all training paradigms except US alone pre-exposure. The effects of unpredicted aversive stimuli on learning and anxiety will be discussed in the light of uncertainty, learned helplessness, and cue salience.

This work funded by the University of Northern Colorado and the Stress and Motivated Behavior Institute.

Poster 4-105**VISUALIZING THE PAST: RACIAL RETRIEVAL CUES INCREASE THE ACCESSIBILITY OF SOCIAL JUSTICE CONCEPTS**

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Descriptors: intergroup relations, racial segregation, collective memory
 Exposure to historical racism increased support for policies that aim to reduce present-day inequality (Salter, 2010). We tested the hypothesis that rather than exposure per se, the extent to which individuals are engaged with the racially charged content (e.g., overt visual attention) may drive these effects. To test this hypothesis, we assessed overt visual attention at the immediate psychophysiological level using an eye-tracking procedure. Participants were randomly assigned to view images that emphasized U.S. racial segregation (n = 25) or images that were altered to omit racial segregation (n = 16) while their gaze patterns were recorded. After the image viewing task participants completed a word completion task. The word-completion task consisted of 25 word fragments, 6 fragments could be completed with social justice-related words or neutral words. For example, "L I B _ _ _" could be completed as liberty (social-justice related) or library (neutral). As predicted, participants higher in visual attention toward the racial retrieval cues in the original photograph condition completed the word fragment task with more justice related words relative to those looking at the doctored photographs. When the racial retrieval cues were obscured (edited photograph condition) social justice concepts were not as readily accessible. Overt visual attention may be one process by which exposure to historical racism drives support for inequality-reducing public policy.

Poster 4-106**THE RESPONSE TO ATROCIOUS EVENTS IN THE PAST: AN ERP STUDY**

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Descriptors: event-related potentials, Holocaust, emotion
 The study of the negative events in the past remains an important topic of research. The aim of this study was to investigate electrophysiological correlates of perception, proceedings emotional frames of historical documentary. 38 healthy volunteers participated in this study. Their task was to view a set of 80 neutral and 80 negative images from a Holocaust documentary. During the presentation ERPs and pupil size were recorded. We analyzed average signal amplitude of ERPs in the time intervals 40–80, 80–120, 120–220, 220–300, 300–400, and 400–700 ms after the beginning of exposure to the stimulus. We demonstrated that ERPs recorded during the presentation of negative, historical and neutral images differed by forms of oscillations, varied in amplitude. The amplitude of the N170 and P300 in frontal zones was greater to neutral pictures than negative, likely because the "abstract stimuli" were more familiar but demanded an answer to the question "what is this?". The historical images attracted more attention and were more emotional (occipital P300), demanded more integration processes to process the information in the images, and to establish semantic content. They also surprised the subjects (frontal N400) and activated their mental, psychological processes at the highest level of integration (late components in the frontal and occipital zones). Greater concurrent pupil dilation to the negative stimuli showed more attention and semantic integration than to neutral images. This data provide new insights into the neural bases of the perception of the negative information.

Poster 4-107**RELATIONS BETWEEN CARDIAC VAGAL TONE, INTERPERSONAL WARMTH AND ATTENTIONAL REGULATION IN PRESCHOOLERS**

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Descriptors: early childhood, self-regulation, vagal tone
 The modulation of autonomic reactivity by the vagus nerve theoretically allows for neural control over emotional processing and responsiveness that facilitates prosocial behavior (Porges, 2003). There is less understanding of the overlap between vagal tone and emotional competence in the preschool years, when parent-child interactions provide children opportunities to practice attentional and emotional regulation. We aimed to describe relations between parent-child relationship quality, vagal tone, and preschoolers' attentional control in response to emotion. Fifty-two 3 to 6 year olds (M = 3.85, SD = .83; 52% girls) and their mothers completed a laboratory assessment. Electrocardiograms were collected during baseline relaxation and mother-child and examiner-child interactions involving scripted prompts for social contact (e.g., count each other's fingers). Children completed a go/no-go task with happy and angry-faced stimuli. Mothers rated children's interpersonal warmth on the SASB Intex. Controlling for age and household adversity, higher maternal ratings of child warmth correlated with higher child RSA at baseline (r = .36, p = .03) and with mothers, r = .41, p = .02, and examiners, r = .41, p = .02. Higher child RSA at baseline and during joint interactions in turn predicted higher go/no-go accuracy for angry faces, $r = .33-.38$, p 's < .05. Findings underscore the interplay between the emotional quality of early parent-child relationships, parasympathetic tone and attentional control and point to the promise of family-based interventions to enhance children's emotional regulation.

Poster 4-108**CEPHALIC MEASURES OF AUTONOMIC AROUSAL**

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Descriptors: emotion, attention, cephalic measures
 Standard methods of recording measures of autonomic arousal, such as electrodermal (EDA) and blood pulse volume (BPV), typically attach sensors to the hands or feet (e.g., Allen, 2007; Farrell, 2001). While it appears that EDA and BPV data can be gathered from several cephalic locations, a review of the literature provides little guidance regarding which sites are best. An empirical approach that compared the effectiveness of the cephalic measures from various locations with data collected from traditional phalangeal recording sites was conducted to address this question. Both EDA and BPV data were gathered from three different cephalic sites as well as traditional phalangeal locations while participants viewed a series of IAPS images. In addition, pupil diameter data were also collected. The findings provide information regarding the optimal location of cephalic measures in relation to those gathered from traditional measurement locations. Further, while EDA, BPV, and pupil diameter have been used to classify responses to affective stimuli, this work explored the relationship among the measures and their optimal combination as a function of valence.

Index to Abstract Authors

- Ada, Emel, S75
 Agathocleous, Andri, S122
 Ahles, Joshua J, S43, S44, S53
 Akkermann, Kristi, S100
 Alderman, Brandon L, S34, S75
 Aldrich, Jaclyn T, S43, S123
 Alexander, Fennell B, S79
 Alhabash, Saleem, S47
 Alhadad, Sakinah SJ, S91
 Alho, Kimmo, S9
 Allen, Ben, S84
 Allen, John JB, S35, S51
 Allen, M. Todd, S125
 Allen-Winters, Stephanie, S2, S37
 Alloy, Lauren B, S113
 Almond, Anthony, S108
 Alpers, Georg W, S102
 Al-Riyami, Abdullah, S47
 Aletmus, Margaret, S88
 Amador, Alfredo Alvarez, S68
 Ambach, Wolfgang, S106
 Ames, Alyssa M, S48
 Ames, Evan G, S59, S60
 Amlung, Michael T, S36
 Amsel, Ben, S6
 Andrasik, Franks, S86
 Andreaaggi, Christian, S57, S119
 Andreatta, Marta, S34, S79
 Andrión, Kristina, S42
 Angrilli, Alessandro, S99
 Angus, Douglas J, S83
 Arai, Jun-ichiro, S72
 Arbel, Yael, S122
 Areshenkoff, Corson N, S25
 Aslaksen, Per Matti, S98
 Asnaani, Anu, S83
 Auerbach, Randy P, S77
 Auksztulewicz, Ryszard, S14
 Austin, Svancara M, S79
 Avery, Trey, S77
 Ayers, Tim S, S28, S47
 Álvares, Roberta SR, S81
 Åsli, Ole, S112

 B Lustyk, M. Kathleen, S3, S32
 Bachman, Peter, S23, S33
 Bailey, Kira, S36
 Bailey, Rachel L, S89, S90, S108
 Baker, Katelyn R, S2, S37
 Baker, Travis E., S37, S116
 Baldwin, Cassandra L, S29
 Baniqued, Pauline L, S80
 Banister, Madeline E, S56
 Barascud, Nicolas, S14
 Barker, Tyson V, S16
 Barnes, Karen, S101
 Barrett, Lisa F, S41
 Barros, Carla, S68
 Bartholow, Bruce D, S25, S36
 Barto, Daniel R, S23
 Bartsch, Felix, S85
 Basar, Erol, S75, S107
 Basseri, Cyrus, S57

 Bastos, Aline Furtado, S48
 Bates, John E, S109
 Bates, Marsha E, S115
 Baucom, Brian R, S40
 Baucom, Katherine JW, S40
 Büchel, Christian, S89
 Beauchaine, Theodore P, S77
 Beauducel, André, S63, S64
 Beck, Diane M, S35, S81
 Begnoche, John P, S114
 Bekshaev, Sergey S, S114
 Bell, Kimberly A, S110
 Bell, Martha Ann, S16, S32, S56
 Bell, Theodore, S31, S55
 Benau, Erik M, S79
 Bendixen, Alexandra, S4, S76
 Benning, Stephen D, S40, S101
 Benvenuti, Simone Messerotti, S99
 Berdica, Elisa, S102
 Berger, Natalie I, S45
 Berke, Collin K, S38
 Berkman, Elliot T, S66
 Berry, Daniel R, S44
 Bertels, Zachariah, S83
 Best, Daniel, S80
 Bickel, Kelly D, S41
 Biehler, Kaitlyn M, S73
 Biehler, Kaitlyn, S73
 Billinger, Martin, S78
 Bismark, Andrew W, S35
 Bjørkedal, Espen, S98
 Blair, Nicholas J, S94
 Blaison, Christophe, S82
 Blechert, Jens, S42, S124
 Bleichner, Martin, S10
 Blumental, Hediemarie, S98
 Blumenthal, Terry D, S20
 Bobes, Maria Antonieta, S86
 Bobilev, Anastasia M, S116
 Bohlmeijer, Ernst, S73
 Bolis, Paul, S108
 Bonanno, George A, S88
 Bornovalova, Marina A, S27
 Botvinick, Matthew M, S14
 Bouslog, Allison F, S58
 Bowles, Amy E, S35
 Bowyer, Colin B, S30
 Braddon-Mitchell, David, S83
 Bradford, Daniel E, S43, S63
 Bradford, Elisabeth EF, S49
 Bradley, Margaret M, S33, S42, S61, S69, S85, S121
 Brauckmann, Christina, S76
 Bress, Jennifer N, S13, S78, S105, S106
 Brislin, Sarah J, S91, S92
 Brocher, Andreas, S63
 Brooker, Rebecca J, S62, S114
 Brooks-Gunn, Jeanne, S77
 Brown, Casey L, S47, S87
 Brown, Darin R, S23
 Brown, Kirk Warren, S44
 Browning, Lauren E, S49

 Brox, Yngve, S98
 Brunellière, Angèle, S105
 Brunia, Kees, S11
 Brunner, Clemens, S78
 Brush, Christopher J, S34, S75
 Bruzi, Alessandro T, S112
 Bublatzky, Florian, S102
 Buchanan, Taylor L, S112
 Buckley, Jude, S96
 Buckley, Peter F, S116
 Buckman, Jennifer F, S115
 Budd, Desiree, S2
 Bufferd, Sarah J, S20
 Bullivant, David, S97
 Buodo, Giulia, S99
 Burdwood, Erin N, S67
 Burleson, Mary H, S40, S101
 Burrell, Anglene N, S125
 Burwell, Scott J, S57
 Buss, Kristin A, S16, S65, S82, S114
 Butera, Christiana D, S56
 Butler, John S, S10

 Cakmur, Raif, S107
 Calkins, Susan D, S16, S32
 Calzada Reyes, Ana Agustina, S68
 Campagnoli, Rafaela R, S81
 Campagnoli, Rafaela, S94
 Campos, Belinda, S15
 Carbine, Kaylie A, S84
 Carmo Blanco, Noelia Do, S105
 Carroll, Haley A, S3, S32
 Casanova, Manuel F, S78
 Casey, James J, S66
 Cavanagh, James F, S14, S23, S62, S110
 Cavusoglu, Berrin, S75
 Chait, Maria, S14
 Chandregowda, Adithya, S36, S122
 Chang, Wen-Pin, S86
 Charalambous, Elena, S53, S120
 Chavanon, Mira-Lynn, S116
 Chen, Andrew CN, S21
 Chen, Antao, S20
 Chen, Kuan-Hen, S14
 Chivers, Meredith L, S97, S120
 Chivers, Meredith, S97
 Choi, Hyeri, S121
 Chwilla, Dorothee J, S13
 Cinciripini, Paul M, S70, S71
 Cipriano, Margarida, S39
 Claiborne, Kimberly N, S71
 Clark, Caron AC, S126
 Clawson, Ann, S84
 Clayson, Peter E, S23, S33, S55
 Clayton, Russell B, S108
 Clements, Katie N, S41
 Clementz, Brett A, S116
 Cloutier, Renee, S98
 Coffman, Brian A, S56, S57, S118, S119
 Cohen, Jonathan D, S14
 Cohen, Neal J, S28

 Colakoglu, Beril Donmez, S107
 Cole, Marion A, S43
 Coles, Michael GH, S106
 Collins, April, S2, S37
 Conceição, Nuno, S39
 Conde, Erick, S36
 Condy, Emma E, S56
 Conrod, Patricia, S37
 Constante, Kevin, S74
 Constantinou, Elena, S53
 Constantinou, Thekla, S53
 Cooper, Patrick S, S119
 Coppens, Ryan P, S46, S117
 Corballis, Paul M, S96, S97
 Corina, David P, S18
 Cornelissen, Jeremy, S104
 Cortese, Kristin M, S71
 Cory, Pettit J, S84
 Cosme, Danielle E, S93, S104
 Costantinou, Elena, S120
 Coulson, Seana, S17, S121
 Crasta, Jewel E, S85, S105
 Creem, Daniel R, S2
 Crenshaw, Alexander O, S40
 Crocker, Laura D, S23
 Croft, Rodney J, S29
 Cronin, Sophie L, S91
 Crowell, Adrienne, S103
 Crowell, Sheila E, S53, S81, S123
 Crowell, Sheila, S43
 Crowley, Michael J, S18
 Cuevas, Kimberly, S16
 Cui, Yong, S39
 Cummins, Glenn, S38
 Cunningham, Emily C, S44
 Cunningham, Emily, S74
 Cunningham, Tony J, S46
 Curham, Kyle J, S35
 Curtin, John J, S43, S63
 Cutlip, Robert G, S126

 D'Andrea, Wendy, S67
 Dalecki, Anna, S29
 Damaso, Karlye, S15
 Danilov, Sergii, S126
 Danovitch, Judith H, S60
 Danvers, Alexander F, S28
 Danyluck, Chad, S64
 Daou, Marcos Z, S112
 David, Isabel A, S94
 David, Isabel, S36
 Davies, Patricia L, S85, S86, S105
 Davis, Elizabeth L, S82, S108, S109
 Davis, Joshua D, S121
 Davis, Kaci B, S58
 Davydova, Elena, S124
 Dawson, Geraldine, S101
 Dawson, Samantha, S97
 Diaz-Ferrer, Sandra, S94
 Deater-Deckard, Kirby, S56
 Debener, Stefan, S10, S42
 Deblieck, Choi, S8
 Deckert, Jürgen, S70

- Delaney-Busch, Nathaniel, S13
 Delgado, Rafael, S94
 Dell'Acqua, Roberto, S118
 DeLong, Katherine, S6
 Denke, Greg A, S41
 Denke, Greg, S102
 Dennis, Tracy A, S17, S88
 Densley, Rebecca, S38
 Denver, John, S126
 der Lubbe, Rob Van, S73, S88
 Desjardins, James A, S67
 Dessy, Emilie, S116
 Devillier, Celina R, S125
 Deweese, Menton M, S71
 Diaz, Anjolie, S32
 Dickson, Danielle S, S29, S93
 Dierolf, Angelika M, S76
 Dieterich, Raoul, S50
 diFilipo, Danielle, S74
 Diéguez-Risco, Teresa, S13
 Ding, Mingzhou, S69
 Dodd, Andrew B, S110
 Dolcos, Florin, S44, S45, S83
 Dolcos, Sanda, S45, S83
 Dolgorukova, Anna P, S101
 Domschke, Katharina, S70
 Donchin, Emanuel, S10, S26, S36, S122
 Donnelly, Michael PW, S2
 Dore, Samyukta S, S79
 Doren, Natalia Van, S87
 Doro, Mattia, S118
 Dougherty, Lea R, S43
 Doukas, Ashley, S67
 Drapekin, Jesse, S34
 Drew, Trafton, S4
 Drisdelle, Brandi Lee, S118
 Drislane, Laura E, S92
 Drobos, David J, S27
 Drollette, Eric S, S50
 Drumm, Annika, S67
 Dubnick, Logan A, S85
 Duckro, Adam, S40
 Duncan, C. Jessie, S40, S101
 Duncan, Charlesynquette M, S69
 Dungan, Sidney, S105
 Dunn, Kaitlin R, S46
 Durbin, C. Emily, S110
 Duschek, Stefan, S71
 Duvall, Kevin, S2
 Dyer, Anne S, S102
 Dyke, Ford B, S112
 Dykstra, Tobin R, S33
- Edge, Michael D, S66
 Edreva, Daniela, S82
 Efimov, Oleg, S97
 Egan, Laura J, S17, S88
 Eklund, Rasmus, S93
 Elbassuoni, Eman A, S96
 El-Baz, Ayman S, S78
 Elkins-Brown, Nathaniel W, S121
 Elmore, Wade R, S103
 El-Sheikh, Mona, S52
 Emek-Savas, Derya Durusu, S75, S107
 Emkes, Reiner, S10
 Emmorey, Karen, S17
- Endrass, Tanja, S20, S50
 Engelmann, Jeffrey M, S70
 Enzminger, Andreas, S126
 Eonta, Alison M, S104
 Erath, Stephen, S52
 Erthal, Fátima Smith, S48
 Esser, Roland, S89
 Esteller, Àngels, S84, S115
 Estes, Annette, S101
 Ethridge, Paige, S89
 Evans, David E, S27
 Everhart, D. Erik, S41
 Everhart, Daniel E, S38, S41
- Fabiani, Monica, S28, S35, S44, S80
 Fallon, Veronica T, S2, S125
 Fallon, Veronica, S2
 Farrell, Kelly N, S67
 Fashingbauer, Nathan, S2
 Federmeier, Kara D, S26, S29, S81, S93
 Federmeier, Kara D., S7
 Feinberg, Ziv E, S77
 Feinberg, Ziv S77
 Femir, Banu, S107
 Fernandez, Nicolas G, S94
 Fernández-Folgueiras, Uxia, S13
 Fernández-Santaella, M. Carmen, S94
 Fiacconi, Chris M, S35, S36
 Fiess, Johanna, S97
 Figueira, Ivan, S48
 Figueira, Jessica, S36
 Filik, Ruth, S26
 Fillion, Diane L, S52, S103
 Fillion, Diane, S52, S103
 Finch, James D, S33
 Finke, Johannes B, S120
 Fink, Andreas, S116
 Finley, Anna J, S103
 Fischer, Agneta, S82
 Fisher, Megan E, S33, S60
 Fisher, Philip A, S66
 Fisher, Terri D, S120
 Flaten, Magne Arve, S98
 Fletcher, Mark A, S28, S80
 Flohr, Elena LR, S34, S114
 Flor, Herta, S59
 Foa, Edna B, S83
 Foell, Jens, S59
 Folk, Daniel J, S46
 Fonfría, Alicia, S84, S115
 Fonseca, Isabel B, S39
 Fonseca, Laura, S60, S88
 Forbes, Chad, S25
 Ford, Judith M, S15
 Fortier-Gauthier, Ulysse, S9
 Foti, Dan J, S31
 Foti, Dan, S31, S89
 Foxe, John J, S10
 Fox, Bryan D, S52
 Fox, Nathan A, S16
 Francisco, Ardeene, S115
 Franken, Ingmar HA, S90
 Franken, Ingmar H, S124
 Frank, David W, S51
 Frank, Michael J, S62
 Fresco, David M, S113
- Friedman, Bruce F, S56
 Friedman, Bruce H, S56, S121
 Friston, Karl, S14
 Frost, Jade, S15
 Froud, Karen, S77
 Fuchs, Xaver, S75
 Fu, Xiaoxue, S65
 Fulham, William R, S119
 Fuseda, Kohei, S113
- Gable, Philip A, S49, S58
 Gabrielle, Carlson A, S43
 Gamer, Matthias, S89
 Gan, Gary, S10
 Gannon, Matthew A, S68
 García Alanis, José Carlos, S116
 García, Lídice Galán, S68
 Garcia, Christopher M, S96
 Garcia, Emmanuel, S60, S88, S120
 Garcia, Natalia, S3
 Garvey, Marjorie A, S18
 Gatzke-Kopp, Lisa M, S77
 Gatzke-Kopp, Lisa, S15
 Gavin, William J, S85, S86, S105
 Gawryluk, Jodie R, S25
 Gayle, Leigh C, S44
 Gelber, Shari, S88
 Georgiou, Dora, S53, S119, S120
 Gerdes, Antje BM, S102
 Gessner, Stacia N, S103
 Gianaros, Peter G, S58
 Gibb, Brandon, S106
 Gibbs, Hailey M, S125
 Gilbert, David G, S46
 Gilbert, David, S117
 Gilliam-Beauchamp, Kathryn S, S66
 Girouard, Cailtin M, S59, S60
 Giuliano, Ryan J, S31, S37, S55, S126
 Giuliano, Ryan, S55
 Glotzbach-Schoon, Evelyn, S79
 Glozman, Janna M, S101, S111
 Godwin, Maurice M, S112
 Goel, Serena, S4
 Gogo, Cody E, S67
 Goldberg-Nakar, Odelia, S75
 Goldstein, Abraham, S75
 Goldstein, Brandon, S54
 Gomez, Juan-Carlos, S49
 Gonzales, Joseph E, S16
 Goodman, Marianne, S94
 Goodman, Robert J, S44
 Gorbunov, Andrei, S70
 Graap, Ken, S43, S52
 Graf, Tim, S63
 Grainger, Jonathan, S17
 Gramann, Klaus, S10
 Grand, Kirk F, S112
 Grand, Kirk, S43
 Grant, Shara S, S56
 Gratton, Gabriele, S28, S35, S44, S80
 Graves, Kelly, S74
 Gray, DeLeon L, S125
 Gregory, Ellen, S103
 Grimm, Juergen, S126
 Grishina, Kseniya I, S111
 Gromer, Daniel, S34
- Grose-Fifer, Jill, S74
 Gruss, Forest, S85
 Gruss, L. Forest, S69
 Guerra, Pedro, S94
 Gugushvili, Manana Gm, S109
 Guntekin, Bahar, S75, S107
 Guyer, Amanda E, S16
 Gwizdala, Kathryn L, S78
- Hackley, Steven A, S11, S57, S58, S107
 Hahn, Shannon, S104
 Haigh, Sarah M, S56, S57, S118, S119
 Hajcak, Greg P, S30
 Hajcak, Greg, S12, S13, S19, S20, S43, S77, S78, S89, S105, S106
 HajiHosseini, Azadeh, S65
 Hale-Rude, Emily, S13
 Hall, Maureen P, S60
 Hamilton, Holly K, S23, S33
 Hamilton, Jessica L, S52, S113
 Hamilton, Rachel KB, S63
 Hamm, Alfons O, S61, S76
 Hamm, Carmen, S61
 Hamm, Jordan P, S116
 Han, Jingjing, S108
 Han, Shihui, S21
 Hanlon, Faith M, S110
 Hanson, Connor, S2
 Harbauer, Martin, S114
 Harper, Jeremy, S24
 Harrison, Tyler, S95
 Hassall, Cameron D, S30, S31, S91
 Hastings, Paul D, S16
 Havrylets, Yuri, S126
 Hayden, Elisabeth, S20
 Hayes, Emma, S32
 Hayrynen, Lauren K, S116
 Hazlett, Erin A, S94
 Hazlett, Laura, S104
 Heathcote, Andrew, S15
 Hecht, Holger, S76, S106
 Hedger, Kathrynne Van, S45
 He, Shaoying, S38
 Heim, Alicia, S58
 Heinrich, Angela, S59
 Heitkemper, Margaret, S3
 Heller, Wendy, S23, S48
 Henare, Dion T, S96
 Henderson, Robert R, S42
 Hennig, Jürgen, S92
 Henning, David A, S45, S78
 Henz, Diana, S74, S114
 Herbert, Cornelia, S21, S22, S123
 Hermann, Christiane, S92, S93
 Herring, David R, S42, S69
 Hess, Ursula, S82
 Hester, Gladys M, S104
 Hewig, Johannes S, S106
 Hewig, Johannes, S38, S42, S90, S91, S106
 Heydari, Sepideh, S111
 Hicks, Brian M, S30
 Hicks, Katelynn, S86
 Higgins, Antonio, S103
 Highsmith, Jonathan M, S38, S41
 Hilimire, Matt R, S107

- Hill, Ashley C, S43, S52
Hill, Kaylin E, S31
Hill, LaBarron K, S70, S98, S122, S125
Hillman, Charles H, S50
Hinojosa, José Antonio, S13
Hirao, Takahiro, S54
Hobson, Nicholas M, S64
Hogan, Jasara N, S40
Hoggard, Lori S, S98, S125
Hohmann, Volker, S76
Holcomb, Phillip J, S17
Hollenstein, Tom, S120
Holroyd, Clay B, S14, S42, S65, S107, S111
Horváth, János, S15
Howard, Alexis, S77
Howse, Ashley, S30
Hsieh, Shulan, S73
Hsu-Wen, Huang, S100
Huang, Chih-Mao, S65
Huang, Haiqing, S69
Huang, Hsu-Wen, S65
Huang, Pei-Shan, S65
Hubbard, Ryan J, S81
Huberman, Jackie S, S97
Hudgens-Haney, Matt E, S116
Hu, Yifan, S83
Hunter, Montana, S119
- Iacoboni, Marco, S8
Iacono, William G, S24, S30, S57, S59
Ievpak, Nataliia V, S86
Iffland, Benjamin, S123
Iglesias, Jaime, S86
Infante, Roberto, S36
Infantolino, Zachary P, S23, S26, S78, S106
Ingersoll, Brooke R, S45
Inoue, Yusuke, S72
Inzlicht, Michael, S64, S121
Iordan, Alexandru D, S44, S45, S83
Iordan, Alexandru, S83
Iuliia, Sosiedka, S115
- Jabr, Mejdy M, S102
Jackson, Edward F, S70
Jackson, Felicia, S78, S106
Jacobs, Cassandra L, S81
Jafarova, Olga, S121
Jagger, Audreyana C, S46
Jaškowski, Wojciech, S88
Jang, Anthony I, S62
Janowich, Jacqueline R, S62
Jasperse, Lee J, S23
Jasperse, Leland J, S33
Jawed, Khurram, S97
Jefferies, Ian, S126
Jefferies, Rose E, S37
Jefferies, Rose, S126
Jennings, J. Richard, S58
Jentink, Kade G, S27
Jentsch, Ines, S49
Jeronimo, Rita, S25
Jha, Amishi P., S6
Jing, Yiming, S100
Jin, Jingwe Frances, S77
- Jin, Jingwen, S49
Jingwen Jin, Aprajita Mohanty, S4
John, Christie, S91
Johnson, Elishia, S47
Johnson, Gabriella M, S107
Johnson, Robin R, S39
Johnstone, Stuart J, S29
Jolicoeur, Pierre, S8, S9, S99, S118
Jones, Emily JH, S101
Jones, William W, S86
Jordan, Kelly, S25
Joseph, Kirchhoff E, S79
Jozefowicz, Jeremie, S105
Jung, Hyunjin, S117
Jung, Tzyy-Ping, S10
Junghöfer, Markus, S8, S85, S113
Juravle, Georgiana, S102
Jutras-Aswad, Didier, S37
- Kaczurkin, Antonia N, S83
Kaiser, C. Kit, S108
Kalarot, Ratheesh, S97
Kalatzis, George, S24
Kallman, Davi, S108
Kamijo, Keita, S20, S54
Kang, Sinyoung, S117
Kao, Shih-Chun, S50
Karalunas, Sarah L, S122
Karayanidis, Frini, S119
Karl, Anke, S73
Karns, Christina M, S31, S55
Karns, Christina, S55
Kastner, Anna K, S114
Katayama, Jun'ichi, S21, S94, S95, S112
Kathmann, Norbert, S19, S20, S50
Katsumi, Yuta, S45, S83
Kavcioglu, Fatih C, S102
Kaye, Jesse T, S63
Kayser, Austin D, S63
Keene, Justin R, S38
Keil, Andreas, S8, S9, S42, S69, S85
Kelley, Nicholas J, S126
Kemper, Susan, S52
Kendall, William, S39
Kepola, Androula, S119
Kertz, Sarah J, S46
Kessel, Ellen M, S43
Khachidze, Irma KI, S109
Khan, Naiman A, S50
Khedari, Vivian, S67
Köhler, Stefan, S36
Khomenko, Yulia G, S79
Kieffaber, Paul D, S44, S48
Kieffaber, Paul, S74
Kim, Kye Y., S56
Kim, Wonkyung, S47
Kimura, Tsukasa, S95
Kingstone, Alan, S39
Kirby, Lauren AJ, S43, S52
Kirilko, Elvira, S74
Kirkland, Anna, S43, S52
Kirschner, Hans, S73
Kirwan, Christopher B, S55
Kiryu, Shigeru, S72
Kiselnikov, Andrey A, S101, S111
Kissler, Johanna M, S12, S95
Kissler, Johanna, S22
- Kizuk, Sayeed AD, S95
Klaver, Peter, S9
Klawohn, Julia, S20, S50
Kleine, Elian De, S73
Klein, Daniel N, S20, S43
Klein, Daniel, S54
Klein, Fabian, S123
Klohn, Teresa, S76
Klucken, Tim, S92
Klumpp, Heide, S12
Kneip, Chelsea, S61
Knight, Erik L, S66
Knight, Robert T., S7
Knoblich, Guenther, S117
Knoeferle, Pia, S22
Kobayashi, Ithori, S110
Kobayashi, Takefumi, S113
Koch, Stefan, S123
Kodituwaku, Piyadasa W, S96
Kong, Tania S, S80
Konig, Andrea, S104
Konvalinka, Ivana, S117
Kotani, Yasunori, S72
Kotlewska, Ilona, S74
Kotov, Roman, S13, S49, S54, S78
Kotz, Sonja A, S68
Koudys, Jacob W, S25
Koushiou, Maria, S53, S120
Kovacs, Maria, S84
Koval, Alexandra V, S79
Kozlovskiy, Stanislav A, S101, S111
Kramer, Arthur F, S50
Kramer, Mark D, S30
Krigolson, Olave E, S30, S31, S91
Kross, Ethan, S61
Krueger, Robert F, S30
Kuehn, Mara J, S62
Kuhn, Manuel, S61
Kujawa, Autumn J, S20
Kujawa, Autumn, S43
Kumar, Manoj, S81
Kuperberg, Gina, S13
Kurgansky, Andrey V, S59
Kutas, Marta, S6
Kuyken, Willem, S73
Kuznietsov, Illya P, S86
- la Coba, Pablo de, S71
Labkovsky, Elena, S34, S124
Ladrón de Guevara1, Cristina Muñoz, S71
LaGasse, Blythe, S85
Lage, Agustin, S86
Lake, Jessica I, S23
Lal, Sara, S24
Lamkin, Samantha R, S45, S78
Lamm, Connie, S41, S102
Lange, David M, S125
Langenecker, Scott A, S12
Langeslag, Sandra JE, S124
Lang, Annie, S108
Lang, Peter J, S33, S42, S61, S69, S85, S121
Lapping-Carr, Leiszle, S40
Laptook, Rebecca S, S20
Larcher, Kevin, S37
Larra, Mauro F, S63
Larsen, Ryan, S44
- Larson, Michael J, S55, S84
Lass-Hennemann, Johanna, S120
Laszlo, Sarah, S4, S116
Latham, Andrew J, S83
Leaver, Echo E, S125
Leaver, Echo, S2
LeCheminant, James, S84
LeCheminant, Rick, S84
Leckey, Michelle, S26
Lee, Elizabeth, S16
Lee, Kellie, S67
Leen-Feldner, Ellen W, S98
Lees, Ty, S24
Lefebvre, Christine, S99, S118
Lehockey, Katie A, S38, S41
Leiker, Amber M, S112
Leneman, Keira, S55
Lent, Tim van, S82
Leonidou, Chrysanthi, S53, S119
Leshner, Glenn, S108
Lesperance, Paul, S37
Letkiewicz, Allison M, S48
Leue, Anja, S63, S64
Leupoldt, Andreas von, S89, S102
Leuthold, Hartmuth, S26
Levenson, Robert W, S47, S66, S87
Levinson, Amanda, S105
Lieberman, Lynne N, S60
Ligeza, Tomasz S, S125
Limberg, Anke, S61, S76
Lim, Tae Hwan, S117
Lindner, Katja, S61, S76
Lindquist, Kristen, S22
Ling, Josef, S110
Lin, Mei-Heng, S86
Lin, Yanli, S33
Lin, Yi-Yuan, S47
Lipko, Samantha, S118
Lipp, Ottmar V, S55, S91
Lissek, Shmuel, S19
Liu, Huiting, S34
Liu, Jiawei, S90
Liu, Keke, S54
Liu, Mengting, S25
Lobo, Isabela, S36
Loftin, Cade, S52
Lo, Sharon L, S60, S110
Lohse, Keith R, S112
Lohse, Keith, S43
Long, Stephanie M, S68
Lonsdorf, Tina B, S61
Lonsdorf, Tina, S82
Loof, Travis, S38
Losier, Talia, S118
Lou, Chen, S47
Loveless, James P, S41
Loveless, James, S38
Low, Kathy A, S28, S80
Loyo, Julieta Ramos, S72
Lucas, Ignacio, S94
Lucchio, Samantha, S122
Luck, Camilla C, S55, S91
Luecken, Linda J, S28, S47
Luehring-Jones, Peter T, S88
Luehring-Jones, Peter, S88
Luhmann, Christian, S77
Lutz, Annika PC, S123
Lutz, Antoine, S6

- Löw, Andreas, S61
Lwi, Sandy J, S66
Lyby, Peter S, S98
- MacDonald, Angus W, S103
Machinskaya, Regina I, S59
Mackenzie, Ian G, S26
Mackin, Daniel, S13
Maclin, Edward L, S28, S44
Maclin, Edward M, S80
MacNamara, Annmarie, S12
Macy, Alan, S43, S52
Madan, Christopher R, S95
Magerman, Adam, S25
Mahmoudzadeh, Mahdi, S80
Makarchuk, Mukola, S126
Makeig, Scott, S9, S10, S17, S18
Makhashvili, Malkhaz MM, S109
Malcolm, Brenda R, S10
Maloletnev, Victor MV, S109
Malone, Stephen M, S24, S57
Manasterski, Christine, S122
Mangun, G. R., S6
Mao, Jingwen, S97
Marakshina, Julia A, S101, S111
Marcela, Otero C, S87
Marchak, Frank M, S126
Marchuk, Ivanna M, S86
Marques, Ana, S39
Marshall, Cassandra L, S52
Martin, Anne, S77
Martin, Frances H, S32
Martínez-García, Natalia, S13
Masaki, Hiroaki, S20, S54
Mascarelli, Danielle, S74
Masson, Michael, S91
Mata-Martín, José Luis, S94
Mathalon, Daniel H, S15
Mathersul, Danielle, S11
Mathewson, Kyle E, S35, S95
Matsuda, Izumi, S21
Maus, Johanna V, S74
Mayer, Andrew R, S110
Mayes, Linda C, S18
Mazhirina, Ksenya, S121
McCarthy, Denis M, S36
McCartin, Jonathan P, S79
McCathern, Alexis G, S118
McDowd, Joan M, S52
McDowd, Joan, S103
McDowell, Jennifer E, S116
McGarrh, Danielle A, S35
McGinley, Jared J, S56, S121
McLean, Carmen P, S83
Mechin, Nicole C, S58
Medaglia, John D, S11
Medina, Amy, S74
Medrano, Michael, S51
Mellman, Thomas A, S110
Mennella, Rocco, S99
Mennin, Douglas S, S60, S88, S120
Mercado, Kevin, S101
Merrillees, Jennifer, S66
Metzger, Brian A, S35
Meyer, Alexandria, S13, S20, S106
Mezulis, Amy H, S43, S44, S53, S123
Mühlberger, Andreas, S34
- Miccoli, Laura, S94
Michelle N Shiota, Jenn-Yun Tein, S47
Machie, Patricia T, S119
Midgley, Katherine J, S17
Mikle, South, S84
Miller, Gregory A, S23, S33, S48
Miller, Matthew W, S43, S112
Miltner, Wolfgang HR, S76, S106
Milyavskaya, Marina, S64
Mimnaugh, Katherine J, S48
Mintz, Brianna, S126
Miskovic, Vladimir, S69
Mitchell, Ellen Sullivan, S3
Möller, Phillip, S74
Méndez-Bértolo, Constantino, S92
Münster, Katja, S22
Mocaiber, Izabela, S81
Moesler, Camilla, S79
Moffett, Jonathan B, S125
Mohanty, Aprajita, S49, S77
Molfese, Dennis L, S109
Molina, Ludwin E, S126
Molina, Stephany M, S40
Moltó, Javier, S84, S115
Montoro, Casandra I, S71
Moore, Matthew, S44, S45, S83
Moore, R. Davis, S50
Moore, Robert D, S50
Moors, Agnes, S112
Morales, Santiago, S82
Moratti, Stephan, S92
Morgan Eisele, Nasser Almutairi, S47
Morris, David H, S36
Moser, Jason S, S33, S45, S60, S61, S110
Moser, Julia, S121
Moua, Keng C, S51
Muehlberger, Andreas, S79
Mueller, Andrea A, S62
Mueller, Erik M, S19, S92, S93
Mukherjee, Prerona, S49
Muldrow, Adrienne, S89
Mullen, Paige, S2
Mullens, Daniel, S15
Mulligan, Bryce P, S25
Munson, Jeff, S101
Murdock, Tamera B, S52
Murphy, Jerry E, S43, S52
Murphy, Tim K, S57, S119
Murphy, Timothy I, S54
Murphy, Timothy K, S56, S118
Murphy, William G, S52
Murphy, William, S103
Musser, Erica D, S122
Musslick, Sebastian, S14
- Nagano, Yuichiro, S113
Nagomova, Zhanna V, S37, S79, S114
Naka, Sanae, S94
Narayanan, Kumar, S14
Narr, Katherine L, S33
Narzikul, Kara M, S51
Nastasiia, Plakhotnyk, S115
Naumann, Ewald, S76, S80
Nazmy, Walaa H, S96
- Necka, Elizabeth A, S45
Nees, Frauke, S75
Nelson, Brady D, S12, S77, S78, S105
Nelson, Caleb, S2
Nelson, Lindsay D, S30
Neophytou, Klavdia, S53
Neszmélyi, Bence, S15
Neueder, Dorothea, S79
Neuhaus, Emily, S101
Neumann, Anna, S41
Neumann, Roland, S80
Neuner, Frank, S123
Neville, Helen J, S31, S55
Neville, Helen, S55
New, Antonia S, S94
Newton, Scott L, S66
Ng, Jennifer, S71
Nienow, Tasha M, S103
Nigg, Joel T, S122
Nilsson, Mats, S93
Nittono, Hiroshi, S119
Norman, Gregory J, S45
Norris, Catherine J, S2
Norton, James JS, S93
Novak, Brittni K, S31
Nowicka, Anna, S74
Nuechterlein, Keith H, S23, S33
- Oberauer, Klaus, S9
O'Hare, Aminda J, S59, S60, S104
Ohgami, Yoshimi, S72
Okhravi, Hamid, S74
O'Leary, Colleen T, S27
Olivares, Ela, S86
Oliveira, José Magalhães, S48
Oliveira, Leticia, S36, S48
Oliver, Taylor L, S40
Oliver, William T, S116
Olson, Ryan L, S34, S75
Omori, Shunya, S112
O'Neil, Makenzie J, S28
Orozco, Orlando Reynoso, S72
Ortega-Roldán, Blanca, S94
Osborne, Kenneth J, S48
Oschwald, Jessica, S9
Osinsky, Roman, S38, S91
Osterhout, Lee, S7
Otake, Keiko, S112
Otero, Marcela C, S66
O'Toole, Laura J, S88
Oumeziane, Bebel Ait, S89
Owen, Adrian M, S35
Ozmus, Gulin, S107
- Page-Gould, Elizabeth, S4, S64
Pakulak, Eric, S31, S55
Palomba, Daniela, S99
Palumbo, Isabella M, S91
Palzes, Vanessa, S15
Panayiotou, Georgia, S53, S119, S120
Panitz, Christian, S92, S93
Panteli, Maria, S119
Paraskeva-Siamata, Michaela, S53
Parker, David A, S116
Parker, Krystal, S14
Park, Byungho, S117
- Park, Jacob, S86
Park, Jong Y, S27
Park, Shinyoung, S117
Parkhurst, David K, S40, S101
Parks, Andrew C, S45, S78
Parks, Nathan A, S68
Parsafar, Parisa, S109
Pastor, María Carmen, S85
Patel, Nirav N, S28
Patel, Richa, S115
Patrick, Chris, S19
Patrick, Christopher J, S11, S59, S91, S92
Patrick, Toni A, S2, S37
Pattyn, Nathalie, S116
Paul, Deepak, S66
Paul, Katharina, S112
Pauli, Paul, S34, S67, S70, S79, S114
Pavlov, Yuri G, S72, S100, S111
Payne, Brennan R, S29
Payne, Jessica D, S46
Pearce, Marcus, S14
Pearse, Jordan GN, S70, S122
Pedrosa, João, S68
Peet, Krista, S100
Peper, Martin, S116
Pereira, Mirtes, S36, S48
Perets, Dmitriy S, S79
Perez, Johana, S86
Perlman, Greg, S13, S54, S78
Petersen, Seth, S31, S55
Petro, Nate, S42
Petro, Nathan M, S69
Petsas, Theofilos, S14
Pezanko, Luke R, S60
Pfanmüller, Jörg P, S76
Phan, K L, S12
Phelps, Randi A, S62
Piasecki, Tom, S108
Pindus, Dominika M, S50
Pineault, Lydia J, S45
Pinheiro, Ana P, S68
Pinner, John FL, S110
Pizzagalli, Diego A, S11, S19
Plakhotnyk, Nastasiia, S126
Poirier, Mark W, S52
Poirier, Mark, S103
Poli, Eleonora, S99
Pollina, Dean, S126
Pontifex, Matt B, S50
Pontifex, Matthew B, S45, S50, S78
Potter, Robert F, S108
Potts, Geoffrey F, S27
Potts, Geoffrey, S26, S27
Potvin, Stephane, S37
Pourtouis, Gilles, S112
Poy, Rosario, S84, S115
Poza, Miguel A, S13
Prado, Kathryn del, S75
Prause, Nicole R, S8
Prause, Nicole, S8
Pressman, Peter S, S87
Preuss, Julia, S50
Price, Cynthia J, S81
Price, Mason H, S36
Przekoracka-Krawczyk, Anna, S88
Puce, Aina, S109
Puerma-Galvéz, Germán, S71

- Puyvelde, Martine Van, S116
Pyasik, Maria M, S101, S111
- Quaglia, Jordan T, S44
Quigley, Karen S, S41
Quinones-Camacho, Laura E, S109
Quintero, Jean M, S60, S88
- Raffaelli, Quentin, S39
Raine, Lauren B, S50
Rakovets, Oksana Yu, S86
Ramsay, Ian S, S103
Rance, Mariela, S75
Randall, Salekin T, S91
Rasmussen, Eric E, S38
Rawls, Eric L, S102
Read, Glenna L, S108
Reed, Andrew C, S49
Re, Anthony, S103
Rehbein, Maimu E, S85
Rehbein, Maimu, S8, S113
Reicherts, Philipp, S79, S102
Reid, M. Jamila, S77
Reif, Andreas, S70
Reinhard, Julia, S70
Ren, Xi, S58
Rennie, Jaime, S119
Reyes del Paso, Gustavo A, S71
Reznik, Samantha J, S51
Ribeiro, Sara F, S39
Ribes, Pablo, S84, S115
Richmond, A, S125
Richter, Jan, S61, S76
Riesel, Anja, S19, S20, S50
Rizun, Volodymyr, S126
Roach, Brian J, S15
Roberson-Nay, Roxann, S104
Roberts, Julia, S12
Roberts, Kathryn T, S26
Roberts, Kevin H, S47
Roberts, Nicole A, S40, S101
Roberts, Nicole, S16
Roberts, Sean M, S33
Robertson, Paul, S97
Robinson, Jason D, S39, S71
Robinson, Jennifer L, S43, S52
Rockstroh, Brigitte S, S97
Rodero, Emma, S27
Rodilla, Carmen Cano, S63, S64
Rodríguez-Ruiz, Sonia, S94
Rodrigues, Johannes, S90
Rodriguez, Rochelle, S86
Rohrer, Charles T, S63
Rojas, Sasha M, S98
Romanos, Marcel, S70
Romay, Roberto J, S46
Rommers, Joost, S81, S93
Roos, Leslie, S66
Rosenbusch, Kaylee, S40, S101
Rosenfeld, J Peter, S34, S124
Ross, Alleyne P, S32
Rothman, David J, S104
Rozhkov, Vladimir P, S114
Ruehle, Matthew A, S46
Ruggero, Camilo, S54
Ruscio, Ayelet M, S11
Rutherford, Samuel E, S46
- Ruttorf, Michaela, S75
Ryman, Sephira G, S110
- Sabatinielli, Dean, S8, S51, S113
Sabharwal, Amri, S49
Sable, Jeffrey J, S2, S37, S86
Sagar, Mark, S97
Said, Kafia, S86
Salisbury, Dean F, S56, S57, S118, S119
Salter, Phia S, S126
Saltmarsh, Oliver, S96
Sanchez, Alicia, S94
Sanctis, Pierfilippo De, S10
Sandler, Irwin N, S28, S47
SanMiguel, Iria, S15
Santos, Maria Fernanda, S48
Sapigao, Rosemarie G, S42
Sarapas, Casey, S34, S60
Saron, Clifford, S6
Sass, Sarah M, S48
Sauder, Colin L, S106
Saunders, Blair, S64, S121
Scharfenort, Robert, S82
Schächinger, Hartmut, S63, S80, S120
Schembre, Susan M, S71
Schemmerhorn, Alice C, S109
Schiele, Miriam A, S70
Schilling, Thomas M, S63, S80
Schindler, Sebastian, S22, S95, S123
Schöllhorn, Wolfgang I, S74, S114
Schmeichel, Brandon J, S103
Schmidt, Andria, S67
Schmidt, Barbara, S42
Schneck, Susan E, S43
Schneider-Garces, Nils, S28
Schröder, Valerie, S116
Schreurs, Karlein, S73
Schröger, Erich, S14, S15
Schriber, Roberta, S16
Schroder, Hans S, S33, S45, S60
Schrum, Katherine, S36
Schulz, André, S123
Schulz, Stefan M, S98
Schwartz, Naama, S124
Scott, Brandon G, S28, S47
Scudder, Mark R, S50
Sears, Lonnie, S78
Sebanz, Natalie, S117
Seeley, Saren H, S120
Segalowitz, Sidney J, S67
Segarra, Pilar, S84, S115
Sege, Christopher T, S42, S69
Sergeev, Arkadiy A, S101
Sergii, Tukaiev, S115
Servatius, Richard J, S125
Shackman, Alexander J, S5, S13, S17
Shader, Tiffany M, S77
Shafer, Andrea T, S44
Shafir, Roni, S124
Shahnazian, Danesh, S65
Shankman, Stewart A, S12, S34, S60
Shannin, Moody N, S102
Sheerin, Christina M, S104
Shemyakina, Natalia V, S37, S79, S114
Shenhav, Amitai, S14
- Sheppes, Gal, S124
Sheu, Lei, S58
Shields, Irina, S103
Shih, Emily W, S82
Shimin, Fu, S87
Shiota, Michelle N., S15, S28
Söhnchen, Bastian, S114
Shors, Tracey J, S34
Siegler, Greg J, S8
Sikos, Les, S2
Sillars, Angela A, S108
Silton, Rebecca L, S48
Simons, Robert F, S26, S67
Simons, Robert, S100
Simpson, Michaela L, S87
Singhal, Anthony, S44
Skowron, Elizabeth A, S31, S37, S46, S126
Skowron, Elizabeth, S55
Slapin, Aurelija, S71
Slinn, Katie, S84
Smart, Colette M, S25
Smith, Karen E, S45
Smith, Stephanie J, S39
Sobierajewicz, Jagna, S88
Soder, Heather E, S27
Soga, Keishi, S54
Sokhadze, Estate M, S78
Sokol, Alona P, S86
Solhaug, Ida, S112
Sollers III, John J, S70, S122, S125
Sommer, Werner, S54
Sonkin, Konstantin M, S79
Soroko, Svyatoslav I, S114
Sosa, Pedro Valdes, S86
Soto, Jose, S16
Souza, Gabriela GL, S81
Spangler, Derek P, S56
Spanoudis, George, S122
Speed, Brittany C, S77, S105
Sperl, Matthias FJ, S93
Spielberg, Jeffrey M, S23
Spironelli, Chiara, S99
Staggs, Holly, S86
Stange, Jonathan P, S113
Stankevich, Lev A, S79
Steffen, Astrid, S97
Stephenson, Alexandra J, S41
Stephenson, Alexandra, S38
Sterling, Lindsey, S101
Stites, Mallory C, S116
Stoekel, Comelia, S89
Stone, Bradly T, S39
Storr, Joanne, S73
Strange, Bryan, S92
Strickland, Casey M, S30
Stürmer, Birgit, S74
Struck, Anne-Marie, S61
Subotnik, Kenneth L, S23, S33
Sugimoto, Fumie, S21
Suschinsky, Kelly D, S120
Sussman, Tamara J, S49
Sussman, Tamara, S4, S77
Sutton, Bradley P, S28
Sutton, Steven K, S27
Sweeney, John A, S116
Sze, Jocelyn A, S87
- Szekely, Akos, S4, S49, S77
Szychowska, Malina, S93
- Takasawa, Noriyoshi, S54
Talalay, Ilya V, S59
Tang, Chien-Hui, S73
Tang, David, S103
Tan, Chin Hong, S28
Tan, Chin-Hong, S80
Tapia, Evelina, S35
Tasman, Allan, S78
Tatarenko, Maria, S126
Taylor, Brittany K, S105
Tein, Jenn-Yun, S28
Tekok-Kilic, Ayda, S67
Tenenbaum, Rachel B, S122
Teper, Rimma, S4
Tesche, Claudia D, S96
Tezuka, Yosuke, S100
Thai, Luyen, S126
Thayer, Julian F, S125
Themanson, Jason R, S46
Theodorou, Christiana, S53, S120
Theodorou, Marios, S53, S119
Thigpen, Nina N, S9, S85
Thomas, Annette, S3
Thompson, Andrew G, S112
Thompson, Dominic, S26
Thorson, Esther, S108
Threadgill, Hunter, S58
Titus, Mary M, S58
Todd, Juanita, S15
Todd, Rebecca M, S47
Todd, Rebecca, S39
Tokowicz, Natasha, S51
Tolentino, Leida C, S51
Tollefson, Jessika, S2
Torpey, Dana C, S20
Torres, Aurora, S29
Trubacheva, Vera S, S70
Trubachev, Vladimir V, S70
Trull, Tim, S108
Tucholka, Alan, S37
Tucker, Don M, S18
Tukaiev, Sergii, S58, S126
Tulay, Elif, S107
Tulenina, Nadezhda V, S72
Tullman, Samuel, S34, S124
Tully, Erin C, S48
Tumulty, Olivia K, S59
Turp-Golbasi, Bilge, S107
Tzeng, Ovid J-L, S100
- Ulrich, Natalie, S106
Umemoto, Akina, S14, S107
Underwood, Amy L, S57
Urbach, Thomas P., S6
Urry, Heather L, S24
Uusberg, Andero, S100
Uusberg, Helen, S100
- Vakhtin, Andrei A, S96
Vakil, Eli, S75
Valadez, Emilio A, S26
Valadez, Emilio, S100
Valle-Inclan, Fernando, S107
Valle-Inclán, Fernando, S57, S58
Valt, Christian, S74

- Van der Peijl, Manja K, S90
van der Veen, Frederik M, S90, S124
van Driel, Irene I, S108
van Noordt, Stefon J, S67
van Strien, Jan W, S90, S124
Vance, James, S2
Vartanov, Alexander V, S101, S111
Vaschillo, Bronya, S115
Vaschillo, Evgeny G, S70, S115
Vasconcelos, Margarida, S68
Vazquez, Lauren C, S24
Venables, Noah C, S30, S92
Venables, Noah, S19
Ventura-Bort, Carlos, S84, S115
Ventura, Joseph, S23, S33
Versace, Francesco, S70, S71
Verstaen, Alice, S66
Verwey, Willem, S88
Vess, Matthew K, S114
Vögele, Claus, S123
Vila, Jaime, S81, S94
Vinitzky, Dmitry A, S101
Voderholzer, Ulrich, S123
Vogeti, Sreekari, S96
Volchan, Eliane, S36, S48, S81
Volpert, Hannah I, S25
Vos, Maarten De, S10
Vought, Ethan, S36
Vrana, Scott R, S104
Vujovic, Lara, S24

Walentowska, Wioleta, S112
Walker, Brea S, S86
Walker, John A, S28

Wallois, Fabrice, S80
Wall-Scheffler, Cara, S3
Walmsley, Natalie J, S122
Wanger, Timothy J, S51
Wang, Tianjiao, S90
Wang, Tu-Te, S10
Wang, Yao, S78
Wang, Ya-Yi, S65
Wang, Yiwen, S38, S100
Ward, Anne C, S34
Ward, Kayla L, S57, S118, S119
Waters, Allison, S18
Watson, Eric M, S38, S41
Webber, Troy A, S27
Webb, Sara J, S101
Weber, Matthew J, S11
Webster-Stratton, Carolyn, S77
Weinberg, Anna, S19, S60, S89
Weinstein-Riechmann, Mirjam Liv, S102
Weissman, Daniel, S55
Weissman, David, S16
Wendt, Julia, S61, S76
West, Gregory, S118
West, Taylor N, S44
Weymar, Mathias, S5, S61, S76
Whelan, Emily R, S96
Whited, Matthew C, S41
White, Justin, S56
Wielgus, Madeline D, S43, S44, S123
Wiemer, Julian, S67
Wiens, Stefan, S93, S104
Wiese, Andrew D, S52

Wieser, Matthias J, S67, S79, S114
Wieser, Matthias, S102
Wiggert, Nicole, S42
Wilhelm, Frank H, S42
Williams, Chad, S31
Williams, Dewayne P, S125
Williams, Terrance J, S33
Willroth, Emily C, S107
Wilson, Nik S, S70
Winker, Constantin, S8, S113
Winkelman, Piotr, S121
Winkler, István, S15
Wirkner, Janine, S61
Wlotko, Edward W, S93
Wolchik, Sharlene A, S28, S47
Wong, Aaron S, S119
Woodall, Keisha D, S31
Woodall, Meagan, S103
Woodman, Geoffrey F., S5
Woods, Nancy Fugate, S3
Woody, Patrick L, S2, S37
Wormwood, Jolie B, S41
Worthy, Darrell A, S30, S59
Wuensch, Karl L, S41
Wu, Allan, S8
Wu, Haijing, S11
Wu, Jia, S18, S24
Wu, Mengyao, S73
Wu, Xia, S87
Wu, Ying Choon, S17
Wu, Ying, S10
Wyczęsany, Mirosław, S125

Yancey, James R, S30, S59, S91, S92
Yang, Chien-Ming, S66
Yang, Xiao E, S56
Yangyang, Liu, S60
Yaptangco, Mona, S81
Yaroslavsky, Ilya, S84
Ya-Yi, Wang, S100
Yee, Cindy M, S23, S33
Yee, Claire I, S28, S47
Yener, Gorsev G, S75, S107
Yeo, Ronald A, S110
Yin, Siyang, S69
Yoshimori, Erika, S119
Yuan, Melissa, S92
Yuan, Sheng, S38, S100
Yu, Xiaoqian, S26

Zambrano-Vazquez, Laura, S35, S51
Zao, John, S10
Zhang, Yanqi, S81
Zhang, Zhen, S100, S38
Zhao, Sijia, S14
Zheng, Guang-Yu, S10
Zhu, Jian, S117
Ziebell, Philipp, S35
Zimmerman, Benjamin, S28, S80
Zisner, Aimee R, S77
Zniva, Richard, S98
Zoellner, Lori A, S3
Zyma, Igor, S115, S126

Index to Abstract Descriptors

- academic achievement, S72
 academic-related hopelessness, S60
 acute exercise, S54
 adaptation, S96
 adaptive, S73
 addiction, S37
 ADHD, S77, S109, S122
 adolescents, S52, S54, S60, S74, S86, S123
 affective disorders, S88
 affective pictures, S120
 affective reactivity, S104
 affect, S41, S52, S102, S103, S113, S121
 African Americans, S98
 aggression, S103
 aging, S25, S26, S28, S48, S52, S76, S80, S99
 alcohol addiction, S124
 alcohol myopia, S58
 alcohol use, S24, S53
 alcoholism, S57
 alcohol, S36, S43, S90, S115
 alpha oscillations, S42, S91, S95
 Alzheimer's disease, S74
 Alzheimer's, S47
 Alzheimer's, S75
 amygdala, S59
 anger, S102
 anhedonia, S44, S53
 anorexia nervosa, S123
 anterior cingulate cortex, S107
 anticipation, S23, S69, S71, S83, S89, S102
 anticipatory attention, S59
 anti-saccade, S67
 anti-tobacco ads, S108
 anxiety and depressive disorders, S61
 anxiety sensitivity, S104
 anxiety, S32, S56, S61–63, S76, S83, S101, S119, S125
 appetitive motivation, S89
 appraisal, S108
 approach motivation, S49, S58
 approach-avoidance behavior, S80
 arithmetic, S29
 arousal, S41, S53
 arterial spin labeling, S28
 attachment, S28, S81
 attention bias modification, S88
 attention selection, S57
 attentional blink, S118
 attentional control, S87
 attentional scope, S58
 attention, S25, S26, S32, S35, S41, S43, S50, S52, S77, S87, S102, S103, S110, S114, S116, S118, S125, S126
 attractiveness, S113
 auditory, S119
 auditory processing, S76, S85
 auditory repetition suppression, S57
 auditory short term memory, S99
 Autism spectrum, S44, S78, S84, S85, S101, S105
 autonomic activity, S113
 autonomic balance, S104
 autonomic feedback, S36
 autonomic nervous system, S87, S121
 autonomic reactivity, S122
 autonomic tone, S37
 autonomic, S55
 aversive conditioning, S85
 aversive motivation, S108
 awareness, S35
 backward conditioning, S55
 baseline, S100
 baselines, S40
 behavioral activation, S39, S53, S103
 behavioral inhibition, S39, S53, S78, S103
 behavioral intentions, S41
 belief attribution, S49
 beta oscillations, S65
 beta, S57
 bilinguals, S115
 binge-eating, S41
 binocular rivalry, S35
 biofeedback game, S121
 biofeedback, S116
 blood pressure reactivity, S58
 blood pressure, S60, S70
 body discomfort, S94
 body dissatisfaction, S94
 body image, S100, S102
 body position, S99
 BOLD, S69
 borderline personality disorder, S94
 brain development, S114
 brain dimorphism, S68
 brain oscillations, S107
 brain volume, S59
 brain, S96
 brain-computer interface, S79
 broaden-and-build theory, S112
 bupropion, S117
 caffeine, S32, S36, S56
 callous-aggression, S92
 cardiac cycle time, S63
 cardiorespiratory fitness, S28
 cardiovascular stress reactivity, S98
 cardiovascular system, S115
 cardiovascular variables, S71
 cardiovascular, S100
 caregivers, S66
 cephalic measures, S126
 cerebral blood flow, S58
 child abuse history, S48
 child maltreatment, S123
 child psychopathology, S109
 child temperament, S110
 childhood, S109
 children, S45, S70, S86, S109
 classical conditioning, S42, S98
 clinical factors, S30
 clinical setting, S81
 CNS stimulants, S39
 CO2 challenge, S104
 cognition, S24, S36, S47, S59, S60, S102, S116
 cognitive conflict, S74
 cognitive control, S34, S55, S62, S64, S80, S84, S107, S110, S111, S119
 cognitive load, S24
 cognitive processes, S27
 cognitive remediation, S103
 coherence, S47
 collective memory, S126
 color, S101
 COM Val158Met, S92
 combined EMG-fMRI, S61
 communication technology, S117
 competition, S96
 complex pattern, S56
 complex trial protocol, S124
 comprehension of temporal connectives, S122
 COMT, S27
 concealed information test, S124
 conditioning, S71, S75, S85
 conflict adaptation, S36, S55
 conflict, S104
 congruency sequence effect, S55
 connectivity, S51, S103
 context conditioning, S79
 context, S123
 contingency ratings, S85
 contingency, S105
 contingent negative variation, S49, S105
 control, S121
 coping style, S53
 coregulation, S101
 corrugator, S92
 cortisol awakening response, S54
 cortisol, S65, S98
 couples, S40
 co-viewing, S38
 cue reactivity, S70
 cumulative risk, S37
 Cyberball, S24
 deception, S34
 decision making, S91
 decision-making, S23, S99, S104
 defensive motivation, S119
 defensive responding, S60
 defensive responses, S48
 delay of gratification, S42
 delta-beta coupling, S62
 dementia, S66, S87
 depression risk, S77
 depression, S31, S34, S46, S48, S78, S89, S101, S106, S117, S120, S123, S124
 developmental, S78
 development, S43, S50, S60, S86, S105
 diffusion tensor imaging, S33
 disability, S108
 disgust images, S108
 disinhibition, S30, S59
 Dissociative Identity Disorder, S39
 distraction effect, S94
 distractors, S96
 dopamine, S27, S33
 driving violations, S119
 dynamic systems, S108
 dysphoria, S99
 dysregulated fear, S65
 early childhood, S126
 early posterior negativity, S90
 eating behavior, S75
 educational attainment, S50
 EEG asymmetry, S34, S117
 EEG coherence, S32
 EEG patterns, S79
 EEG spectral power, S37
 EEG waves structure, S114
 EEG-source alpha coherence, S59
 effortful control, S110
 ego depletion, S26
 ego-depletion, S103
 electrocardiography, S48, S120
 electrodermal activity, S27, S125
 electroencephalography, S24–26, S32, S41, S42, S44, S45, S48, S57, S62, S65, S67–69, S72, S74, S75, S79, S84–86, S91, S107, S109, S110, S114, S115, S125
 electromyography, S121
 electrophysiology, S85
 embodiment, S121
 emoticons, S26
 emotion coherence, S87
 emotion from identity, S94
 emotion processing, S48
 emotion regulation, S24, S52, S60, S67, S82, S87, S88, S94, S97, S103, S109, S113
 emotional control, S125
 emotional dampening, S41
 emotional imagery, S53, S119
 emotional images, S33
 emotional perception, S51
 emotional processing, S99
 emotional reactivity, S61, S121
 emotion, S23, S26–28, S32, S33, S35, S36, S38, S41, S42, S44, S47, S49, S51, S56, S59–62, S64, S66–69, S71, S74, S79, S81, S82, S85, S95, S97, S101–104, S107, S108, S113, S114, S120, S121, S124, S126
 emotions, S115
 empathy, S47, S60, S105

- encode, S54
 engagement, S35
 English, S86
 entrainment, S95
 error monitoring, S50
 error, S90
 error-related negativity, S26, S31, S33, S35, S39, S45, S50, S60, S63, S64, S78, S84, S86, S110, S115, S122
 escape, S69
 event-related optical signal, S44
 event-related oscillations, S75, S107
 event-related potentials, S26, S27, S30, S31, S34, S39, S42, S44, S45, S50, S51, S55, S60, S61, S64, S68, S71–74, S77, S83–89, S91, S92, S95, S100–102, S105, S106, S109, S111, S112, S116, S118, S121, S123, S124, S126
 event-related spectral perturbation, S118
 excitation transfer, S38
 executive functioning, S38
 executive function, S32, S37, S65
 exercise, S45
 expectancies, S25
 expectancy, S92
 expectation intensity, S64
 expectation, S95
 expressive writing, S104
 externalizing, S30, S43, S59, S82, S115
 extraversion, S116
 eye blink reduction, S78
 eyeblink conditioning, S125

 face and name processing, S74
 face perception, S39
 face processing, S101
 Facebook, S47
 faces, S123, S74, S86
 facial EMG, S108, S35
 facial expression, S91
 facial expressions, S92
 facial simulator, S97
 fairness consideration, S38
 fashion coordinate, S119
 fear conditioning, S92, S93
 fear extinction, S92, S93
 fear generalization, S70, S79
 fear learning, S91
 fear reactivity, S53
 fear, S30, S55, S59, S67, S76, S77, S89
 fear-relevance, S91
 feedback negativity, S38, S64
 feedback-monitoring, S64
 feedback, S74, S81
 feedback-related negativity, S26, S35, S36, S67, S91, S100, S112
 fetal alcohol spectrum disorders, S96
 fibromyalgia, S71
 flanker, S50, S59, S115
 flexibility, S88
 fMRI, S42–45, S52, S61, S69, S72, S76, S82, S83, S86, S106, S110
 food advertising, S90
 food cues, S89, S90
 food, S71, S84
 frontal asymmetry, S90
 frontal theta activity, S99
 frontal theta, S67
 functional connectivity, S80
 functional neurological symptoms, S97
 functional transcranial Doppler sonography, S71

 gait, S74
 gambling, S106
 gamification, S88
 gaze cuing, S114
 gender, S50, S97
 genital responses, S120
 girls, S98
 glucose, S103
 goal relevance, S112
 Go/NoGo, S115
 grammaticality judgments, S51
 gray matter volume, S59
 group membership, S38

 habituation, S52, S57, S78
 health disparities, S70, S122
 health literacy, S52
 health, S28
 heart period, S92
 heart rate reactivity, S46
 heart rate variability, S30, S41, S66, S70, S81, S98, S104, S110, S115, S125
 heart rate, S27, S30, S47, S69, S84, S95, S106, S108, S112
 hemispheres, S29
 heterotypic comorbidity, S77
 hippocampus, S28, S59
 Holocaust, S126
 human adaptability, S70
 hydrogen sulfide, S96
 hypnosis, S76
 hypnotic analgesia, S76

 ICA, S67, S78
 imagery, S61, S69
 imaginary movements, S79
 immersive environment, S117
 immune system activity, S110
 implicit, S106
 impulsivity, S31, S42, S43
 individual differences, S36, S41, S75, S90, S92, S104, S107
 induced visual block, S76
 inferior frontal cortex, S83
 inhibition, S29, S72, S73, S96, S106
 inhibitory control, S55
 intergroup relations, S126
 intergroup, S64
 internalizing, S30
 interoception, S36
 interparental conflict, S109
 inverse solutions, S86
 Iowa Gambling Task, S99
 irony, S26
 irritability, S43

 Japanese, S86
 joint action, S117
 joint-subsystems, S114

 kinematics, S48

 language, S29, S80, S93, S100, S122
 late positive potential, S33, S40, S44, S61, S75, S77, S89, S93, S100, S103
 latency variability, S86
 late-positive potential, S107
 laterality, S72
 lateralization, S111
 lateralized EEG power spectra, S73
 lateralized readiness potential, S88
 life satisfaction, S87
 linear mixed effects modeling, S116
 load, S93
 longitudinal study, S114
 long-term memory, S28
 LORETA, S68
 love, S124
 loving-kindness, S73
 lower body negative pressure, S80

 magnetoencephalography, S75, S92, S97
 major depressive disorder, S89
 masking, S118
 mass communication, S38
 medial-frontal negativity, S27, S36
 meditation, S25, S64
 melancholia, S34
 memory reactivation, S28
 memory suppression, S34
 memory, S23, S54, S58, S61, S63, S67, S81, S103, S122
 mental health, S47
 mere presence, S38
 message processing, S108
 meta-analysis, S86
 meta-memory, S36
 methodology, S56
 methods, S91
 microexpression, S97
 midfrontal theta, S119
 migraine, S37
 mimicry, S82
 mindfulness meditation, S60
 mindfulness, S26, S32, S33, S73, S77, S104, S112
 misattribution, S63
 mismatch negativity, S86, S93, S118
 mismatch, S119
 Monty Hall Dilemma, S54
 mood induction, S79
 Māori, S70, S122
 mother-child, S24
 motivated attention, S95
 motivation, S27, S83
 motor control, S74
 motor imagery, S88
 motor learning, S75, S88, S112
 motor potential, S54
 motor, S43
 multi-diagnostic sample, S81
 multilevel linear modeling, S25

 multimodal imaging, S37
 multimodal interaction, S95
 multimodal, S94
 multiscale EEG entropy, S25
 multi-sensory, S23
 multivariate pattern analysis, S49
 music, S29, S125
 musical ability, S51

 N170, S39, S96
 N1, S37, S58
 N200, S36
 N2pc, S57, S96
 N2, S46, S62, S110
 N400, S29, S81, S100, S119
 narrative imagery, S42
 near outcome, S106
 Necker cube, S86
 negative bias, S83
 neural biomarker, S105
 neuroanatomy, S87
 neurofeedback, S78, S100
 neuroimaging, S59, S77
 neuromarketing, S117
 neurophysiology, S39
 neutral stimuli, S60, S85
 nicotine addiction, S70, S71
 nicotine, S27, S46
 nocebo, S79
 NoGo N2, S84
 nonconscious emotion processing, S39
 nouns, S95
 novelty detection, S56
 nurses, S24

 obesity, S75
 object categorization, S68
 obsessive-compulsive disorder, S50
 odor, S34
 oFN, S105
 optical imaging, S80
 orthostasis, S122
 outcome evaluation, S91
 outcome monitoring, S116
 overprotection, S98

 P2, S37, S46
 P300 CIT, S34
 P300, S65, S67, S94, S95, S122, S124
 P3b, S46
 P50 suppression, S29, S33
 pain processing, S71
 pain, S75
 paired tones, S118
 parent-child interactions, S77
 parenting socialization, S82
 parenting, S62, S105, S109
 Parkinson's, S107
 perceived discrimination, S125
 perception, S49, S51, S69, S72, S77
 perceptual biases, S85
 perceptual learning, S68
 perceptual load, S93
 performance monitoring, S54, S58, S112
 performance, S56, S90, S116

- peripheral psychophysiology, S94
perseverative cognition, S125
person perception, S25
personality, S31, S120
perspective taking, S48
Phase shift, S86
phase-locking, S35
phylogenetic fear, S90
physical affection, S40
physical health, S47
physiological alignment, S117
physiological arousal, S38
physiological cost, S121
physiological linkage, S66
physiological reactivity, S66
picture perception, S121
picture viewing, S42
picture, S113
pilot skill, S116
placebo analgesia, S98
placebo, S79
plasticity, S85
positive emotion regulation, S88
positive emotion, S112
postauricular reflex, S40, S57, S101, S107
post-movement beta rebound, S96
posturography, S48
prediction, S81, S93, S105
pre-ejection period, S44, S53, S56, S77, S82
pre-exposure, S125
pregnancy, S88
prejudice, S64
premature infants, S80
prepulse inhibition/facilitation, S112
preschoolers, S114
primary biological motivation, S89, S90
probe P3, S92
psychoneurometric, S30
psychopathology, S62
psychopathy, S40, S84, S91, S92, S99
psychosis, S49, S57
PTSD, S54, S83
puberty, S98
punishment, S23
pupillometry, S23, S24, S42, S63
- QEEG, S68
Qigong, S114
quality control, S68
- racial segregation, S126
reactivity, S29
reading development, S116
- reading, S29
reappraisal, S82, S125
recognition memory, S33
recognition potential, S99
reflective self, S74
refractory period, S29
regulation, S124
reinforcement learning, S30, S31, S58, S65, S111
reinstatement, S82
reliability, S66
respiration, S89, S102
respiratory sinus arrhythmia, S28, S40, S43, S46, S51, S56, S67, S77, S82, S101, S108, S109, S113, S123
response inhibition, S24, S84
resting state, S80
restricted eating, S90
reward positivity, S37, S42, S43, S58, S111
reward prediction error, S111
reward processing, S31, S89
reward sensitivity, S34
reward, S31, S53, S65, S75, S78, S106, S122
risk, S106, S110
risk-taking behavior, S27
romantic partners, S101
romantic relationships, S67
rule learning, S106
- scenes, S81
schematic faces, S39
schizophrenia, S23, S33, S56, S57, S103, S116, S118, S119
ScreenX, S117
second language learning, S51
secure, S81
selective attention, S31, S55
self-affirmation, S103
self-compassion, S73
self-distancing, S61
self-induced stereotype, S37
self-injurious thoughts and behaviors, S123
self-referential processing, S73, S77
self-regulation strategy, S121
self-regulation, S46, S66, S126
self-resemblance, S120
semantics, S100, S101
sensitization, S91
sensory discrimination, S23
sensory gating, S105
sensory task, S59
sentences, S29
set formation, S119
- sex differences, S111
sexual arousal, S120
sexual psychophysiology, S97
sexual response, S40
signal-to-noise ration, S68
skin conductance, S69, S83, S87, S94
sleep, S52, S66, S110
smile, S74
smokers, S39
smoking availability, S70
social anxiety, S102
social cognition, S49, S74
social context, S116
social coordination, S117
social exclusion, S46
social influence, S107
social interaction, S34, S83, S87
social judgment, S124
social learning, S42
social neuroscience, S64
social stress, S45
social support, S98
social withdrawal, S65
socioeconomic status, S28, S98
source analysis, S72
spatial attention, S73
spatial cognition, S111
speech errors, S122
spontaneous blink rate, S33
ssVEP, S85
startle blink, S40
startle, S25, S43, S48, S52, S53, S55, S57, S60, S61, S63, S69, S76, S78, S94, S102, S107, S112, S120, S121
state anxiety, S51
state worry, S35
stimulus generalization, S43
stimulus preceding negativity, S58
stimulus-preceding negativity, S54, S72
stimulus-response compatibility, S63
strategy, S105
stress reactivity, S63
stress, S23, S27, S28, S32, S40, S44, S66, S80, S96, S98, S113, S125
subjective cognitive decline, S25
substance use, S46
sustained anterior negativity, S99
syllable, S118
sympathetic response, S46
syntax, S26
- target-force production, S54
task switching, S62
tears, S82
temperament, S82, S114
- templates, S81
temporal attention, S95
temporal stability, S66
temporal summation of pain, S71
test-retest reliability, S26, S63
Theory of Mind, S49
theta oscillations, S91
theta, S110, S24
threat predictability, S76
threat sensitivity, S41, S92
threat, S49, S89
time perception, S45, S47, S49, S79
time-frequency analysis, S93
TMS, S78
tobacco cues, S108
trait anxiety, S51
trait worry, S35
transdiagnostic approach, S76
trauma, S67
traumatic brain Injury, S67
triarchic, S84, S92
trust, S100
trypanophobia, S90
twin differences, S24
Type D, S29
- Ultimatum Game, S38, S45
uncertainty, S23, S44, S50
unconditioned stimulus, S93
unfairness, S64
- vagal tone, S126
vegetative state, S35
verbal cognition, S111
verbal creativity, S37
video game, S103
virtual reality, S90
visual attention, S97
visual body image processing, S123
visual perception, S47
visual, S96
voice, S68
- webcam, S95
women's health, S32
working memory, S23, S27, S49, S58, S65, S72, S93, S99, S100, S111
worry, S45, S51, S120
- γ -band, S115