PSYCHOPHYSIOLOGY

THE INTERNATIONAL JOURNAL OF THE
SOCIETY FOR PSYCHOPHYSIOLOGICAL RESEARCH

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2020 Virtual Annual Meeting of the Society for Psychophysiological Research

Virtual Pre-Conference Workshop: October 4–6
Virtual Annual Meeting: October 7–9
Virtual Post-Conference Workshop: October 10–11
Website: www.sprweb.org

The 2020 Virtual Annual Meeting Program includes one Pre-Meeting Workshop, one Invited Address, Big Idea Sessions, Symposia, and a Post-Meeting Workshop. Specific research topics will be covered in the Symposia. The majority of the research reports will be discussed at the Poster Sessions.

This Supplement contains the abstracts from each presentation in the Symposia, Big Ideas, and Poster Sessions.

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

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

Dan Foti
2020–2021 Program Committee Chair

Program Highlights

Sunday, October 4, 2020, 11:00 a.m.-3:00 p.m., EDT
Monday, October 5, 2020, 11:00 a.m.-3:00 p.m., EDT
Tuesday, October 6, 2020, 11:00 a.m.-3:00 p.m., EDT
Pre-Meeting Workshop
Mini ERP Boot Camp
Organizer and Presenter:
Steven J. Luck, PhD, Center for Mind & Brain and Department of Psychology, University of California, Davis

Wednesday, October 7, 2020

10:00 a.m.-11:00 a.m., EDT
Invited Address
Chemistry of the Adaptive Mind: Lessons from Dopamine
Roshan Cools, PhD
Principal Investigator, Motivational and Cognitive Control Lab, Donders Institute for Brain, Cognition and Behavior, Professor of Cognitive Neuropsychiatry, Radboud University Medical Center, Nijmegen, The Netherlands

11:00 a.m.-12:00 p.m., EDT
Symposium #1: RISKY BUSINESS: USING PSYCHOPHYSIOLOGY TO UNDERSTAND RISK AND REWARD IN HEALTH AND ILLNESS

12:30 p.m.-1:30 p.m., EDT
Big Ideas Session #1: Sex Differences and Women‘s Health

1:30 p.m.-2:30 p.m., EDT
Poster Session 1

2:30 p.m.-4:00 p.m., EDT
Diversity and Outreach Committee Event, co-sponsored by the Australasian Cognitive Neuroscience Society
Building Diversity Pipelines
Dr. Kim R. Bobby, D,E,&I Leadership Consultant, Higher Education
The effectiveness of implementation of institutional policies and practices aimed at increasing representation from diverse groups in academic and research environments is often hampered by weak recruitment and retention of faculty, staff and students from diverse backgrounds. Dr. Bobby will lead an interactive workshop targeting barriers and enablers of wider diversity pipelines in academia.

Thursday, October 8, 2020

10:00 a.m.-10:30 a.m., EDT
Early Career Award Address
Kyle E. Mathewson
University of Alberta

10:30 a.m.-11:30 a.m., EDT
Symposium #2: TO PREDICT OR NOT TO PREDICT: MODELING EEG DATA, PROMISES, AND LIMITATIONS

11:30 a.m.-12:30 p.m., EDT
Big Ideas Session #2: Understanding Laboratory and Real-world Behavior

12:30 p.m.-1:30 p.m., EDT
Poster Session 2

5:00 p.m.-6:00 p.m., EDT
Workshop: New Reviewer Do's and Don'ts
Monica Fabiani, Editor-in-Chief, *Psychophysiology*
Frini Karayanidis, Associate Editor
Lisa Gazke-Kopp, Senior Editor

In this workshop, the Editor-in-Chief of *Psychophysiology* and members of the Editorial Board will provide some tips and resources for new reviewers of journal articles, including how to get invited to do your first review, and what to do once you are, including best practices and typical problems.

Friday, October 9, 2020

10:00 a.m.-11:00 a.m., EDT
Psychophysiology Editorial Board Meeting

11:00 a.m.-12:00 p.m., EDT
Symposium #3: HOW AND FOR WHOM: FUNCTIONAL MECHANISMS IN COGNITION AND MOOD CONSIDERING SEX AND IDENTITY-RELATED FACTORS

12:30 p.m.-1:30 p.m., EDT
Awards Ceremony and Business Meeting

1:30 p.m.-2:30 p.m., EDT
Poster Session 3

Saturday, October 10, 2020, 10:00 a.m.-11:30 a.m., EDT
Sunday, October 11, 2020, 10:00 a.m.-11:30 a.m., EDT
Post-Meeting Workshop: ERP Decoding Methods
Organizer and Presenter:
Steven J. Luck, PhD
Center for Mind & Brain and Department of Psychology, University of California, Davis

Gi-Yeul Bae, PhD
Arizona State University

Aaron M. Simmons, BS
University of California, Davis,

Symposia Abstracts

Symposium 1

RISKY BUSINESS: USING PSYCHOPHYSIOLOGY TO UNDERSTAND RISK AND REWARD IN HEALTH AND ILLNESS

Session Chair: Luke Clark
University of British Columbia

Descriptors: Reward, Risk-taking, Addiction

Reward processing and risk-sensitive choice are intersecting cognitive domains with profound relevance to everyday behavior, developmental trajectories, and mental illnesses. This symposium will describe recent work on the behavioral assessment and computational modeling of risky choice, informed by convergent psychophysiological approaches including facial electromyography (Otto), reward-related EEG (Freeman), machine learning of task-related fMRI data (Yip), and eye-tracking (Clark). Ross Otto (Assistant Prof, McGill) will present data on the combination of peripheral psychophysiology (facial EMG and skin conductance) with computational modeling of a behavioral economic risky choice task, highlighting the differentiation of positive and negative facial EMG responses during advantageous and disadvantageous choices. Clara Freeman (PhD student at McGill in Anna Weinberg's lab) will focus on reward-related EEG signals during adolescence, and their associations with alcohol consumption during a peak developmental window for risky behaviors. Sarah Yip (Assistant Prof, Yale University) will present neuroimaging data in substance use disorders, demonstrating how reward and cognitive control tasks differentially predict the future use of cocaine versus opioids. Turning finally to disorder gambling as a form of behavioral addiction, Luke Clark (Full Prof, University of British Columbia) will consider how the design features of modern slot machines harness mechanisms for reward and risky choice, with new insights afforded by mobile eye tracking.

USING PSYCHOPHYSIOLOGY AND COMPUTATIONAL MODELS TO UNDERSTAND EMOTIONAL RESPONSES TO THE OUTCOMES OF RISKY CHOICES

Ross Otto[1]; Larissa Ferreira Pedrosa[2]; Aaron Heller[3]; Hanna Davies[1]; Sana-Eve Faraji[1]
[1]McGill University, [2]University of Sao Paolo, [3]University of Miami

Accounts of emotion identify two principal dimensions of affective response: valence and arousal, which are thought to play critical information-signaling roles in evaluating the action outcomes. However, inter-relationship between the valence and arousal are less well understood. Here, we examine the interplay between these chief components of emotional response following the outcomes of choice in a well-characterized risky decision-making task, leveraging a model of subjective value and physiological measurements of rapid emotional response using skin conductance (SCR) and facial electromyography (fEMG) recordings. We found that when the risky action is subjectively superior to the "sure thing"—in terms of choice values—arousal responses were larger following positive versus negative outcomes, and this pattern was mirrored by the positive valence component of emotional response: zygomatic fEMG activity appears greater for positive outcomes, while negative valence (corrugator fEMG) did not differentiate between outcomes. The inter-relationships between the valence and arousal components of affective response differed for subjectively disadvantageous risky choices: arousal did not differentiate between positive and negative outcomes, but negative valence increased following negative outcomes, and—perhaps counter-intuitively—positive valence decreased after a positive outcome. Taken as a whole, these data suggest specific circumstances where coordinated valence and arousal responses jointly carry information about the "goodness" of an action just taken.

Funding: Social Sciences and Humanities Research Council, Canada Foundation for Innovation.

NEURAL RESPONSES TO REWARD AND RISK-TAKING: DIFFERENTIAL ASSOCIATIONS ACROSS ADOLESCENT DEVELOPMENT

Clara Freeman and Anna Weinberg
McGill University

Risky decision-making involves weighing the potential gains and costs associated with a given behavior. Accordingly, those with greater reward sensitivity may take more risks due to greater salience of gains. While in many situations some degree of risk-taking is advantageous, risk-taking in excess can become pathological or dangerous, especially when involving drugs and alcohol. Therefore, understanding the role of reward sensitivity in risk-taking is beneficial for identifying those at risk for problematic risk behavior. Because risk-taking behavior peaks in adolescence, it is especially important to understand how reward and risk relate across development when the neural circuits supporting these constructs are still developing. In this talk, I will present data from an adolescent sample (ages 10–19) showing that the association between laboratory risk-taking and neural reward sensitivity, as measured by the Reward Positivity (RewP), is moderated by age such that the RewP predicts greater risk-taking in later but not earlier adolescence. I will then extend these findings on the RewP and laboratory risk-taking with data identifying how the RewP predicts real-life risk-behavior in emerging adults—particularly in the form of problematic alcohol use. These results show that those with a greater RewP report more alcohol consumption. Taken together, these data help inform our understanding of how reward sensitivity measured by the RewP predicts risk-taking behavior across development in the laboratory and in real life.

Funding: Canadian Institutes of Health Research, Canada Foundation for Innovation, and Natural Sciences and Engineering Research Council.

RELEVANCE OF REWARD VERSUS COGNITIVE BRAIN STATES FOR PREDICTION OF DIFFERENT SUBSTANCE USE BEHAVIORS

Sarah Yip
Yale University

Predominant theories of addictions emphasize interactions between reward, cognitive and affective systems as central to addictions and their treatment. However, the specificity of these domains to different types of addictive behaviors is incompletely understood. Here, we apply a recently developed machine learning approach, connectome-based predictive modeling (CPM), to generate the models of cocaine and opioid use behaviors from functional connectivity data acquired during reward and cognitive task performance. We find that connectivity data acquired during reward task performance is optimal for prediction of cocaine abstinence across three separate clinical samples, but that cognitive task data are optimal for prediction of opioid abstinence. These data are consistent with behavioral data demonstrating that different mood states relate to cocaine versus opioid use, even in the same individuals (Epstein et al., 2009). They emphasize the importance of considering brain state when generating predictive models of addictions and suggest that reward-related brain states may be most closely linked to stimulant use.

Funding: This work was supported by grants K01DA039299, R21DA045969, P50DA09241 T32DA022975, and R01DA035058 from the National Institute on Drug Abuse.

HOW SLOT MACHINE DESIGN FEATURES HARNESS BRAIN SYSTEMS FOR RISK AND REWARD

Luke Clark, Spencer Murch, Catharine Winstanley, and Mariya Cherkasova
University of British Columbia

Slot machines appear to be one of the more "addictive" forms of gambling. For example, in a sample of people with Gambling Disorder recruited in Vancouver, slot machines were the modal preferred form of gambling, in 50% of the sample (Kennedy et al., 2019, Psychophysiology). This talk will focus on how design features of modern slot machine games influence reward processing and risky choice, as mechanisms for addictive disorders. Our experiments have taken two approaches. One approach has sought to manipulate individual design features (e.g., audiovisual feedback, opportunities for illusory control) to demonstrate an impact on behavior. For example, the addition of win-paired audiovisual feedback (i.e., flashing lights and jingles) on a risky choice task biased participants to the riskier option (Cherkasova et al., 2018, Journal of Neuroscience). Eye tracking data indicated that this bias was driven by reduced attention to probability information. An alternative approach is to consider the collective impact of these design features. Slot machines can create a subjective state of immersion that is linked to problem gambling symptoms. Testing slot machine gamblers ($n = 53$) as they played an authentic slot machine in our lab, higher levels of immersion were characterized by more saccades overall, more fixations to regions of the display conveying performance information, and a greater behavioral response to reinforcement (Murch et al., 2020 Addiction and unpublished data). These findings carry implications for both treatment of gambling problems and gambling regulation.

Funding: Centre for Gambling Research at UBC is supported by the Province of BC Government and the British Columbia Lottery Corporation. LC also holds funding from Natural Sciences and Engineering Research Council of Canada.

Symposium 2

TO PREDICT OR NOT TO PREDICT: MODELING EEG DATA, PROMISES AND LIMITATIONS

Chair: Hedwig Eisenbarth
Victoria University of Wellington

Descriptors: EEG, Modeling, Computational

Understanding the time domain characteristics of psychophysiological data and their relationship with subjective experience or performance is profiting heavily from advances in computational methods. How can we use those computational methods to better understand psychophysiological reactivity in the context of sensation and performance based on large data sets or in the context of spaciotemporal decomposition? This symposium includes four presentations that show promises and limitations of iterative, cross-validating, data-driven computational methods across different types of neurophysiological data? Hause Lin will introduce a component analysis based tool to investigate spatiotemporal neural dynamics on the single-trial level, which might get lost in common averaging approaches. Peer Herholz will present an example for the use of a representational model framework in the context of multimodal music perception data, allowing the incorporation of multi-channel information. Another example will be presented by José C. García Alanis, in which they used time-generalized multivariate pattern analysis of evoked EEG activity to discriminate processes of proactive control. The last presentation by Hedwig Eisenbarth will show the application of a machine learning algorithms to predict dimensional ratings of valence and arousal from physiological data derived during music video watching. Across all four presentations, emphasis not only lies in the promises of those analysis tools, but also in what the imitations of those approaches are, providing some points for discussion of their use.

HYPOTHESIS-DRIVEN DIMENSION REDUCTION AND SOURCE SEPARATION FOR TIME-DOMAIN EEG DATA

Hause Lin[1], and Mike Cohen[2]
[1]University of Toronto, [2]Donders Institute for Brain, Cognition and Behavior, Radboud University

We introduce a flexible multivariate analytic framework that can potentially uncover further spatiotemporal neural dynamics that supplement what can be learned from conventional event-related potential (ERP) analyses. This technique—generalized eigendecomposition (GED)—is conceptually simple and computationally efficient. Like principal or independent components analysis, it leverages the spatiotemporal structure of EEG data and uses matrix decomposition (i.e., eigendecomposition) to reduce data dimension and separate sources. But unlike these methods which are merely descriptive decomposition techniques, GED explicitly incorporates hypothesis testing, allowing researchers to flexibly contrast experimental manipulations or cognitive states. Here, we gently introduce the GED framework and show how to implement it. We present a simulation study that demonstrates why and how it is superior to other dimension reduction methods; then, we present two case studies that focus on ERP components related to conflict-monitoring and feedback processes. Our results show that GED recovers single-trial dynamics that may be lost or attenuated during trial-averaging (ERPs) and unmixes overlapping temporal and spatial information. We hope ERP researchers will now have yet another simple but versatile tool that not only complements existing methods but also provides further insights into spatiotemporal dynamics in time-domain EEG data.

INVESTIGATING SPATIAL AND TEMPORAL CORRELATES OF CORTICAL MUSIC REPRESENTATIONS THROUGH REPRESENTATIONAL MODELS

Peer Herholz
Montreal Neurological Institute

How are incoming sound waves transformed into abstract cortical music representations along the auditory system & what role do music features, concepts & musical training play in this cascade like processing? We investigated this question in a multimodal, multi stage project within which participants were exposed to a broad range of music genres & their brain activity recorded using fMRI ($n = 15$) & EEG ($n = 11$), as well as tasked with arranging the respective excerpts in a behavioral setting where the influence of musical training was also examined ($n = 20$). Using the representational model framework, a versatile model space, including music features (e.g., pitch, tempo, etc.), convolutional neural network (CCN) layers & conceptual models (e.g., genre descriptions) was tested regarding how well it can predict the observed spatial & temporal neural, & behavioral representations. Results indicate that spatial patterns are highly stable across processing stages in the auditory system, while diverging drastically across time. Comparably, layer-specific CCN representations resembled the found processing hierarchy closely. Behavioral representations were remarkably similar across participants & project stages, but not influenced by musical training. Furthermore, effects providing first evidence for an interaction between music features & concepts were found. Thus bottom-up & top-down processes seem to influence the computation of music representations along the auditory system. These are based on holistic percepts achieved over long time scales & are not modified by musical training.

MAPPING THE COGNITIVE ARCHITECTURE OF PROACTIVE CONTROL USING TIME-GENERALIZED MULTIVARIATE PATTERN ANALYSIS OF EVOKED EEG ACTIVITY

José Alanis
University of Marburg

Event-Related Potentials (ERPs) have proven a valuable source of information to understand the mechanisms engaged during exertion of cognitive control. However, testing the specific temporal sequence of these processes using ERPs is challenged by component overlap and unstandardized time-windows for component identification. Here, we analyzed oscillatory activity evoked during performance of a dot-pattern expectancy task, where the active maintenance of cues was integral for anticipating upcoming behavioral demands. (a) To map the temporal evolution of proactive processing, a mass-univariate analysis approach was implemented (i.e., taking all sensors and all time points into account). (b) These analyses were validated by time-generalized multivariate pattern analyses (MVPA) in an independent sample. Results revealed a cascading organization of proactive control following cue presentation. Early evoked activity (<.3 s) was mainly supported by frontal-occipital theta oscillations. Late activity (>.3 and <1 s) was mainly supported by a more parietal activity pattern in the alpha band. MVPA results indicated that the latter time period discriminated best between high and low predictive cues, suggesting separable neural processes in spite of comparable ERP responses. Our results suggest that the exertion of proactive control arises from a cascading activation of neurocognitive modules, index by the oscillatory dynamics of a frontal-parietal network. We discuss the functional significance of these oscillatory patterns, as well as their relation to behavioral performance.

PREDICTION OF VALENCE AND AROUSAL RATINGS BY EEG AND PERIPHERAL PHYSIOLOGICAL DATA

Hedwig Eisenbarth, Tim Gastrell, Caitlin Heesterman, and Bing Xue
Victoria University of Wellington

Mapping subjective experiences onto (neuro-)physiological activity on a continuous rather than event-related basis has made some progress using machine learning algorithms. Here, we used the DEAP data set to investigate differences between two main prediction algorithms (K-nearest neighbor and Random forest) for prediction of valence versus arousal ratings and the impact of varying numbers of features included in the analysis. The data set are comprised of 40 participants' physiological data and subjective ratings of 32 music video clips. Performance of the machine learning based prediction was assessed by the Root mean squared error (RMSE). In comparison to the use of raw EEG data, using four power bands for the 32 EEG channels and in addition to 28 peripheral physiological channels, we found a higher accuracy in arousal prediction than in valence prediction. Most importantly, inclusion of more than five features (EEG channel power spectra or peripheral channels) lead to most accurate predictions (RMSE < 2 on a 1–10 scale). In comparison to categorical prediction, which have been used predominantly in the past, dimensional rating prediction is still less accurate, but potentially more useful given the dimensional characteristics of valence and arousal experiences.

Funding: University Research Funding from Victoria University of Wellington.

Symposium 3

HOW AND FOR WHOM: FUNCTIONAL MECHANISMS IN COGNITION AND MOOD CONSIDERING SEX AND IDENTITY-RELATED FACTORS

Session Chair: Courtney Louis, Lilianne Gloe
Michigan State University

Discussant: Lisa Gatzke-Kopp, The Pennsylvania State University

Descriptors: Mood, Cognitive Control, ERPs

Although psychophysiological research has primarily focused on investigating biomarkers and mean-level differences, functional mechanisms underlying these associations have been understudied. Connecting physiology to self-report and/or behavioral measures with consideration of sex and identity-related factors will ultimately lead to a greater understanding of the explanatory function of psychophysiological measures in mood and behavioral performance. We provide examples of ways in which functional mechanisms can be explored across a variety of studies in females. Louis will discuss how estradiol differentially relates to negative affective symptoms and post-error behavior between black and white females. She will discuss the importance of race in women's mental health. Weigard will present results that indicate that emotional variability does not differ in females taking oral contraceptives varying in levels of hormone concentrations and those naturally cycling. These results challenge the notion that blunted emotional variability results from dampening of ovarian hormone fluctuations across the menstrual cycle. Gloe will discuss how inducing worry in female participants shifts the relationship between trait worry and flanker task behavior. She will also explore how the error-related negativity (ERN), an error-monitoring ERP, relates to proactive and reactive control in the context of state worry. Discussion will center on the implications of the findings as they pertain to the utility of considering functional mechanisms within contextual and sex/identity-related factors.

INVESTIGATING THE ROLE OF ESTRADIOL IN MOOD AND COGNITION ACROSS BLACK AND WHITE FEMALES

Courtney Louis and Jason Moser
Michigan State University

Evidence suggests that fluctuating levels of estradiol in females influence mood symptoms and cognitive performance. Although research indicates that black and white females have varying estradiol levels across the menstrual cycle, it remains unclear whether estradiol fluctuations differentially predict mood variability or performance. As such, we examined—(a) the role of estradiol fluctuations in mood symptoms, and (b) interactive effects between estradiol and the error-related negativity (ERN) on post-error performance, with a focus on whether these effects were consistent across 85 white and 28 black naturally cycling females. Participants completed daily questionnaires for 35 days assessing worry, anxious arousal, and anhedonia, provided daily saliva samples to assay estradiol, and completed a modified flanker task four times throughout their menstrual cycle. The results revealed that estradiol fluctuations exacerbated anhedonia for white females ($b = .81$, $p = .02$), but not black females ($p = .68$). Moreover, estradiol predicted less anxious arousal symptoms for black ($b = -.66$, $p = .04$) but not white females ($p = .92$). No effects reached significance for worry, (p's > .22). Results also revealed that estradiol predicted better post-error accuracy ($b = .03$, $p = .03$) in black but not white females ($p = .68$). Estradiol did not interact with the ERN in neither black nor white females to predict performance (p's > .18). Findings highlight the need for consideration of race to improve our understanding of women's mental health for all.

Funding: Project # 1R01MH108511-01; "Cognitive Control in Anxiety: The Role of Ovarian Hormones," PI: Jason Moser.

OVARIAN HORMONES AND DAILY EMOTIONAL VARIABILITY: LITTLE EVIDENCE FOR DIFFERENCES BETWEEN THE ENDOGENOUS MENSTRUAL CYCLE AND EXOGENOUS ORAL CONTRACEPTIVE USE

Alexander Weigard, Amy Loviska, and Adriene Beltz
University of Michigan

There is compelling evidence that ovarian hormones influence emotion, including that the exogenous estrogens and progestins in oral contraceptives (OCs) predict depression. However, the extent to which ovarian hormone fluctuations influence emotional variability is not known. Because OCs do not mimic the menstrual cycle, but rather provide relatively constant hormone dosing, there is a widely held assumption that OCs reduce day-to-day variability in emotion. The goal of this project was to test of this hypothesis using data from a 75-day intensive longitudinal study of naturally cycling (NC) women (n = 30) and women using three types of OC: monophasic ethinyl estradiol (EE) and drospirenone (n = 22), triphasic EE and norgestimate (n = 32), and monophasic EE and norethindrone acetate (n = 30). Differences between NC women and OC groups in three indices of affect variability—volatility, day-to-day carryover, and cyclicity—were evaluated with Bayesian methods that quantify the amount of evidence supporting a null or alternative hypothesis (Bayes factor) and provide estimates of effect size (δ posterior). Bayes factors generally indicated that the data provided more evidence for similarities between NC women and OC groups (i.e., a null hypothesis with $\delta = 0$) than for differences, and posterior distributions suggested that, even if differences exist, effect sizes are likely small. Thus, the data provide evidence against the hypothesis that OCs blunt day-to-day emotional variability.

Funding: Adriene Beltz is funded by the Jacobs Foundation; Alexander Weigard is funded by NIAAA T32 AA007477 to Frederic Blow.

EXPLORING FUNCTIONAL IMPLICATIONS OF WORRY: ASSOCIATIONS BETWEEN ERROR-MONITORING AND PROACTIVE CONTROL

Lilianne Gloe and Jason Moser
Michigan State University

Past work has indicated that worry relates to a larger error-related negativity (ERN) in females. Despite the breadth of past research, mechanisms underlying this relationship and their implications for worry and cognitive control in females remain unclear. Less theoretical and empirical attention has been devoted to distinguishing between state and trait worry in their associations with cognitive control. Additionally, an enlarged ERN in worriers has been theorized to relate to greater reliance on reactive control (as opposed to proactive control). The current study aimed to disentangle the associations between state and trait worry, ERN and reactive (vs. proactive) control. 138 females were recruited based on high and low Penn State Worry Questionnaire scores and randomly assigned to a worry induction group or neutral induction group during which they completed a series of cognitive tasks. The ERN was elicited during errors on the Eriksen letter flanker task. Proactive/reactive control was measured via AX-CPT task performance. Results indicated that neither state nor trait worry were associated with the ERN. Increases in trait worry, however, related to faster flanker RTs for the worry induction group, but slower RTs for the neutral induction group. Additionally, less proactive control related to a larger ERN in the worry induction group, but a smaller ERN in the neutral induction group. Results suggest the importance of considering state worry for better characterizing functional relationships between worry and cognitive control-related error monitoring.

Funding: Lilianne Gloe is an NSF GRFP fellow.

Big Ideas Abstracts

BIG IDEAS SESSION #1: SEX DIFFERENCES AND WOMEN'S HEALTH

SEX DIFFERENCES AND THE ROLE OF OVARIAN HORMONES IN ASSOCIATIONS BETWEEN ANXIETY AND COGNITIVE CONTROL: UNCOVERING NOVEL MECHANISMS FOR WOMEN'S MENTAL HEALTH

Jason Moser, Courtney Louis, Lilianne Gloe, and Ruofan Ma
Michigan State University

Descriptors: Women's Health, Anxiety, Cognitive Control
It is well documented that anxiety is more prevalent in females than males. Anxiety is also more impairing in females. Yet, little is known about the mechanisms involved in females' anxiety and its associated impairments. Uncovering mechanisms involved in the experience and impact of anxiety in females is important for improving the etiological models and treatments to meet the needs of unique individuals. In this talk, I will review findings from a set of studies showing that electrophysiological markers of cognitive control-related error monitoring represent indicators of neural processes more strongly related to anxiety in females than males. Moreover, subsequent studies demonstrate that ovarian hormonal status affects this relationship in females. Studies involving females using versus not using hormonal contraceptives and direct assays of ovarian hormones point to the involvement of both estradiol and progesterone in the relationship between anxiety and cognitive control. This work highlights the importance of considering sex differences in neurocognitive studies of anxiety, and, importantly, that the interplay among ovarian hormones and error-related cognitive control represents a novel mechanism for better characterizing the expression and impact of anxiety in females.

Funding: NIMH R01 MH108511: Cognitive control in anxiety: The role of ovarian hormones.

THE ERROR-RELATED NEGATIVITY (ERN) AND THE MENSTRUAL CYCLE: EFFECTS OF OVARIAN HORMONES ON THE ERN AND OBSESSIVE-COMPULSIVE SYMPTOMS

Elizabeth Mulligan[1], Greg Hajcak[1], Julia Klawohn[1,2], Brady Nelson[3], and Alexandria Meyer[1]
[1]Florida State University, [2]Humboldt University of Berlin, [3]Stony Brook University

Descriptors: Error-Related Negativity, Checking, Progesterone
Cyclical variation in hormone levels across the menstrual cycle have recently been associated with variability in symptoms of obsessive-compulsive and anxiety disorders. Previous studies suggest a potentiated neural response to errors (i.e., the error-related negativity or ERN) may be a biomarker of anxiety and risk. However, there is a dearth of research examining whether variation in ovarian hormones over the course of the natural menstrual cycle modulates the ERN, and whether the impact of hormones on ERN might relate to anxiety symptoms across the cycle. Using a within-subject design, the present study examined ovarian hormones, the ERN, and self-reported checking symptoms (i.e., inspection of one's own behaviors to reduce anxiety about potential adverse outcomes) in both the follicular and luteal phases of the menstrual cycle in 40 naturally cycling women. A more negative ERN was associated with greater checking symptoms in the luteal phase of the menstrual cycle, even when controlling for ERN amplitude in the follicular phase. Moreover, changes in checking symptoms between phases were associated with changes in the ERN between phases. Finally, a significant mediation model was found such that the ERN mediated the association between progesterone and checking symptoms in the luteal phase. The present findings suggest that ovarian hormones may influence checking symptom severity by modulating neural sensitivity to errors, and that fluctuation in the ERN between menstrual cycle phases may play a role in the expression of anxious and obsessive-compulsive symptoms.

EFFECTS OF MATERNAL IPV-PTSD ON MOTHERS' EVALUATION OF THREAT AND TRUSTWORTHINESS IN AVATARS AND INTERGENERATIONAL TRANSMISSION OF EMOTIONAL APPRAISAL BIAS TO THEIR CHILDREN

Virginie Perizzolo[1], Dominik Moser[1,2], Marylène Vital[3], Alexander Todorov[4], Sandra Rusconi Serpa[5], and Daniel Schechter[1,6]
[1]University of Geneva, Department of Psychiatry, [2]University of Bern, [3]University of Geneva Hospitals, [4]Princeton University, [5]University of Geneva, Faculty of Psychology, [6]Lausanne University Medical Center

Descriptors: Electrophysiology, Posttraumatic Stress Disorder (PTSD), Intergenerational Transmission
We studied how mothers' IPV-PTSD affects the evaluation of facial communication of dominance/threat and valence/trustworthiness, as well as potentially their children's appraisal of facial expressions, using high-density electroencephalography (HD-EEG) and collected behavioral data. A nested sample of 30 mothers (16 IPV-PTSD mothers and 14 non-PTSD controls) performed a face evaluation task using a validated set of avatars; and 47 children (26 children of IPV-PTSD mothers and 21 children of non-PTSD controls) performed an Emotional Face Matching Task. Results demonstrated that maternal PTSD and exposure to violence correlated with under-appraisal of threat and over-evaluation of trust in the nested study. Source-localization findings confirmed bias in encoding/decoding processing, with increased activity in the limbic system in response to threat as well as decreased activation in the left aPFC in response to trust, in IPV-PTSD mothers compared to non-PTSD controls. Results obtained in the child-study showed greater global field power in response to all emotions and difficulties in processing negative emotions, with decreased activation of the right dlPFC in children of IPV-PTSD mothers, compared to non-PTSD controls. These two innovative studies were the first to demonstrate that maternal PTSD affects both maternal social judgment and is associated with their own children's emotional appraisal. These findings are of potential benefit to the development of more effective parent-child interventions among families with interpersonal violence exposure.

Funding: This research is funded by a Swiss National Science Foundation NCCR-SYNAPSY grant (n° 51AU40_125759).

FRONTAL ASYMMETRY AS A NOVEL BIOMARKER FOR PHYSICAL ACTIVITY AND INACTIVITY

Hunter Threadgill[1], Ricardo Wilhelm[2], Battogtokh Zagdsuren[2], Hayley MacDonald[2], Mark Richardson[2], and Philip Gable[3]
[1]Florida State University, [2]The University of Alabama, [3]University of Delaware

Descriptors: Physical Activity, Frontal Asymmetry, Motivation
The Center for Disease Control reports that 9% of deaths are associated with physical inactivity and the World Health Organization ranks physical inactivity at the 7th leading cause of preventable death in the world. However, motivational processes can modulate this global health problem. The current study sought to investigate whether frontal asymmetry, a neural marker of motivation, relates to PA levels. Across two studies, participants completed the International Physical Activity Questionnaire, measuring self-reported PA and sedentary behavior. Resting EEG was then recorded. Correlation and regression analyses were conducted to examine the relationship between left frontal alpha asymmetry, PA, and sedentary behavior, as well as potential moderators, such as sex. Study 1 (n = 24) found that left frontal alpha asymmetry was unrelated to PA and inversely related to sedentary behavior (time spent sitting on a weekday and weekend day). Study 2 (n = 109) found that left frontal alpha asymmetry was related to PA. Left frontal alpha asymmetry was inversely related to sedentary behavior, but only in women. Together, results suggest that greater left frontal activity is related to PA, but is inversely related to sedentary behavior in women. To our knowledge, these data are the first to show an association between left frontal alpha asymmetry and PA or sedentary behavior. Levels of left frontal asymmetry may be a novel biomarker and important target for interventions designed to increase physical activity, an increasingly important global health problem.

BIG IDEAS SESSION #2: UNDERSTANDING LABORATORY AND REAL-WORLD BEHAVIOR

THE FURIOUS THIRD: LOW MIDFRONTAL THETA AND STATE ANGER PREDICT PUNISHMENT IN A THIRD PARTY DICTATOR GAME

Johannes Rodrigues[1], Marvin Liesner[1], Mario Reutter[1], Patrick Mussel[2], and Johannes Hewig[1]
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Descriptors: Feedback Related Negativity (FRN); Reward Positivity (Rew-P), Third Party Dictator Game: Punishment and Compensation, Influence of State Anger on Compensation and Punishment

In third party dictator games, participants may show punishment behavior, expressed using their money to take away money from the dictators. This punishment has been interpreted as "altruistic." However, it was shown that this punishment is related to trait anger instead of trait altruism if compensation is also available as a behavioral option. In the present study, we investigated the influence of state anger on punishment and compensation in the third party dictator game with 56 participants. Therefore, we used movie sequences for emotional priming, including the target states anger, happy and neutral. We measured the feedback-related negativity (FRN) and midfrontal theta band activation, to get an electro-cortical correlate of the processing of fair and unfair offers. Also, we assessed single trial FRN and midfrontal theta as a predictor for punishment and compensation. We found that punishment was linked to state anger. Midfrontal theta, which has previously been linked to altruistic acts and cognitive control, predicted less punishment. Additionally, trait anger led to enhanced FRN for unfair offers. This led to the interpretation that the FRN depicts the evaluation of fairness, while midfrontal theta captures an aspect of cognitive control and altruistic motivation. We conclude that the term "costly punishment" is more appropriate than "altruistic punishment" as no direct link of altruism and punishment is given. Also, midfrontal theta complements the FRN, offering additional insights into complex responses and decision processes, especially as a single trial predictor.

Funding: This work was funded by the European Union through the project "Individualisierung Digital" (Fonds 823881) in the european fonds for regional development (Europäischer Fonds für regionale Entwicklung: EFRE).

ADVANCING THE VIABILITY OF NONDECEPTIVE PLACEBOS TO IMPROVE PHYSICAL AND PSYCHOLOGICAL HEALTH

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Descriptors: NonDeceptive Placebos, Health

An emerging consensus in the scientific and medical field has begun to advance a seemingly radical idea: the simple belief that one is taking real medication often leads to one feeling better. This is called the placebo effect. However, the ubiquitous belief that deception is necessary in order for placebos to work prevents their widespread use. Fortunately, for the past decade, there has been accumulating evidence that placebos administered without deception may still help improve physical and mental health. However, a most pressing issue is that these observed beneficial effects have primarily been demonstrated with self-report measures, casting doubt as to whether they represent genuine psychophysiological effects. In this talk, we argue that psychophysiological research is uniquely qualified to play an important role in advancing the viability of nondeceptive placebos to improve physical and psychological health. We use one of our experiments as a case study to highlight important conceptual and methodological pitfalls in prior work attempting to demonstrate nondeceptive placebo effects on psychobiological outcomes. We argue that researchers should consider the type of placebo effect being manipulated, the domain in which it is being tested, and the type of measures utilized. We further discuss future directions of nondeceptive placebo research in a psychophysiological context based on our knowledge of deceptive placebo mechanisms.

BEHAVIORAL, LIFESTYLE, AND DIETARY TREATMENTS OF ASTHMA: FOUNDATION IN PSYCHOPHYSIOLOGY

Thomas Ritz[1], Chelsey Werchan[1], Juliet Krol[1], Alicia Meuret[1], Bernhard Dahme[2], and David Rosenfield[1]
[1]Southern Methodist University, [2]University of Hamburg

Descriptors: Asthma, Behavioral Intervention, Translation

Psychophysiology is a key discipline in creating the basis for a mechanism-driven approach to behavioral interventions for mental and somatic illnesses. I will use the example of asthma to demonstrate the translation of basic psychophysiological findings into behavioral, dietary, or lifestyle intervention strategies. Despite progress in medical treatment, asthma control remains unsatisfactory and life-threatening exacerbations can occur. Psychosocial factors contribute to suboptimal control, but interventions have lagged behind epidemiological and basic research insights. I will present three examples of translational work that target the psychobiological processes in asthma. Bronchoconstriction in asthma in response to negative affect is mediated by parasympathetic excitation and strategically implemented physical activity and an active lifestyle can be instrumental in reversing bronchoconstriction. Hyperventilation is a characteristic in asthma and is linked to bronchoconstriction, dyspnea, and anxiety. Respiratory training emphasizing hypoventilation has been successful in reducing anxiety and symptoms, and improving asthma control and aspects of airway function. Respiratory infections facilitated by stress can lead to asthma exacerbations and longer-lasting stress or depression weaken pathogen defense by airway nitric oxide. Boosting airway nitric oxide by dietary nitrate helps combating stress-induced sickness and cold symptoms. There is an urgent need for more translational work that can help reduce the burden of this chronic illness and improve the patients' quality of life.

Funding: This presentation is partially funded by an NIH/NHLBI project grant (R01 HL142775) for the Dallas Asthma Brain and Cognition Study (Dallas ABC Study).

CAN FOOD PREFERENCES BE MODIFIED BY POSTHYPNOTIC SUGGESTIONS? AN EVENT-RELATED BRAIN POTENTIAL STUDY

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Descriptors: Implicit Food Preference, Posthypnotic Suggestion, Event-Related Potentials

Unhealthy food choices are implicated in two worldwide issues, the burden of global disease and climate change. The preference for high- over low-calorie food and difficulties in inhibiting the desire for high-calorie food are important factors involved in unhealthy food choices. Here, we explored posthypnotic suggestions (PHS) as a possible new tool to increase the preference for low-calorie food. A food-face classification, measuring implicit food preferences, and a Go-NoGo task, measuring inhibition, were administrated with PHS being activated or deactivated in a counterbalanced design. In the food-face classification, without PHS the early visual P1 amplitude was larger in response to high than low-calorie pictures, possibly reflecting differential reward-associations. PHS eliminated this difference in P1 and yielded faster RTs and larger amplitudes of the late positive component in response to low- versus high-calorie items. Hence, positive bias toward low-calorie food due to PHS seems to have enhanced their effective processing by increasing motivated attention. In the Go-NoGo task, PHS decreased NoGo-N2 and increased P3 in both Go and NoGo conditions, possibly by turning low- and high-calorie items more pleasant and unpleasant, respectively, requiring more proactive control to inhibit task-irrelevant food-related emotions. Together, PHS effectively increased the preference for low-calorie food and inhibition of impulses toward high-calorie food, therefore, PHS may be a promising tool to support healthy and sustainable food choices.

Funding: German Academic Exchange (DAAD).

Poster Abstracts

POSTER SESSION 1

Poster 1-001

RESTING-STATE BRAIN NETWORK SEGREGATION IS ASSOCIATED WITH CHANGES IN HEART RATE VARIABILITY ACROSS THE LIFESPAN

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Descriptors: Resting-state Functional Connectivity(rsFC), Heart Rate Variability (HRV), Neurovisceral Integration

Age-related declines in brain network segregation measured with fMRI using resting state functional connectivity (rsFC) have been shown to be related to changes in arterial elasticity and cognitive performance (Kong et al., 2020; Wig et al., 2017). Vascular reactivity is also expected to index vascular health. Therefore, here we hypothesized an association between heart rate variability (HRV) and network segregation. We analyzed rsFC and HRV data in a group of 41 subjects (age range 20–75 years, 19 Males/22 females). The fMRI dataset was converted to BIDS format and went through preprocessing using the fMRIPrep pipeline (Esteban et al., 2019). We extracted the resting state network nodes using the Power atlas (Power et al., 2011); the preprocessing of resting state data and motion correction was done using the XCP pipeline (Ciric et al., 2018). HRV was analyzed in both the time and frequency domains with the help of in-house R scripts adapted from the RHRV package (Martinez et al., 2017). HRV changes significantly predicted segregation in sensory-motor networks, especially in the visual network, even after controlling for the effects of age. These results provide important insights on how autonomic influences indexed by changes in HRV could modulate resting state network organization, with implications for our understanding of how visceral signals modulate cognition, perception and behavior. Further investigation is needed to elucidate the dynamic, trial-by-trial nature of this brain-heart relationship.

Funding: This work was supported by NIA grant R01AG059878 to M. Fabiani and G. Gratton.

Poster 1-002

COGNITIVE RESERVE (CR) MEDIATES COGNITIVE DYSFUNCTION DURING A WORKING MEMORY TASK IN ELDERLY AFTER MILD TRAUMATIC BRAIN INJURY. AN ERP STUDY

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Descriptors: Event-Related Potentials, Cognitive Reserve, mTBI

Elderly patients who have sustained mild traumatic brain injury (mTBI) are more vulnerable to cognitive dysfunction than younger patients due to the accumulative neurodegenerative effect of ageing. We studied whether cognitive reserve (CR), the capacity to sustain brain damage without clinical symptoms, mediates these consequences of mTBI in elderly using event-related potentials (ERPs). Eighteen elderly (68.8 ± 4.8 years) were studied one month after mTBI, as well as 27 age-matched healthy elderly (67.4 ± 5.0 years). CR was estimated with the Cognitive Reserve Index Questionnaire and used to determine High and Low CR groups by median split. Sixty-four-channel EEG was recorded during a visual N-Back task with three levels. Individual P2 and P3 component latencies and amplitudes were derived, as well as accuracies and reaction times. The latter were used to calculate the inverse efficiency score (IES). Data were analyzed using mixed RM-ANOVAs. We found that the mTBI elderly with higher CR had amplitudes and latencies comparable to healthy elderly. Within subjects, as memory load increased, amplitudes decreased and latencies increased. Only for mTBI elderly, CR correlated with P3 latency in the 0- and 2-Back task levels, and with accuracy in the 1- and 2-Back task levels. The P3 amplitude and the IES correlated for 0-, 1- & 2-Back task levels. These results suggest that CR comes into play only when brain damage occurs as performance and brain activity of patients with high CR was comparable to that of healthy participants.

Funding: This project was partially supported by a grant of the Council of Science and Technology of Mexico (CONACyT): Fellowship No. 709126 (awarded to the first author).

Poster 1-003

POLARITY-REVERSED ERP SUBSEQUENT MEMORY EFFECTS IN OLDER ADULTS REFLECT A RELATIVELY STRONG AGE-RELATED DECLINE IN ASSOCIATIVE MEMORY

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Descriptors: ERPs, Subsequent Memory, Aging

Comparing stimulus-elicited brain activity between subsequently remembered vs. forgotten information gives insights into the mechanisms of successful memory encoding in particular tasks and populations. Typically, such ERP "subsequent memory effects" (SME) present as more positive-going amplitudes for subsequently remembered items, but polarity-reversed ERP SMEs have been reported under shallow, perceptual encoding strategies. Two experiments are reported that speak to the role of polarity-reversed ERP SMEs in the well-replicated associative memory deficit of older adults. In experiment 1, object pairs were encoded with a task that did not provide ample opportunity for elaboration. Both age groups performed poorly and showed an early, polarity-reversed SME, which in young adults also emerged in a perceptually-focused single item encoding task. In experiment 2, object pairs were encoded via interactive imagery. Older adults showed strongly reduced associative memory, compared to young adults. Slow wave SMEs with a typical polarity were observed in young adults and older adults who performed relatively well in associative memory. Older adults with low associative memory performance, by contrast, showed a polarity-reversed, early SME. Taken together, early polarity-reversed ERP SMEs reflect perceptual item encoding that is not beneficial for generating inter-item associative memory traces. In older adults, this SME presumably reflects the inability or failure to engage higher-level, elaborative encoding mechanisms, contributing to an age-related associative memory decline.

Funding: Nikolaus Koch Foundation, Trier, Germany [grant number 17/135].

Poster 1-004

EMOTION REGULATION, DEPRESSION, AND THE LPP IN OLDER ADULTS

Melissa Meynadasy[1]; C.J. Brush[1]; Russell Mach[1]; Julia Sheffler[1]; Dimitris Kiosses[2]; Natalie Sachs-Ericsson[1]; Greg Hajcak[1]
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Descriptors: Emotion Regulation, Depression, ERPs

Whereas aging is associated with an increase in the successful use of Emotion Regulation (ER) strategies (Urry & Gross, 2010), depression-prone older adults have deficits in ER (Kraaij et al., 2002). Identifying patterns of ER deficits in older adults may elucidate mechanisms that contribute to depression in aging, and may provide targets for treatment. The current study examined the late positive potential (LPP) in an ER task in 47 older adults (M = 68 years) who scored high on ER (high ER group) or low on ER and high on depressive symptoms (low ER group). Participants viewed negative or neutral stimuli for 7 s and were instructed to attend normally (i.e., react trials) or reframe their emotional response (i.e., reappraise trials). There were reduced LPP amplitudes in the low ER group compared to the high ER group (p's < .038) across trial types and valence, a pattern previously shown in depressed individuals. Depressive symptoms were negatively correlated with LPP to react and reappraise trial types (p's < .047). A Time Window (i.e., 1,500–4,000, 4,000–7,000 ms) × Group interaction was observed (p = .020) on LPP react–reappraise difference scores. The low ER group exhibited a decreased LPP difference score from early to late time windows; the LPP difference score increased in the high ER group. This may reflect better ability in the high ER group to use task instructions. Results indicate the LPP may be a promising measure for studying individual differences in ER among older adults and could advance our knowledge about the contribution of ER deficits in depression.

Funding: This work was supported by the Institute for Successful Aging (Florida State University) Grant number OMNI 089009-550-000473.

Poster 1-005

PROCRASTINATION AND THE N2PC

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Descriptors: Procrastination

Procrastination is familiar to most individuals, found in a variety of contexts from studying at universities (Afzal & Jami, 2018) to taking care of our health (Moghadam et al., 2019). However, little is known about the neurological or cognitive correlates of this behavior (Hu et al., 2018; Wu et al., 2016). Recently Wu et al. demonstrated using a reward task that individuals rating high in procrastination had a delayed and larger amplitude P2 in comparison to those low in procrastination. Wu et al. suggest those with high procrastination are more impulsive but process information more slowly with greater motivation-driven attention. As research suggests that selective visual attention as indexed by the N2pc can be modulated by motivation (Sänger & Washer, 2011) the N2pc may also reflect individual differences in procrastination. However, to date no studies have examined the N2pc in relation to procrastination. This study examined individual differences in procrastination as measured by the Lay Procrastination Scale (1986) in relation to the N2pc elicited by a visual search task (n = 191). Significant differences in N2pc amplitude (r = .149, $F(1, 189) = 4.27$, p = .04) but not latency ($p > .05$) were seen. Those with lower levels of procrastination showed larger amplitude N2pc activity. This is consistent with Wu et al.'s model of procrastination where motivation driven attention is required - those who engage in more procrastination may require additional motivation to increase N2pc related activity to perform tasks at the same level of those with lower levels of procrastination.

Funding: This work was funded by grants from NSF DUE 1625521, DUE 1625610, and DUE 1626554.

Poster 1-006

DYNAMIC ADJUSTMENTS OF MIDFRONTAL THETA CONTROL SIGNALS IN YOUNG ADULTS AND ADOLESCENTS

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Descriptors: Cognitive Control, Adolescence, Neural Oscillations

During task performance, our level of cognitive control is dynamically adjusted to task demands. In classic interference tasks this is reflected, for example, by the congruency sequence effect (CSE), the finding that the effect of conflict is smaller following conflicting compared to non-conflicting trials. Although brain areas related to cognitive control (e.g., the ACC or the DLPFC) show protracted maturation across adolescence, previous studies found that adolescents show similar behavioural CSEs to adults. In the present study, we investigated whether there are age-related changes in the neural underpinnings of dynamic control adjustments using EEG. Early adolescents (ages 12–14, N = 30) and young adults (ages 25–27, N = 29) completed a confound-minimized flanker task optimized for the detection of sequential control adjustments. The CSE was observed in midfrontal theta power thought to capture ACC-mediated monitoring processes, but was not modulated significantly by age. Adolescents, however, showed a smaller congruency effect in the power and cross-trial temporal consistency of midfrontal theta oscillations than adults. No age differences were observed in phase-based connectivity between midfrontal and lateral frontal regions in the theta band. These findings provide strong support for the role of midfrontal theta oscillations in conflict monitoring and reactive control, and suggest that the cognitive system of early adolescents initially responds less reliably to the occurrence of conflict than that of adults but the two groups then modulate control similarly.

Poster 1-007

DIFFERENCES IN TRAFFIC CONDITIONS ARE RELATED TO N1 AMPLITUDE CHANGES DURING CYCLING

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Descriptors: ERP, Mobile EEG, Outdoor cognition

Over recent years, researchers have made use of portable technology to develop outdoor EEG paradigms. This mobile EEG methodology is allowing researchers to conduct experiments in highly ecologically valid environments, away from isolated laboratory chambers. In the present study, we wanted to test whether cycling environments influence ERP components related to attentional processes. While riding a bicycle, 29 participants completed an auditory oddball task in three different environments, varying in levels of complexity and traffic volume. We compared the oddball-elicited N1 amplitude for standard and target tones in three different cycling scenarios (protected bike lane by fast traffic, painted bike lane with active traffic, protected bike lane with quiet traffic). Following target and standard tones, we found a significantly smaller N1 amplitude at electrodes Fz and Pz in the protected/quiet traffic environment relative to the fast traffic protected lane and painted lane in active traffic. Previous mobile studies have found increased N1 amplitude in busier environments, suggesting an increase in auditory filtering while participants complete the oddball task. Our findings support these previous results by showing a reliably larger N1 amplitude in the two busiest cycling conditions, providing further evidence that N1 processes are modulated by environmental factors during the auditory oddball task.

Funding: NSERC Discovery grant Start-up funds from the faculty of science of the University of Alberta.

Poster 1-008

INTERACTIONS BETWEEN EFFECTS OF LATERAL MASKING AND TARGET ECCENTRICITY USING THE N2PC AS A MARKER OF ATTENTIONAL DEPLOYMENT

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Descriptors: N2pc Component, Target Eccentricity, Lateral Masking

The N2pc is an electrophysiological marker of visual attention that decreases in amplitude with increasing target eccentricity. This distance-from-fovea effect has been hypothesized to result from qualitative processing differences (Schaffer et al., 2011) or neuron concentration differences between foveal and peripheral areas (Papaioannou & Luck, 2020). We examined the relationship between lateral masking and target eccentricity. Subjects searched for a green or an orange box with a gap on the top. In every display, a green box and an orange box were presented in opposing horizontal lower hemifields, either near or far from fixation, and the task-relevant colour was manipulated between-subjects. These items could be presented with two additional grey items. When there were four boxes, items were presented in both near and far locations. The N2pc was only modulated by eccentricity or the number of stimuli when the target (task-relevant item with a gap on top) was present. The N2pc was delayed for far targets compared with targets closer to fixation, regardless of whether there was a nearby distractor, suggesting that lateral masking was not responsible for this delay in attentional processing. When there were two items, near targets produced a larger N2pc compared with far targets. When there were four items, however, there was no difference in amplitude between near and far targets, suggesting that the additional distractor was processed. Our results suggest that lateral masking impacts N2pc amplitude and can potentially override effects due to target eccentricity.

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Poster 1-009

NEURAL ACTIVITY RELEVANT TO TEMPORAL ATTENTION-MEDIATED AFFECTIVE PRIMING AND ITS RELATIONSHIP WITH TRAIT ANXIETY

Takuya Imani; Tomokazu Urakawa; Hikaru Ishisaka; Takenori Onishi; Osamu Araki
Tokyo University of Science

Descriptors: Temporal Attention, Affective Priming, Tarit Anxiety
The unconscious priming has been reported to depend on temporal attention (Naccache et al., 2002). However, temporal profile of neural activity relevant to such a temporal attention-dependent priming remained to be unclear. In terms of the unconscious affective priming, the present study tried to clarify this issue by using electroencephalography. In our experiment, we employed a stimulation paradigm in which a subliminal presentation of primer (happy or fearful face) was followed by a supraliminal presentation of target (neutral face). To control temporal attention, a visual cue indicating a timing of the primer's presentation consistently or inconsistently was presented at the beginning of each trial. Behavioral results showed that allocation of temporal attention to the happy primer, but not to the fearful primer, significantly yielded the priming. In line with the behavioral results, allocation of the temporal attention pronouncedly enhanced an early visual evoked potential at a latency of 60 ms (N60) following the primer's onset for the happy primer but not for the fearful primer. With a focus on interindividual difference in the trait anxiety, we further found a significant correlation between the anxiety and N60's enhancement exclusively for trials with the fearful primer. These findings suggest that the enhancing effect of temporal attention on affective priming is implemented in the brain as early as about 60 ms following the primer's onset, and such early visual processing for a negative affect would be obscured if the trait anxiety was not considered.

Poster 1-010

CHRONIC EXPOSURE TO VIOLENT GAMES INCREASES ATTENTION AND THE SENSE OF PRESENCE TOWARD VIOLENT SCENES: MEASURING ERP ELICITED BY ELECTRICAL PROBES WHILE WATCHING EMOTIONALLY VARIED FILMS

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[1]Mie University, [2]National Institute of Information and Communications Technology, [3]Kwansei Gakuin University

Descriptors: Violent Games, ERP, Sense of Presence
This study attempts to expand our understanding on (sense of) presence (i.e., spatial presence, a feeling of being there in virtual environment) and cognitive/emotional processing as a function of violent game (VG) exposure. It has been claimed that feeling presence generally requires high level of attention and arousal during exposure to mediated environments, which is also considered to be one of primary conditions for players to feel "enjoyment". However, the condition is not consistent with notions of desensitization effects known to be brought by habitual play of VG. In order to tackle the question, this study investigated whether the amount of attentional resources allocated to emotionally manipulated video clips and sense of presence would vary as a function of VG exposure. To this end, P300 elicited by electrical probes randomly applied (mean ISI = 10.75 s) on the wrist of 43 Japanese college students were measured during 2 min of each 12 video clips (neutral, highly pleasant, highly unpleasant (violent), and highly coactive) and the level of presence they had felt were asked. It was predicted that habitual VG players would exhibit smaller P300 amplitude (i.e., more attention) and feel higher level of presence while watching violent scenes. The results supported the predictions with interactions between VG exposure and emotional contents of video clips on both P300 amplitude (p = .001) and on presence (p = .059). Established arguments on desensitization effects of playing VG may need to be reconsidered through ERP and presence research.

Funding: Grant-in-Aid for Scientific Research (C) 26380996.

Poster 1-011

RESTING HEART RATE VARIABILITY DOES NOT PREDICT INHIBITORY CONTROL IN THREE ATTENTIONAL TASKS

Kristen Judy; Jared McGinley
Towson University

Descriptors: Heart Rate Variability, Inhibition, Attention
Dominant psychophysiological theories have emphasized the role of vagally mediated heart rate variability (vmHRV) in executive function performance. Despite the theoretical association, empirical research linking these constructs is sparse and the findings are inconsistent. The current study was specifically designed to test whether resting vmHRV predicted cognitive inhibition across three laboratory tasks (i.e., Stroop, Flanker, and Simon). 221 undergraduates (49 male) participated in a one-hour laboratory study. Resting vmHRV was calculated from a 5-min ECG recording period, and separate cognitive inhibition scores were calculated for the three tasks (average reaction time for congruent trials was subtracted from incongruent trials). No significant correlations were observed with vmHRV and inhibition metrics for any of the three tasks (all ps > .10). Follow-up regression analyses which covaried for the influence of respiration rate, as well as relevant health and demographic variables, also did not significantly predict inhibition (all ps > .10). Although the broader research literature has demonstrated links between vmHRV and performance across a variety of contexts, we encourage further falsification of existing theoretical models to better define the links between vmHRV and executive function.

Poster 1-012

NEAR-MISS INFERENCE: MEASURING PHASIC ELECTRODERMAL ACTIVITY AND FEAR BRADYCARDIA TO TEST A COGNTIVE MECHANSIM OF PATHOLOGICAL ANXIETY

Matthias Haucke; Gregory Gutmann; Gregor Wilbertz; Stephan Heinzel
Freie Universität Berlin

Descriptors: Near-Miss Inference, Anxiety Disorder, Phasic Electrodermal Activity
A possible explanation for the maintenance of maladaptive beliefs in pathological anxiety, is the overreaction towards near-miss outcomes. We hypothesize that near-miss events (i.e., barely escaping an aversive electric impulse) will evoke higher physiological anxiety responses than other types of miss outcomes. Thirty-three Psychology students were presented a gambling wheel and received a mild electric impulse, instead of a monetary win. Outcomes were separated into 8 different types of misses, ranging from complete miss (1) to near-miss (8). We recorded an electrocardiogram (ECG) and electrodermal activity (EDA). Skin conductance response (SCR) were calculated via a continuous decomposition analysis. Moreover, a continuous heart period trace (HP trace) was computed. SCR responses were statistically significantly affected by the type of miss event $F(7, 224) = 21.09$, $p < .0005$. The Bonferroni post hoc tests revealed that near-miss events were statistically significantly higher than all other events (p's < .005). Similiarly, heart period trace was statistically significantly affected by the type of miss event $F(7, 196) = 3.52$, $p < .005$. The Bonferroni post hoc tests revealed that only near-miss event 8 evoked statistically significant higher HP trace slowing (i.e., fear bradycardia) than other miss events (p's < .005). Thus, near-miss events led to heightened physiological fear response. To conclude, this paradigm can be used to study near-miss events as a potential cognitive mechanism of pathologic anxiety.

Poster 1-013

THE HR ENTRAINMENT AND CALMING EFFECTS OF SUBTLY VARYING LIGHTING

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Descriptors: HR Entrainment, Stress Reduction, Lighting

Where many stress reduction applications require explicit attention or effort, we investigated the potential of an implicit strategy based on heart rate (HR) entrainment by subtly varying lighting: Light variations at sub-HR frequency might entrain one's HR towards this lower frequency, which is then perceived as a lower level of arousal. We exposed 41 participants to 3 lighting conditions: static light (S), light varying in intensity at HR frequency (HR100), and at a frequency 20% below (HR80). Wallwashers illuminated all visible walls at a constant level (S), or with a subtle variation around this level (HR100, HR80). The 3 conditions were presented in 3 consecutive sessions in which participants performed stressing tasks, while HR, skin conductance level (SCL), and subjective anxiety were measured. Two ANOVAs showed no significant effects of lighting condition on anxiety or SCL reactivity (p's > .10), thus failing to support a calming effect of the sub-HR lighting. An ANOVA on HR reactivity did not yield a significant effect either (p = .88), thus failing to support a HR entrainment effect. While we must conclude that subtly varying sub-HR lighting does not induce any calming or HR entrainment effects, these results contrast with earlier reports: Anishenko et al. (2000) did find HR entrainment for lights with large intensity variations, suggesting our subtle variation was too weak. And Azevedo et al. (2017) did report significant calming effects for subtle tactile stimulation, possibly because the tactile sense is closer to one's natural HR proprioception than the visual.

Poster 1-014

NATURE AS A MODULATOR OF THE ERROR-RELATED NEGATIVITY

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Descriptors: Error-related Negativity, Attention Restoration Theory, Nature

According to Kaplan's Theory of Attention Restoration, spending time in a natural environment can restore depleted cognitive resources, and specifically attentional resources, by giving cognitive control networks a chance to rest and recuperate. If this is true, then we would expect to see changes in event-related potentials (ERPs) relating to cognitive control when participants have spent substantial time in nature compared to a control environment. Specifically, in the present study, we examine how exposure to nature could influence the Error-Related Negativity (ERN) component. This component is reflective of the brain's error- processing system, a key aspect of cognitive control networks of the brain. Previous research suggests that the ERN amplitude increases as working memory capacity, motivation, and attention increase during a task. To examine whether the ERN increases in nature, we took 60 participants on a 5-day camping trip and had them complete a Flanker Task while EEG was recorded at three time points: before the trip, on the trip, and after the trip. Consistent with Attention Restoration Theory, we report a significant increase in ERN amplitude when participants are tested outside in nature on a multi-day camping trip, compared to testing before or after the trip.

Poster 1-015

AN EVENT-RELATED POTENTIALS STUDY ON THE MULTILINGUAL AND BI-DIALECTAL EFFECT ON EXECUTIVE CONTROL

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University of Cyprus

Descriptors: Bilingualism, Executive Control, Event-Related Potentials

We examined the hypothesis that multilingualism enhances executive control (EC), a cognitive system that includes switching, working memory and inhibition. This advantage has been argued to stem from multilinguals' everyday experience in using EC to manage two language systems in the mind and brain. We were particularly interested in whether the advantage extends to bi-dialectals who speak two closely related dialects of the same language. We compared ten multilingual (in Greek and another language), ten bi-dialectal (in Cypriot Greek and Standard Modern Greek) and ten monolingual (in Standard Modern Greek) young adults. Participants performed a Flanker task, a test of inhibition (the ability to inhibit irrelevant information). We focused on the N2 and P3, two Event-Related Potential components that have been related to EC processes. The groups did not differ in background variables, including age, gender, socioeconomic status, education level and general intelligence. For the N2, we measured mean amplitude for correct incongruent trials, 220–400 ms after target at electrodes Fz and FCz. For P3, we measured mean amplitude for correct incongruent trials, 300–500 ms after target at electrodes Cz, CPz and Pz. Our results revealed no significant group differences in either the N2 or P3 components. We examine potential limitations of our study including small sample size and low power and the use of a single task that tapped into only one EC component. We also discuss our findings in the context of the recent debate about the existence of a multilingual advantage in EC.

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Poster 1-017

EFFECTS OF ADOLESCENT CONCUSSION ON NEURAL PERFORMANCE MONITORING: A LONGITUDINAL STUDY

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Descriptors: Performance Monitoring, Adolescent, Concussion

Performance monitoring, the ability to detect errors and subsequently improve future behavior, is a cognitive process that may be disrupted by concussion. Cross-sectional and longitudinal studies of adults following concussion suggest variability in post-concussion performance monitoring abilities; yet, despite important consequences of concussion on the developing brain, no longitudinal studies of performance monitoring following adolescent concussion are available to date. We measured the error-related negativity (ERN) and error positivity (Pe) event-related potential (ERP) components related to performance monitoring collected during a modified flanker task in adolescents with concussion (n = 28) and healthy adolescent controls (n = 27) within three weeks of concussion and again approximately one-year post-injury. ERN and Pe values were larger following errors than correct trials for both groups. 2-Time (3-week, one-year) by 2-Group (concussion, control) repeated measures ANOVAs on residualized difference scores showed no statistically-significant main effects or interactions for either ERN or Pe residualized values. Thus, in this sample of adolescents with concussion, there appear to be non-significant changes in neurophysiological measures of performance monitoring immediately following concussion that are not altered over time—suggesting ERN and Pe amplitudes are not clear physiological indicators of concussion presence or change over time in adolescents.

Funding: Funding was provided by the BYU College of Family, Home, and Social Sciences.

Poster 1-018

PHYSIOLOGICAL PREDICTORS OF INHIBITORY CONTROL DEVELOPMENT ACROSS EARLY CHILDHOOD IN MALES WITH FRAGILE X SYNDROME

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Descriptors: Respiratory Sinus Arrhythmia, Inhibitory Control, Fragile X Syndrome

Inhibitory control (IC), the ability to restrain a dominant response, and respiratory sinus arrhythmia (RSA), an index of parasympathetic nervous system function, both underlie regulatory behavior and social development. The relationship between physiology and IC across early childhood in fragile X syndrome (FXS), a genetic disorder characterized by poor IC and hyperarousal, remains unclear. This study examined the association between IC and RSA maturation in FXS (n = 25) and typically developing (TD) males (n = 35). IC and RSA were assessed at multiple points between 0 and 72 months via parent-report measures and ECG recording during a baseline period. Subject-specific slopes and intercepts were calculated. T-tests and a stepwise multiple regression of IC slope on RSA intercept, group, and group*intercept were run. FXS males exhibited significantly lower IC slope (p < .001), IC intercept (p = .001), RSA slope (p = .024), and RSA intercept (p = .039), compared to TD males. The multiple regression model revealed significant main effects of group (B = −.012, $t(41)$ = −3.20, p = .003) and RSA intercept (B = .010, $t(41)$ = 2.28, p = .028), which accounted for 35% of variance in IC slope. FXS males exhibit atypical IC and RSA, though RSA in early childhood predicts IC maturation similarly for TD and FXS males. Understanding the biological underpinnings of IC development may elucidate early markers of social and behavior problems and facilitate early intervention. Our findings suggest IC may be a plausible endophenotype of autonomic dysregulation in FXS.

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Poster 1-019

ON THE RELIABILITY OF THE N2-COMPONENT IN A MODIFIED 3-STIMULUS CONCEALED INFORMATION TEST

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Descriptors: Modified Concealed Information Test, Frontal N2, Reliability

Research on deception focused on the investigation of event-related potentials (ERP) to facilitate our knowledge on cognitive-motivational processes underlying deception. In this study we investigated the reliability of the frontal N2 amplitude as an indicator of conflict monitoring in a modified Concealed Information Test (CIT). The modified Concealed Information Test (CIT) includes three stimulus types: probe, misinformation, and irrelevant stimuli (initially N = 67). We investigated variations of Cronbach's Alpha coefficients for the number of epochs per stimulus type, task modality (verbal vs. figural) and for types of ERP quantification (baseline-to-peak, peak-to-peak, mean amplitude). Cronbach's Alpha coefficients of N2 amplitude increased with the number of epochs across task modality, stimulus types and electrode positions. In a figural CIT, the frontal N2 amplitude indicated excellent Cronbach's Alpha coefficients (≥.90) across electrode positions and quantification methods for 25 epochs per stimulus type. Moreover, at least 15 epochs were necessary to achieve excellent Cronbach's Alpha coefficients (≥.90) of the peak-to-peak N2 in a modified CIT across electrode positions and stimulus types. Higher intercorrelations for peak-to-peak N2 epochs indicated that the difference scores computed as N2-peak minus P2-peak in each trial result in conceptually more homogeneous N2 epochs. We provide best-practice advises for the necessity to assess N2 amplitude in a modified CIT with excellent reliability.

Poster 1-020

EMOTIONAL AROUSAL AND CAUSAL NEUROCIRCUIT PERTURBATIONS: A CONCURRENT TMS-FMRI INVESTIGATION OF STATE DEPENDENCE

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Descriptors: Transcranial Magnetic Stimulaiton, State Dependence, Neuroimaging

Therapeutic non-invasive brain stimulation, such as repetitive transcranial magnetic stimulation (rTMS), is moving toward manipulating the state of the patient during treatment delivery. This includes immersive environments, visual cues, and imaginal exposure. However, little is known about how context alters neural responses to TMS. We investigated whether state dependence would influence the responsiveness of the fronto-parietal and somato-motor networks to single pulse TMS (spTMS). Twenty-four healthy individuals completed a picture-viewing paradigm in the MRI scanner. Pleasant, neutral and unpleasant pictures from the International Affective Picture System were presented in blocks. While pictures were presented in the foreground, spTMS was delivered intermittently to left dorsolateral prefrontal cortex (dlPFC), the typical therapeutic target. TMS delivered to the dlPFC during emotional picture processing relative to fixation was associated with increased BOLD responses in bilateral fronto-parietal regions. TMS delivered to M1 during picture blocks was associated with increased BOLD responses in cerebellar regions of the somato-motor network. In the absence of TMS pulses, activation was evident in the visual cortices and amygdalae during emotional picture viewing, activation also present during concurrent TMS. In fact, increasing emotional arousal during TMS, increases concurrent activation in the targeted networks. These findings suggest that varying emotional arousal during rTMS may be a productive means of strengthening the response within the targeted network.

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Poster 1-021

BODY-ORIENTED TRAINING HAS POSITIVE EFFECT ON EXECUTIVE ABILITIES IN 5–6 YEARS AGE CHILDREN

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Descriptors: Executive Abilities, Body-oriented Training, NEPSY

It is known that preschool age is a sensitive period for development of executive abilities in children. It is important to develop the trainings and environment for successful development of this abilities in children. The goal of this study was to reveal the effect of body-oriented training on executive abilities in 5–6 years age children. We compared the efficacy of two methods of training (body-oriented training for children vs. conventional motor exercises) in a randomized controlled pilot study. 26 typically developing children between 5 and 6 years (M = 5.51 years, SD = 0.85, 19 boys and 7 girls) of age were included and randomly assigned to training conditions according to a 2 × 2 cross-over design. The body-oriented training included yoga's exercises and breathing techniques. It was adapted for preschool age. To assess the executive functions and attention in children we used 4 subtests from NEPSY (Auditory Attention and Response Set, Visual Attention, Statue, Design Fluency). Effects of training were analyzed by means of an ANOVA for repeated measurements. The ANOVA has revealed ($p < .05$) that for all 4 subtests on executive functions and attention the body-oriented training was superior to the conventional motor training, with effect sizes in the medium-to-high range (0.51–0.92). The findings from this pilot study suggest that body-oriented training can be used as an effective approach for development of the executive abilities in preschool children. However, it is necessary to do further research for revealing the impact of body-oriented trainings on children.

Poster 1-022

NATURAL ENVIRONMENTS MODULATE NEUROPHYSIOLOGICAL CORRELATES OF REWARD

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Descriptors: Reward Processing, Nature, Electroencephalography

There is an open question concerning how different physical environments affect neural processes. The current study used EEG to explore reward processing and how it changes in response to different environmental demands. We were interested in an urban-nature environmental comparison because growing evidence suggests that nature improves both attention and affect. We focused on the reward positivity—a component of the event-related brain potential that is related to reward processing and has been found to be altered in individuals with attention disorders and depression. Using a within-subjects design, we measured the RewP from 62 participants before, during, and after a five-day camping trip. To control for potential covariates that might affect neurophysiological activity, we measured blood glucose levels, amount of exercise and sleep at each test. Participants also completed questionnaires related to mood, mindfulness, and social connection. These additional measures were taken to assess potential alternative explanations for the differences that we observe. We found that the amplitude of the RewP decreased in nature. This pattern was not associated with any depressive symptoms because individuals reported greater positive affect in nature. Instead, we believe the pattern of data is indicative of more efficient attentional control and/or a decreased reliance on external reward to motivate attentional control. Our findings open the door to future research exploring time in nature as a way to regulate altered reward processing in individuals with ADHD.

Poster 1-023

THETA FRONTOPARIETAL NETWORKS UNDERLYING SWITCH AND MIXING COSTS DURING TASK-SWITCHING

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Descriptors: EEG, Connectivity, Task-switching

In task-switching paradigms, behavioural performance is poorer when participants are required to switch tasks, compared to repeating the same task (i.e., switch cost), and for repeat trials that are intermixed with other trials compared to repeat trials in a single task block (i.e., mixing cost). Event-related potential (ERP) and time-frequency power analyses have shown switch and mixing effects at frontal and parietal sites. These frontal and parietal effects reflect activity in broad frontoparietal networks, typically in the theta band (~4–8 Hz). In this study, we examine frontoparietal networks activated in response to switch and mixing effects. We also examine how activity in these networks is associated with behavioural outcomes. Participants (N = 197) completed a cued-trials task-switching paradigm with concurrent EEG. We used inter-site phase clustering (ISPC), a measure of functional connectivity across electrode sites, to establish connectivity from a frontal and a parietal seed. These analyses revealed frontoparietal networks which were common in both the switch and mixing costs, as well as networks which were present for the mixing or switch cost only. This suggests the existence of dissociable networks underlying the mixing and switch costs. Moreover, for some frontoparietal connections, increased connectivity was associated with faster RT. Thus, the present study suggests that different frontoparietal theta networks are associated with switch and mixing costs and that these networks are associated with improved task-switching performance.

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Poster 1-024

COMPARISON OF HIGH-INTENSITY INTERVAL TRAINING EXERCISE MODALITIES ON EXECUTIVE FUNCTION AND TEMPORAL DYNAMICS OF INHIBITORY CONTROL AND EVENT-RELATED POTENTIALS

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Descriptors: Exercise, Cognition

Acute aerobic high intensity interval training (HIIT) has demonstrated positive effects on inhibitory control in young adults. However, the evidence is not well established regarding the combination of HIIT aerobic and resistance training in accordance with underlying neural mechanisms following acute exercise. The aim of the present investigation was to examine the after effects of HIIT-aerobic and HIIT-aerobic resistance on event-related potentials (ERP's) during an inhibitory control task in 18- 30-year-old adults. All participants (n = 24) completed the flanker task on three separate counterbalanced days (i.e., HIIT-aerobic, HIIT-aerobic resistance, and seated rest). HIIT-aerobic consisted of running bouts on a treadmill at 90% of maximal heart rate with intermittent bouts of walking. HIIT-aerobic resistance consisted of high intensity calisthenics with intermittent resting periods. Task performance and the P3 ERP component were assessed at approximately 30 and 85-min following 9-min of each condition. Results revealed no improvements or decrements in behavior (i.e., reaction time, response accuracy) and P3 measures of latency and amplitude following the HIIT and rest conditions. Together, these data suggest that inhibitory control and neuroelectric underpinnings are not affected by different modalities of HIIT at 30 and 85-min following the exercise bouts. Such findings have implications for promoting time-efficient healthy physical activity behaviors without disrupting necessary cognitive functioning throughout the day.

Poster 1-025

DIFFERENTIAL PATTERNS OF THETA ACTIVITY UNDERLYING VARIOUS COGNITIVE CONTROL STRATEGIES

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Descriptors: Theta, Self-regulation, EEG

We recorded EEG from 157 participants at the University of Arkansas as they performed three computer tasks that tested inhibitory control (Go/Nogo Task), proactive and reactive control (AX-Continuous Performance Task), and resolving response conflict (Global/Local Task- modified Flanker Task). Time-frequency analysis (ERSP) was the primary focus of this study, in order to take advantage of the temporal and frequential characteristics of EEG recordings. The ERSPs and following statistical analysis showed significantly higher midfrontal theta band (4–8 Hz) power values for target trials (those that required more cognitive control) than control trials, which indicated that the procedure was implemented correctly. Furthermore, statistical analysis revealed that reactive control and inhibitory control had significantly higher theta power values than both proactive control and response conflict, and that proactive control had significantly higher theta power values than response conflict. Taken together, these results suggest a common underlying physiological mechanism for initiating and executing cognitive control, namely frontal midline theta band oscillations, but how these oscillations are integrated into cognitive processing still remains unclear. The results of this study suggest that theta power might be an important factor in allowing frontal midline brain regions to differentiate cognitive control mechanisms, but further work will need to be completed to investigate the role of theta power and theta phase in establishing and coordinating cognitive control.

Poster 1-026

TASK-ORDER CONTROL IN DUAL-TASKING: EVIDENCE FROM EVENT-RELATED POTENTIALS AND MULTIVARIATE PATTERN ANALYSIS

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Descriptors: Dual-tasking, Event-related Potentials, Task Switching

Many dual-tasking paradigms require the serial execution of two distinct tasks in close temporal succession. Recent studies indicate that not only the individual stimulus-response mappings of the two subtasks, so-called task sets, are represented on the neural level. Also superordinate aspects of the dual-task compound appear to be represented in a distinct way, such as the temporal order of subtask execution in its own task-order set. The present study investigates cognitive control processes involved in the preparation of this task-order set by means of event-related potentials (ERPs). Adopting the basic methodology of (single-)task switching studies, we utilized a PRP paradigm with cued task-order switches and compared (a) trials with fixed task order in continuous-order blocks, (b) trials with repeated task order in variable-order blocks, and (c) trials with switched task order in variable-order blocks. We found two neural correlates of task-order preparation, an order-mixing positivity and an order-switch positivity. In both the temporal and the spatial domains, these ERPs closely resemble their respective counterparts commonly found in (single-)task switching paradigms when individual tasks are switched. Moreover, multivariate pattern analysis on task-order confusion errors showed that the process underlying the order-mixing positivity is the indispensable prerequisite for successful task-order selection whereas the process underlying the order-switch positivity appears to serve only a subordinate role of task-order implementation.

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Poster 1-027

AM I ALWAYS EXPERIENCING DISTRESS WHEN OFFERING COMFORT TO MY PARTNER DURING STRESS? HEART RATE VARIABILITY AND NONOPTIMAL CAREGIVING SYSTEMS IN PARTNERS OF PATIENTS WITH CHRONIC PAIN

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Descriptors: Couples, Pain, Caregiving

While comfort provided by a romantic partner can promote well-being in patients with chronic pain, caregiving can be nonoptimal, involving hyperactivation strategies (e.g., controlling or compulsive) and deactivation strategies (e.g., insensitive and distant). Results from a previous pilot study showed that partners of persons with chronic pain who report higher use of deactivation strategies had higher SCL when offering contact comfort during a stressful chronic pain video, while higher use of hyperactivation strategies was not linked with SCL (Clement et al., 2019). The goal of the present study was to expand these findings with a measure of heart rate variability, inter-beat-intervals (IBIs), using the same participants. We predicted that hyperactivation strategies would be linked with longer IBIs and higher deactivation strategies would be linked with shorter IBIs, when providing comfort during a stressful chronic pain video. The Caregiving Questionnaire (Kunce & Shaver, 1994) was used to measure caregiving. Using a single-case repeated measures design, 6 couples watched a chronic pain video while the partner alternated every 2.5 min between holding and not holding the patient's hand. Cardiac activity was recorded throughout the experiment. Results were inconsistent for deactivated caregiving strategies, while partners who reported higher use of hyperactivation strategies had longer IBIs when offering contact comfort. Findings are discussed in light of previous psychophysiological research on providing comfort under stress.

Poster 1-028

DO OUR HEARTS BEAT TOGETHER: FACTORS RELATED TO HEART RATE SYNCHRONY IN TWO COUPLES DURING A LABORATORY EXPERIMENT ON ROMANTIC SUPPORT

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Descriptors: Heart Rate Synchrony, Romantic Attachment, Social Support

Romantic partners play a significant role in regulating each other's emotions, which can be measured by the degree to which they become synchronized in their physiological responses, such as in their heart rates (Butler, 2015). Physiological synchrony is highly dependent on the relational context in which it is studied. Hgh physiological synchrony has been observed during both conflict situations, as well as during social support, and this may vary as a function of attachment-related constructs. Here, we examined the variability in heart rate synchrony during a support experiment as a function of romantic attachment, emotional regulation capacities, and communication patterns. Using a single case repeated measures design, electrocardiogram activity was recorded for 30 min in two couples during a romantic support experiment. Overall heart rate synchrony indices were calculated for the entire session. Participants also completed self-report questionnaires on the attachment-related study variables. The partners in the couple with low heart rate synchrony displayed differential patterns of insecure romantic attachment and negative communication patterns, but similar difficulties in emotion regulation abilities. The partners in the couple with high heart rate synchrony reported elevated and similar levels of romantic attachment insecurity, low patterns of negative communication, and differential difficulties with emotional regulation capacities. Findings suggest that attachment theory is a useful framework for understanding physiological synchrony in romantic dyads.

Funding: An internal operating grant was received from the Institut du savoir Montfort to conduct this research.

Poster 1-029

RESTING HEART RATE VARIABILITY AND ITS RELATION TO RISK-TAKING BEHAVIOR

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Descriptors: Heart Rate Variability

Risk-taking behavior (RTB) is action positively associated with chance of loss. Resting vagally-mediated heart rate variability (HRV) indexes individual differences in inhibitory capacity. Higher resting HRV predicts better performance on judgement and decision-making (JDM) tasks. Research has yet to examine the association between HRV and hypothetical and self-report RTB. Recent work suggests that the potential association between HRV and RTB may vary across domains. In a sample of 79 subjects (52 females, mean age = 19 ± 1.54), HRV was assessed via electrocardiogram. RTB was assessed via a series of questions gauging preferences toward risk seeking behavior in three domains: certain gains vs. higher expected value gambles, certain gains vs. lower expected value gambles, and certain losses vs. lower expected value gambles (Risk Seeking Behavior Questionnaire; Frederick, 2005). A significant positive association was found between resting HRV and RTB (r = .309, p < .01) in the domain of certain gains vs. lower expected value gambles (e.g., $100 for sure or a 25% chance of $200); no other significant associations were found. Results suggest individuals with higher HRV are more likely to engage in RTB than individuals with lower HRV when choices are low stakes, but not when they stand to gain a larger amount or lose any amount with certainty. These novel findings highlight the complex association between resting HRV and RTB. Findings may also apply to health problems developed and maintained by poor inhibitory control and RTB, such as substance use and gambling disorders.

Poster 1-030

ALPHA AND THETA OSCILLATIONS REFLECT VALUE AND CONTROL SIGNALS DURING SELF-REGULATION IN DIETARY DECISION MAKING

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Descriptors: Alpha, Theta, Self-regulation

How does cognitive self-regulation alter value computation and evidence accumulation (EA)? Do different strategies operate via different mechanisms? We recorded EEG as subjects chose whether to eat different foods while responding naturally or regulating their choices by either focusing on healthy eating or decreasing their desire for food. We used a drift diffusion model (DDM) of attribute valuation and EA to predict expected neural signals, finding that suppression of alpha (9–12 Hz) power matched predicted EA. At frontal and occipital sites, alpha suppression correlated with the tastiness of food in natural decisions. Similarly, alpha suppression tracked food healthiness when subjects focused on healthy eating. By contrast, during self-regulation, alpha suppression no longer tracked food tastiness. The time course of alpha suppression followed closely with the predicted time course of EA in the DDM, and predicted behavioral success in down-regulating the influence of food tastiness on subjects' choices across both regulatory strategies. We also found an earlier rise in theta (4–8 Hz) power at frontal and occipital sites that correlated more positively with food tastiness when subjects regulated their decisions. A stronger correlation between tastiness and early theta power predicted a weaker influence of food tastiness on subjects' choices in both regulatory strategies. Our findings suggest that regulation may recruit early control processes through theta oscillations to modulate the influence of attributes on EA, reflected in the disruption of alpha suppression.

Funding: Funded by Canada NSERC discovery grant.

Poster 1-031

HOW DO WE DECIDE? ALPHA- AND BETA-POWER LATERALIZATION GROW WITH ACCUMULATED EVIDENCE THROUGHOUT A DELAY

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Descriptors: Evidence Accumulation, Beta-power Lateralization, Delayed Decisions

One potential neural correlate of evidence accumulation during decision making is a beta power reduction over motor cortices preceding the response, which is more pronounced over the hemisphere contralateral to the response side. We investigated whether this beta-power lateralization (BPL) encodes the current state of the decision and compared it with a motor preparation signal, the lateralized readiness potential (LRP). BPL was hypothesized to be present prior to an instructed response delay, while LRP was expected to appear locked to the response. Two variants of the random dot motion task were performed by 30 healthy humans during electroencephalography (EEG) recordings. Participants chose whether a noisy dot display moved dominantly left or right. They were either allowed to respond once they had made their decision (IMMEDIATE condition) or after an imperative cue that was presented following a fixed interval after stimulus onset (DELAY condition). In support of our hypotheses, the LRP emerged before the response but was not present after stimulus onset yet. In contrast, alpha and beta lateralization already increased during stimulus viewing. Notably, in DELAY, lateralization already increased before and throughout the delay period, thus appeared locked to the stimulus not the response. We conclude that, opposed to LRP, BPL seems to be involved in higher cognitive processes, potentially encoding temporally relevant decision information. Moreover, this finding expands to lower frequencies (alpha band) and is less frequency-specific than previously assumed.

Poster 1-032

NEUROELECTRIC INDICES OF EMOTIONAL PROCESSING IN INDIVIDUALS WITH A HISTORY OF CONCUSSION

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Descriptors: Concussion, Emotion, Event-related Potential

Emotional processing is thought to be altered following a concussion through small functional and structural disruptions that impact information processing pathways. Over time, these disruptions may result in behavioral impairments. Thus, the use of behavioral and functional outcomes may be effective for assessing changes in emotional processing that can occur post-concussion. The primary purpose of this study was to examine behavioral and neurocognitive differences in response to emotional face images between individuals with and without a history of concussion. Fifty participants (18 female; 32 male) were recruited and assigned to either a concussed (n = 23; M_{age} = 24.1 ± 1.0) or non-concussed (n = 27; M_{age} = 23.2 ± 0.6) group based on medical and self-reported concussion history. Participants completed a modified emotional oddball paradigm where representative positive (smiling), negative (frowning), and neutral faces from the Radboud Faces Database were displayed. Neuroelectric measures of P3 amplitude and latency, as well as behavioral measures of response accuracy and reaction time were assessed during the experiment. The concussion group showed significant reductions in accuracy (p = .035), but no difference in reaction time (p > .05) compared to the non-concussed group. An increase in P3 latency (p = .049) was also found in the concussed group, with no observed group differences in P3 amplitude (p > .05). Findings suggest that concussions may lead to chronic neuroelectric and behavioral deficits in classifying emotional, facial expressions.

Poster 1-033

MULTIMODAL IMAGING OF NARRATIVE IMAGERY: TRIAL-BY-TRIAL EEG ALPHA POWER PREDICTS BOLD IN THE IMAGERY NETWORK

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University of Florida

Descriptors: Mental Imagery, Concurrent EEG-fMRI
Mental imagery is a critical factor in the etiology and maintenance of many psychiatric disorders, as well as a component in gold-standard treatment interventions. However, the neural underpinnings of mental imagery are poorly understood. Using fMRI, research has demonstrated that visual script-driven mental imagery activates frontal, motor, and visual networks in the brain. Scalp-recorded EEG has shown a selective increase in endogenous activity in the alpha band during mental imagery tasks. To define the neurophysiology of narrative mental imagery, we combined the information from blood oxygen level-dependent (BOLD) signals with concurrently recorded EEG alpha-band power during a visual script-driven mental imagery task in a sample of 21 healthy participants. Analyses demonstrate that established BOLD activation patterns during mental imagery and alpha-band activity were replicated using the concurrent EEG-fMRI methodology. Multimodal trial-by-trial analyses showed strong covariation of fMRI-BOLD changes and alpha power changes, which was most pronounced within regions associated with narrative imagery: frontal gyri, dorsal and ventral visual stream, and cerebellum. The findings suggest that alpha-power changes in the scalp-recorded EEG represent a sensitive and specific index of brain network engagement during narrative imagery.

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Poster 1-034

DOES LOOKING AT YOUR LOVED ONES INHIBIT DEFENSIVE RESPONDING WHILE UNDERGOING THREAT?

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Descriptors: Instructed Threat Learning, Attachment Figures, Startle Reflex
Previous research has shown that looking at your loved ones can diminish the experience of pain and reduce the activity of defensive reflexes. This study addresses the question of whether images of your loved ones serve as implicit safety cues and reduce the impact of a threatening context. We examined the persistence of verbally instructed threat over three consecutive test days. Thirty-four participants viewed images of their loved ones (i.e., father, mother, romantic partner, and best friend) and also of unknown persons within contextual background colors (i.e., blue and green) while the eye blink startle-EMG, SCR, and ratings were obtained. Using the threat-of-shock paradigm, participants were informed that they could receive up to three electric shocks while seeing a specific background color (e.g., green) while another background color indicated safety (e.g., blue). Results confirm threat/safety learning in showing pronounced defensive responding to instructed threat relative to safety context (e.g., threat-enhanced startle reflex and SCR). In addition, the threat-potentiated startle response slowly declines over the test days indicating extinction learning. However, there was neither a main effect of picture category (loved vs. unknown faces) nor a significant interaction of category and threat/safety context. Thus, a long-term learning history of positive experiences with your loved ones did not reduce the impact of contextual threat. Findings are discussed in reference to motivational priming account, attachment theory, and clinical implications.

Funding: This work was supported by the German Research Foundation (BU 3255/1-1 and -2).

Poster 1-035

EMOTIONAL CONCORDANCE IN THE TIME-COURSE OF EMOTIONS

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Descriptors: Emotional Concordance, Baseline, Recovery
Objectives: Theories of emotion posit that emotions comprise of synchronised changes across various response systems (*emotional concordance*). Little is known, though, about how emotional concordance changes in the time-course of emotions. The current study examines emotional concordance in anticipation, during and after emotional episodes. Methods: Seventy-nine participants viewed neutral, pleasant and unpleasant film clips and rated continuously how pleasant they felt prior (anticipation), during, and after (recovery) each clip. We also recorded autonomic arousal (skin conductance, heart rate) and behavioural expression (corrugator, zygomatic activity) measures during each phase. Within-person cross-correlations between each physiological measure and self-reported pleasantness were calculated for each phase. Results: Analyses showed significant phase effects; all physiological measures correlated moderately with self-reported pleasantness during anticipation and recovery, but correlations reduced during film viewing. The concordance of self-reports with Skin Conductance and Heart Rate did not differ between films. However, self-reports showed higher concordance with zygomatic activity during pleasant films and with corrugator activity during unpleasant films. Discussion: Findings suggest that moderate concordance among emotion responses is the default, which is disrupted by the presence of emotional stimuli. Positive and negative emotions result in expected concordance differences, but only for behavioural expressions. More in-depth analyses will explore these effects further.

Funding: The current work was funded by a University of Cyprus post-doctoral research grant.

Poster 1-036

EMOTIONAL PROCESSING AS A FUNCTION OF DIFFERENT PROBABILISTIC CONTEXTS: A HIGH-DENSITY EEG INVESTIGATION

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Descriptors: Emotional Predictions
Classical emotion theories have long considered emotions as psychophysiological response patterns. Recently, the role they play in the anticipation of stimuli has been highlighted by the theory of constructed emotions (Barrett, 2017), according to which emotions are neural predictive models, constructed from past experience to anticipate upcoming events and prepare for action. This study aimed to investigate the effects of different probabilistic contexts on emotional processing. A S1-S2 paradigm was presented to 26 participants: S1 was a face with a happy, fearful, or neutral expression, and S2 was a IAPS picture with positive, negative, or neutral valence. Predictability was manipulated across 3 blocks of 120 trials each, in which S1 valence was predictive of S2 valence in the 100%, 75%, or 50% of trials. During the task, 128-ch high-density EEG was recorded. The cluster-based permutation analysis revealed a modulation of S1 processing by valence and predictability: in conditions of valid and high predictability, a larger N170 was found to fearful as compared with neutral (100% and 75% blocks) and happy (75% block) facial expressions. The anticipation phase was modulated only by predictability, with a larger CNV in the 50% than in the 75% block. S2 processing was mainly modulated by emotion, with larger LPPs for emotional than neutral pictures and larger amplitudes in the valid (100% block) as compared with the random (50% block) predictive context. Overall, emotional processing was modulated by the predictive information conveyed by different probabilistic contexts.

Funding: The study was supported by a grant from MIUR (Dipartimenti di Eccellenza DM 11/05/2017 n. 262) to the Department of General Psychology, University of Padova.

Poster 1-037

DYNAMICS OF EMOTIONAL REGULATION AND INTEROCEPTION AFTER INFRA-LOW FREQUENCY NEUROFEEDBACK: A PILOT STUDY

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Descriptors: Interoception, Emotional Regulation, Neurofeedback

Neurofeedback is an emerging non-pharmacological approach for improvement of emotional and bodily regulation. In a pilot study, we evaluated the dynamics of emotional regulation and interoception after infra-low frequency EEG neurofeedback from the T4P4 site, which we have previously shown to influence the brain intrinsic connectivity underlying multisensory integration. Nine females with prenosological signs of emotional dysregulation, including anxiety, mild depression and somatoform symptoms, underwent 15 sessions of infra-low frequency neurofeedback. The examination, including fMRI-based heartbeat detection task, Screening for Somatoform Symptoms, Autonomic Perception Scale, Mayer-Salovey-Caruso Emotional Intelligence Test, Spielberger State-Trait Anxiety Inventory, Short Health Anxiety Inventory and Toronto Alexithymia Scale, was performed at inclusion, after a waiting period and after a course of neurofeedback. First, we found that the interoceptive accuracy, interoception-related brain activation and emotional intelligence remained stable—no effects of neurofeedback were detected. We suggest that these trait abilities are not influenced by this particular type of neurofeedback. Second, a significant beneficial shift in the parameters characterizing subjective well-being, including anxiety, alexithymia and somatoform symptoms, was observed after the neurofeedback but not after the waiting period. Further research is necessary to differentiate the nonspecific psychotherapeutic and neurophysiological effects of the intervention.

Poster 1-038

STEADY-STATE VISUAL EVOKED POTENTIALS DIFFERENTIATE EMOTIONAL FROM NEUTRAL VIDEO CLIPS

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Descriptors: SSVEP, Attention, Videos

Human emotion states involve the integration of multiple dynamic sensory cues. Here we assembled a set of 10-s multimodal video clips to evoke emotion that are suited to psychophysiological recording. Pleasant (15), neutral (7), and unpleasant (15) clips were selected to be equivalent in basic perceptual features, average sound intensity, and average luminance. Because of the ongoing, dynamic nature of audiovisual clips, event-related potentials are not a feasible means of recording electrocortical brain activity. To sample electrocortical activity evoked by video clips, each clip was presented with a narrow border that flickered on and off at 7.5 Hz, which induced a continuous steady-state evoked potential, or ssVEP. The ssVEP signal is dominant over occipital sensors, but widespread across the scalp, and retains topographical variation that reflects regional differences in activity. EEG was collected from 64 sensors in 42 participants as they viewed the 37 clip series in mixed order on a monitor and speaker in a shielded room. After the series, ratings of pleasantness and arousal were collected, which strongly differentiated all contents. While overall ssVEP amplitude was greatest over midline occipital sensors, emotion differences were greatest over lateral occipital and centroparietal sensors. Consistent with past work using static scenes, ssVEP amplitude was reduced during emotional, compared to neutral videos, reflecting enhanced motivated attention toward the clip. These data encourage the further development of video clips for the study of emotion.

Poster 1-040

CHILDREN WHO EXPERIENCE GREATER SOCIAL REJECTION IN KINDERGARTEN ARE CHARACTERIZED BY AN INABILITY TO REGULATE THEIR AFFECTIVE AROUSAL IN RESPONSE TO FRUSTRATION

Cassidy Fry; Lisa Gatzke-Kopp
Pennsylvania State University

Descriptors: Respiratory Sinus Arrhythmia, Emotion Regulation, Peer Relationships

The inability to regulate affective arousal in the context of frustration can jeopardize children's ability to form successful friendships. The present study utilized a sample of n = 235 kindergarteners (63% male, 68% Black) oversampled for risk to examine whether socially rejected children differ from their socially accepted peers in their physiological response to frustration. Respiratory sinus arrythmia (RSA) was measured in 30 s epochs across 3 task blocks alternating a reward with a loss condition. Children were classified as peer rejected (n = 66) if proportionally more classmates indicated that they disliked playing with the child, or peer accepted if proportionally more classmates reported liking to play with the child (n = 169). Results indicated that peer-rejected children displayed more RSA withdrawal during the frustration block relative to the preceding reward block (γ = .06, p = .05), and a lack of recovery in the subsequent reward block that followed frustration (γ = −.24, p = .02). In contrast, peer-accepted children displayed less RSA withdrawal during frustration (γ = −.09, p = .01), and successful physiological recovery following frustration (γ = .36, p = .006). These patterns suggest that peer-rejected children have greater difficulty regulating their arousal when frustrated, which may contribute to their classmates' disinterest in playing with them. Interestingly, teacher-reported social competence was not predictive of RSA reactivity or recovery (ps > .05), suggesting that this type of dysregulated arousal may be especially salient in the peer context.

Funding: Pennsylvania Department of Health.

Poster 1-041

REAPPRAISAL AS A STRATEGY TO COPE WITH RECURRENT STRESS: IMPLICATIONS FOR PERFORMANCE AND CARDIOVASCULAR RESPONDING TO STRESS

Siobhán Griffin; Siobhán Howard
University of Limerick

Descriptors: Reappraisal, Cardiovascular Reactivity, Stress

Instructed use of reappraisal has been associated with a more adaptive cardiovascular response profile (greater cardiac output and lower total peripheral resistance) in response to a single stress exposure, as well as better task performance. However, no previous research has examined if instructed reappraisal aids cardiovascular habituation to recurrent stress. Habituation is indexed by a significant reduction in the cardiovascular response during the second stressor compared to the first stressor. A failure to habituate is thought to reflect an underlying lack of ability to adapt to, and cope, with stress. One hundred and seventy-three young adults (121 women, 52 men) completed a standardised laboratory stress paradigm; 20-min acclimatization period, 10-min official baseline, a 5-min speech task, a 10-min rest, a 3-min instruction (manipulation) period, and a second 5-min speech task. Prior to the second task, participants were either instructed to reappraise feelings of arousal/stress as helping them adapt to the stressor (reappraisal instructions) or informed their blood pressure was being monitored (control instructions). Cardiovascular parameters were measured using the Finometer Pro. All participants demonstrated lower SBP, CO, and HR during the second stress exposure; indicative of significant cardiovascular habituation. However, there were no significant differences in cardiovascular habituation, or in performance, between the reappraisal and control group. Directions for future research are outlined.

Poster 1-042

EMOTIONAL FACE CONGRUENCY PROCESSING FOLLOWING A CONTROLLED SIX-WEEK MINDFULNESS MEDITATION GROUP INTERVENTION

Mika Honda[1]; Alexandra Muir[1]; Whitney Allen[1]; Lilly Bautista[1]; Hannah Lowry[1]; Tanner Hicks[1]; Lindsay Fruehauf[1]; Sean Vanhille[1]; Cheryl Garn[2]; Davey Erekson[1]; Michael Larson[1]
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Descriptors: Mindfulness, Emotional Processing

Mindfulness meditation interventions are suggested to improve some attentional processes and abilities to effectively regulate emotion. We tested emotional face processing where participants were randomized to a six-week group-based mindfulness intervention ($n = 35$) or weekly TED talks ($n = 42$). Pre- and post-intervention electroencephalogram (EEG) data was collected during an emotional face congruency task and P300 event-related potential (ERP) component amplitude was extracted as a measure of face-related attention. A 2-Group (mindfulness, control) × 2-Time (pre, post) × 2-Congruency (congruent, incongruent) repeated measures ANOVA yielded no main effects of group ($p = .67$), time ($p = .35$), or congruency ($p = .12$), nor any significant interactions ($p > .10$). Notably, participant ratings of engagement, stress, and mood were significantly better in the TED talk than mindfulness groups. These results failed to support our hypothesis that mindfulness intervention would increase emotional face processing and regulation ability and question the efficacy of the group-based mindfulness intervention. Further research with a larger sample size and a more effective and possibly long-term intervention is needed to determine whether mindfulness is effective in improving emotional processing.

Poster 1-043

EFFECTS OF ACCEPTANCE-BASED EMOTION REGULATION DURING PAIN ANTICIPATION

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Descriptors: Emotion regulation, Pain, Fear

One of the most studied emotions in relation to pain is fear, which has been associated to physical disability, emotional distress and increased pain severity. Emotion regulation (ER) strategies have been effective in down-regulating negative emotions, including fear. However, there are only a few evidences regarding acceptance effects in reducing fear during pain anticipation. Our study aims at exploring the influence of acceptance in a threat of pain task conducted with a total of 44 undergraduates. Each trial consisted of a 12-s colour frame (blue or yellow) indicating whereas participants could receive a pain stimulus (threat) or not (safe). A cue was included to instruct them to *maintain* or *decrea*se their emotions (a word presented in the centre of the black screen). Digitized probes (105 dB) were delivered either at 6 or 10-s after cue onset in order to prompt startle reflex, as a measure of ER effectiveness on fear of pain anticipation. Anxiety ratings (0–9 scale) were collected after each trial. Results showed significant differences between safe and threat conditions (look and decrease) for both self-reported anxiety and startle reflex responses, with enhanced responses for threatening trials. No differences were found between threat-look and threat-down conditions. Our findings suggest that brief verbal acceptance instructions might not be effective to modulate self-reported and startle responses. In addition, psychophysiological effects may have been diminished by the active engagement and experience of negative emotions that acceptance could initially imply.

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Poster 1-044

LAUGHING AT FUNERALS AND FROWNING AT WEDDINGS: EMOTIONAL MIMICRY OF HAPPY AND SAD EXPRESSIONS IN SCENES

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Descriptors: Emotional mimicry, Top-down modulation, Interpersonal closeness

When someone acts normatively deviant, perceivers are likely to attribute negative traits to the person and experience a desire to distance themselves. According to the reverse engineering of emotions view, emotion expressions and context interact in providing social signal value of these expressions. According to the emotional mimicry as social regulator view, emotional mimicry both depends on affiliation goals and fosters affiliation when it occurs. The present research had the goal to assess whether social scenes that are either norm congruent or normatively deviant influence facial mimicry. For this, we created an embedded dynamic emotional face task. We measured facial EMG while participants observed a person expressing either norm congruent (e.g., smiling during a wedding) or normatively deviant (e.g., smiling during a funeral) emotions, before rating the perceived emotions and their interpersonal closeness to the expresser. A total of 90 participants (45 men) saw happy and sad emoters in three contexts: happy (weddings), sad (funerals), and neutral (blank screen). For affective deviance, we found emotional mimicry to be reduced or absent, whereas there was little influence on emotion recognition. Such modulations played out differently for happiness and sadness mimicry: For the former, interpersonal closeness was more influential, for the latter appropriateness was more influential. Our results suggest strong support for top-down social modulation of emotional mimicry and provide novel insights into the under-researched area of mimicry of emoters in scenes.

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Poster 1-045

TRIARCHIC PSYCHOPATHIC TRAITS: RELATIONS WITH PHYSIOLOGICAL AND SELF-REPORT INDICATORS OF EMOTION REGULATION EFFICACY

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Florida State University

Descriptors: psychopathy, LPP, emotion regulation

Individuals with psychopathic traits, particularly those high in boldness, exhibited blunted late positive potential (LPP) response when viewing aversive pictures in an emotion regulation task, but not when attempting to up- or down-regulate their emotional reactivity (Ellis et al., 2017). The present study investigated (a) whether this effect extends to pleasant images, (b) whether regulation effects for boldness are present for specific picture contents (e.g., direct threat, mutilation, erotic, nurturant), and (c) whether discrepancies between self-reported emotional reactivity and LPP response in high-bold individuals (Ellis et al., 2017) extend to ratings of affect-regulation success. Participants (N = 62) were instructed to enhance or suppress emotional responses to pleasant and unpleasant pictures, or simply view the picture. Following the task, participants rated the perceived effectiveness of their emotion-regulation efforts. Higher-bold individuals showed reduced LPP differentiation between suppress and view conditions for threat and nurturant images only. Furthermore, in line with the LPP findings, individuals high in boldness reported greater success in downregulating their reactivity to threatening scenes. Thus, high-bold individuals were more effective in reducing their LPP when told to suppress their emotional response to threat and nurturant scenes, to a level similar to their LPP when viewing scenes of these types. They were also aware of their success in downregulating threat response. Implications for the adaptive features of psychopathy will be discussed.

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Poster 1-046

THE EFFECT OF TASK LENGTH ON FUNCTIONAL CONNECTIVITY OF THE AMYGDALA IN A PICTURE VIEWING TASK

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Descriptors: Amygdala, IAPS

Recent studies suggested that amygdala response to emotive stimuli can be employed as a biomarker for mental disorders. However, the amygdala response can be affected by methodological factors such as activation tasks or content of emotive stimuli. In the present functional magnetic resonance imaging (fMRI) study, we investigated whether the functional connectivity of the amygdala could be affected by the length of time of viewing emotive pictures. Thirty-two participants performed a picture viewing task where they were asked to see emotionally neutral, negative, and positive pictures. Experiments were performed in simple and complex conditions: they were different in terms of the order and duration of picture presentation. Analyses showed that the bilateral amygdala was significantly activated both in the simple and complex conditions. However, the functional connectivity of the amygdala was different between them. In the simple condition, negative pictures elicited significant connectivity of the left amygdala to the operculum that is involved in pain or somatosensory processing. In the complex condition, the positive pictures elicited connectivity of the left amygdala to regions related to language and attention processing. These findings suggest that underlying brain mechanisms of amygdala activation in the simple and the complex activation paradigm could be different although both paradigms can elicit amygdala activation.

Poster 1-047

AFFECT, STRESS, AND SWEAT: THE IMPACT OF EMOTIONAL CONTEXT ON THE BIDIRECTIONAL ASSOCIATION BETWEEN PHYSIOLOGICAL LINKAGE AND GENERAL STRESS

Ashley Kuelz; Emily Butler
University of Arizona

Descriptors: Physiological Linkage, Emotional Context, Couples

We investigate the interplay of emotional context, between-person physiological linkage (the covariation between partners' physiology), and general stress. Three patterns of skin conductance linkage were assessed: in-phase (physiology converging), anti-phase (physiology diverging), and uncoordinated (no meaningful covariation). Fifty-two romantic dyads had 20-min conversations in the lab while their electrodermal activity (EDA) was continuously measured. Measures of individual-level general stress and dyad-level emotion (e.g., partner's average emotional experience) were assessed using self-report measures. The R package, rties, was used to categorize couples into qualitatively distinct groups based on the dynamics of their EDA. Two models were used to test connections between the three variables using Bayesian regression analyses. Two groups of couples emerged: (a) profile-1 characterized as in-phase EDA, and (b) profile-2 characterized as anti-phase EDA. Significant interactions emerged between partners' EDA linkage profile and the psychological measures, both when profiles were used as the outcome (Beta = .92, HDI = .08, 1.83) and as the predictor (Beta = .20, HDI = .03, .39). Across both models: (a) during a positive interaction, couples exhibiting an in-phase pattern of EDA linkage reported less general stress compared to couples exhibiting an anti-phase pattern, and (b) during a negative interaction, couples exhibiting an anti-phase pattern of EDA linkage reported less general stress compared to couples exhibiting an in-phase pattern.

Poster 1-048

THE INFLUENCE OF THE PRESENTATION PERIOD ON THE FUNCTION OF THE LATE POSITIVE POTENTIAL

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Descriptors: Late Positive Potential, presentation period, N1

It is reported that the function of the late positive potential (LPP), elicited by negative pictures, inhibits the processing of the subsequent visual information, as investigated using N1 (Brown et al., 2012). As LPP is known to be unaffected by the presentation period of pictures (Codispoti et al., 2009), in this study, we investigated the effect of the presentation period on the brain function reflected by the LPP. Forty-six university students were assigned to the short-period group (N = 26, 11 females) and the long-period group (N = 20, 11 females). Participants performed a decision-making task with visual stimuli. The pictures from the open affective standardized image set (OASIS: negative, positive, neutral) were presented for 200 ms (short period) or 800–840 ms (long period); then, the visual stimuli were presented during the LPP modulation. Two-way 3 (valence) × 2 (period) repeated-measures ANOVA for analyzing the amplitude of the LPP and N1 were used. The results indicated a significant interaction for the LPP amplitude, and a significant increase in positive picture compared to negative and neutral pictures in the short-period group (ps < .05). For the N1 amplitude, results indicated only a main effect of pictures, and a significant increase in positive picture compared to the negative picture (p < .05), irrespective of the groups. In this study, the LPP amplitude was affected by the presentation period, but N1 was unaffected. We also showed that the brain activity elicited by positive picture might facilitate the processing of the subsequent visual information.

Poster 1-049

TRAIT MINDFULNESS AND AFFECTIVE EMBODIED PRIMING AS MEASURED BY THE LATE POSITIVE POTENTIAL: AN ERP STUDY

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Descriptors: Trait Mindfulness, Embodied Cognition, ERP

Interest in mindfulness has been increasing with contemporary research showing a myriad of neural changes associated with the practice. Trait mindfulness is the measure of individual differences in characteristics attributed to mindfulness practice that co-vary in individuals. Trait mindfulness include increased awareness of one's body and/or increased space between one's sense of self and one's psychological and physiological reactions to stimuli. Studies of embodied cognition investigate how activating reference to the body can change an individual's mood, perception, and actions. Until now, the relationship between trait mindfulness and embodied cognition remains unclear as investigations of embodiment and trait mindfulness have been scarce. Participants (n = 30) completed an emotional embodied priming task, while ERPs were recorded. Negative embodied primes shown before neutral images had the fastest response time compared to non-embodied primes and neutral embodied primes, and negative embodied primes for negative images, p's < .05. Negative embodied primes for neutral images were found to have reduced LPP responses compared to non-embodied primes for negative images, suggesting that they did not evoke elaborative processing. The subscale of trait mindfulness called "Describing" was found to significantly correlate with neural responses indicative of selective attention to emotional stimuli. These findings elaborate on the influence of embodiment in our attentional processing and how that influence may vary among individuals with different trait mindfulness patterns.

Poster 1-050

INCREASED LEVELS OF P300 OVERLAP BETWEEN SELF AND STRANGER DURING THREAT TASK

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University of Virginia

Descriptors: ERP, P300, Self-other Overlap

Neurobiological investigations of empathy often support increased levels of overlap between spatial neural representations of self and other. However, more investigation is needed for temporal neural representations of self and other in order to further understand more acute changes in threat perception. Therefore, we investigated the association between self and other-directed threat cues using ERP. We measured the mean amplitude of P300 in 72 participants while alone, holding a partner's hand, or holding a stranger's hand. During each condition, participants were presented with randomly ordered threat and safety cues. Threat cues indicated 20% chance of shock to self (alone condition) or shock to other (stranger and partner conditions). Linear mixed effect model indicated increased amplitude in P300 in central parietal areas when experiencing a partner's threat compared to a stranger's threat (F(1, 70) = 12.04). However, higher P300 in the threat-to-self alone condition predicted similar neural activity in the threat-to-other stranger condition (F(1, 70) = 11.10) and P300 in threat-to-self alone condition was significantly correlated with threat-to-other stranger (r(70) = .63, p < .001) more so than threat-to-other partner (r(70) = .30, p = .010). Findings indicate that participants perceived a partner's threat as more salient than a stranger's threat. However, participants also perceived a stranger's saliency of threat as more similar to their own threat. This investigation aids in understanding the precise neural timing of the threat perception of others as it relates to the self.

Poster 1-051

MODULATION OF THE EARLY LPP BY CONFLICTING POSITIVE MOTIVATIONAL AND NEGATIVE EMOTIONAL STIMULI

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Descriptors: LPP, ERP, Emotion

The late positive potential (LPP) is enhanced in response to both affective and non-affective motivators. Past research has found an additive effect of these motivators, such that emotional images that are also task-relevant motivators produce a larger LPP. However, no past study has examined the LPP in response to two conflicting positive and negative motivators. The current project examined the effect of differently-valenced motivators on the LPP. Participants (N = 51) engaged in a picture viewing task with disgusting and neutral images during reward or non-reward trials. The LPP was quantified as the average amplitude between 400 and 800 ms after picture onset. There was a significant main effect of emotion on LPP amplitude, such that disgusting images elicited a larger LPP than neutral images regardless of trial type. This main effect was qualified by a significant emotion by trial type interaction. Disgust images presented on reward trials produced the largest LPP amplitudes compared to disgust images on non-reward trials and all neutral images. Positive motivators (e.g., monetary reward) and negative motivators (e.g., disgusting images) appear to modulate the LPP in an additive fashion. Approach and avoidance motivators appear to combine to enhance the LPP, suggesting the LPP is sensitive to enhanced motivation, even when the motivation is in opposite directions

Poster 1-053

DISTINCT PHYSIOLOGICAL PROFILES OF SHAME AND FEAR IN WOMEN EXPOSED TO IPV

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New School of Social Research

Descriptors: Shame, Physiology, IPV

Emerging evidence demonstrates that survivors of interpersonal violence (IPV) may be more prone to experiencing shame. This study used a multimodal assessment of physiology to examine the distinct roles of shame and fear in physiological dysregulation in an effort to scrutinize the heterogeneity of response in trauma survivors. Sixty-seven community dwelling women with exposure to IPV completed self-report questionnaires, a paced breathing, a talking baseline and a shame induction task, where participants discussed a memory that invoked feelings of shame, all with concurrent physiological monitoring - impedance cardiography, electrocardiogram, and galvanic skin response. A regression analysis showed that shame and fear are associated with distinct patterns of physiological arousal. Fear was associated with an increase in cardiac output (CO), beta = .37, 95%CI [.03, .71], t(38) = 2.21, p = .033, while shame was associated with a reduction in CO, beta = −.36, 95%CI [−.70, −.02], t(38) = 2.17, p = .036. Overall, the model explained 10% of the variance (F(2, 38) = 3.34, p = .046, adj. R^2 = .105). In addition, self-reported state shame was negatively associated with rhythmic sinus arrhythmia at baseline but positively associated with RSA during the task. The change in RSA was significant, z(63) = 1.8, p = .036. Until now PTSD has been classified as fear-based and associated with the "fight or flight" response of sympathetic activation. However, this study shows that PTSD has a more complex physiological presentation represented by the emotion shame, a sympathetically de-activating emotion.

Poster 1-054

SHIELDING CHIPS REDUCE EFFCTS OF SMARTPHONE-EMITTED RADIATION IN THE 5G RANGE ON EEG BRAIN ACTIVITY

Diana Henz
University of Mainz

Descriptors: 5G, Shielding Chips, EEG

Current literature shows adverse effects of electromagnetic fields (EMFs) emitted by mobile phones on EEG brain activity. In previous studies, it was shown that shielding chips that are applied in mobile phones reduced effects of mobile phone-emitted EMFs on brain activity. In the present study, we investigated the effects of shielding chips on brain activity when subjects were exposed to mobile phone radiation in the 5G range. Subjects were exposed to EMFs emitted by a smartphone (Samsung Galaxy S10 5G) call. We tested the following experimental conditions: (a) smartphone call with application of a shielding chip (Gabriel-Tech), (b) smartphone call without application of a shielding chip, (c) control condition with smartphone switched off. Each condition was tested for 15 min. High-density EEG was recorded from 128 electrodes applied according to the international 10–20 system before, during, and after each experimental condition. Results showed increases in EEG beta and gamma activity in frontal, temporal, parietal, and occipital areas when subjects were exposed to the smartphone without application of a shielding chip compared to the control condition. EEG beta and gamma activity significantly decreased in frontal, central, temporal, parietal, and occipital areas when the shielding chip was applied compared to the condition without shielding chip. Results indicate that application of the shielding chip reduces increases in high-frequency brain activity induced by smartphone-emitted EMFs in the 5G range.

Poster 1-055

GENETIC ASSOCIATION OF THE NICOTINIC ACETYLCHOLINE RECEPTOR ALFA-4 SUBUNIT GENE (CHRNA4) RS1044396 WITH INTERNET ADDICTION IN SIBERIAN ADOLESCENTS: A CASE-CONTROL STUDY

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Scientific Research Institute for Medical Problems of the North

Descriptors: Internet addiction, adolescents, genetic predisposition

Internet addiction (IA) is a relatively new psychological phenomenon, most commonly marked in socially vulnerable groups (e.g., in adolescents and young adults). In two case-control studies have been shown that *CHRNA4* rs1044396 variants are associated with IA in adults (Jeong et al., 2017; Montag et al., 2012). To our knowledge, no replication of these studies in adolescent population has been published so far. Methods: 347 urban Siberian (Krasnoyarsk, Abakan) adolescents (aged 12–18) were tested with Chen Internet Addiction Scale (CIAS). Based on the CIAS score, Internet users were categorized into three groups: adaptive Internet users (AIU); maladaptive Internet users (MIU); and pathological Internet users (PIU). For each case of PIU/MIU adolescents, a corresponding AIU control was selected in the same school who matched the case in both sex and age. Genotyping was carried out using the polymerase chain reaction approach. Chi-square and Kruskal-Wallis tests were used. Results: We revealed that rs1044396 CC genotype prevalence progressively increase with IA severity: AIU group (n = 179)—19.6%, MIU group (n = 79)—30.4%, and PIU group (n = 86)—36.1% (pAIU-MIU = 0.1; pAIU-PIU = 0.02). Additionally, CC genotype carriers exhibited the highest CIAS score (TT – 41 (35–60), CT – 40 (33–62), and CC – 53.5 (37–66), p(K-W) = 0.023). Conclusions: Thus, CC variant of CHRNA4 rs1044396 was associated with IA in Siberian adolescents. We suppose that the cholinergic system may be involved in the PIU at the early stage of addiction formation and in population with low rate of nicotine dependence.

Funding: The reported study was funded by RFBR according to the research project № 18-29-22032\19.

Poster 1-056

DOES AMPLIFICATION STYLE MATTER? IT'S IN THE WAY THAT YOU USE IT: A COMPARISON OF ACTIVE- AND PASSIVE- TRANSMISSION EEG ELECTRODES DURING A WALKING ODDBALL TASK

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Descriptors: Walking, Electrodes

It has been stated that active-transmission electrodes should improve signal quality in mobile EEG recordings. However, few studies have directly compared active- and passive-transmission electrodes during a mobile task. In this repeated measurements study, we investigated the performance of electrodes using active and passive signal transmission, using the same amplifier system, during a mobile auditory oddball task. 18 participants performed an auditory oddball task both while standing and walking in an outdoor environment. While walking, there was a significant decrease in P3 amplitude, increased baseline ERP data noise and decreased signal-to-noise ratio (SNR). No significant differences were found in signal quality between the two electrode types. Walking movement, data noise, SNR and P3 amplitude were re-test reliable between recordings, demonstrating that individual differences can be reproduced on different days and with different electrode systems. We conclude that adequate use of a passive system achieves signal quality equivalent to that of an active system.

Poster 1-057

MISTAKES THAT MATTER: AN EVENT-RELATED POTENTIAL STUDY ON OBSESSIVE-COMPULSIVE SYMPTOMS AND SOCIAL PERFORMANCE MONITORING IN DIFFERENT RESPONSIBILITY CONTEXTS

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Descriptors: Error-related Negativity, Social Performance Monitoring, Obsessive-compulsive Symptoms

Mistakes that affect others often are linked to increased feelings of responsibility and guilt. This especially holds for individuals high in obsessive-compulsive symptoms (OCS), who are characterized by inflated feelings of responsibility and a fear of causing harm to others. This event-related potential study investigated individual differences in OCS in social performance monitoring with a focus on the role of responsibility for other's harmand the error-related negativity (ERN). Healthy volunteers low (N = 27) or high (N = 24) in OCS performed a Flanker task in the presence of a gender-matched peer in three conditions. Mistakes could either have negative monetary consequences for (a) oneself, (b) the other, or (c) no one. Results showed enhanced ERNs for mistakes that harmed others instead of the self for individuals high in OCS, whereas individuals low in OCS showed decreased amplitudes specifically for mistakes affecting no one versus oneself. Amplitudes of the error positivity but not the ERN also were larger in the high OCS group. These findings indicate that high OCS are associated with enhanced performance monitoring in a social responsibility context, when mistakes harm others instead of the self, and demonstrate the importance of integrating the social context in performance monitoring research as a way to shed more light on obsessive-compulsive symptomatology.

Funding: This work was supported by a personal grant from the Netherlands Organization for Scientific Research awarded to E.R.A. de Bruijn (NWO; VIDI grant nr. 452-12-005).

Poster 1-058

INCOME AND FINANCIAL STRESS PREDICT NEURAL RESPONSES TO INFANT FACES AMONG OPIOID-DEPENDENT WOMEN

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Descriptors: Maternal Sensitivity, Late Positive Potential, Infant Cues

Peripartum women exhibit enhanced neural responses to infant emotion cues, measured by the late positive potential (LPP). The LPP is an event-related potential component that has been linked to sustained attention to emotional information. Maternal sensitivity to infant cues may be modulated by risk factors such as low income and financial stress, however little is known about how these variables relate to the LPP. The current study explores the association between income, financial stress and differences in LPP to infant emotion faces among opioid-dependent peripartum women. Participants were peripartum women who were receiving medication-assisted treatment for opioid dependence ($n = 27$). Participants reported on their income and financial stress and completed a task in which they viewed images of laughing, crying, or neutral infants while their electroencephalogram (EEG) activity was recorded. Difference scores were created for responses to crying versus laughing conditions (CL) and crying versus neutral conditions (CN). A multiple regression revealed that income ($\beta = .411$, $p = .02$) and financial stress ($\beta = -.382$, $p = .03$) significantly predicted CL, but not CN ($\beta_{income} = .302$, $p = .12$; $\beta_{stress} = -.116$, $p = .54$). These results emphasize the importance of low income and financial stress as risk factors for impaired neural sensitivity to infant cues among opioid-dependent peripartum women. Future research should examine the mechanism by which income and financial stress predict parental neural responses and whether these findings generalize across different groups.

Funding: Support from National Institute of Health R01 HD098525 and anonymous donor.

Poster 1-059

THE JOYS OF MOTHERHOOD: ASSOCIATIONS BETWEEN NEURAL REWARD RESPONSIVENESS IN THE ANTENATAL PERIOD AND POSTNATAL MOTHER-INFANT ATTACHMENT QUALITY

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Descriptors: Reward Processing, Attachment Quality, Maternal Behavior

Mother-infant attachment quality has protracted effects on maternal and child health and development. Previous studies suggest that reward-related neural regions underlie maternal behavior, and thus, may impact attachment quality. The present study utilized a longitudinal design to examine associations between the antenatal (i.e., in pregnancy) Reward Positivity (RewP), an event-related potential (ERP) elicited by feedback indicating monetary reward, and self-reported attachment quality at approximately 1 year postpartum. EEG was recorded during a gambling task in 63 pregnant women at an OB/GYN clinic in Tallahassee, FL. The RewP was analyzed as the difference score following gain compared to loss feedback between 250 and 350 ms at the FCz electrode site. Follow-up measures were collected at 1 year postpartum using the Maternal Postpartum Attachment Scale (MPAS). A larger antenatal RewP was associated with greater overall attachment quality and greater pleasure in interaction with the infant at 1 year postpartum. Furthermore, while the RewP was not directly associated with the tolerance and acceptance of the infant, postpartum pleasure in interaction with the infant mediated an indirect association between the antenatal RewP and tolerance and acceptance of the infant. These findings support previous studies suggesting a role for reward-related motivational systems in maternal behavior and suggest that individual differences in neural reward responsiveness may impact mother-infant attachment quality in the postnatal period by modulating pleasure taken in caring for the infant.

Funding: This work was supported by the following grants: NIMH R21 MH116481 & NIMH T32 MH093311.

Poster 1-060

STRESS EXPOSURE, PERCEIVED PREDICTABILITY, PARASYMPATHETIC CARDIAC REGULATION, AND CHILDREN'S APPROACH AND AVOIDANCE BEHAVIORS

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Descriptors: Parasympathetic Nervous System, Value Learning, Children

Being able to recognize, interpret, and use cues signaling rewards and threats is critical to survival. Chronic or extreme stress during childhood disrupts these processes, but the mechanisms through which this occurs are not well understood. One hypothesis is that these effects are related to high levels of unpredictability. Additionally, parasympathetic cardiac regulation has been linked to variability in children's outcomes after stress. In adults, parasympathetic regulation is associated with differences in sensitivity to cues of threat and reward, making it of particular interest when considering how individuals learn and use value information. Here, we examined whether parasympathetic cardiac regulation interacts with experiences of stress and perceptions of predictability to influence how children use learned information to approach and avoid rewards and threats. Measures of resting parasympathetic activity, perceptions of predictability, and exposure to stress were collected from 72 children (8–9 years old). Children's approach and avoidance of rewards and threats was assessed using an instrumental conditioning paradigm. We found that higher levels of predictability were associated with more effective approach and avoidance behaviors, but only for children with high levels of resting parasympathetic activity. Overall, this research suggests that resting parasympathetic cardiac regulation moderates children's effective use of learned value information. Further, children's use of value information is related to their perceptions of environmental predictability.

Funding: This work was supported by the National Institute of Mental Health [R01MH61285, T32MH018931-30], a James McKeen Cattell Fund Fellowship, and by a core grant to the Waisman Center from the National Institute of Child Health and Human Development [U54 HD090256].

Poster 1-061

FAIRNESS PERCEPTION IN PRESCHOOLERS: EARLY AND LATE COMPONENTS INVOLVED IN RESOURCE ALLOCATION APPRAISAL

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Descriptors: Developmental Neuroscience, Social Skills, EEG

"Inequity aversion" is the natural tendency to avoid unfair outcomes. This behavior is present since early/middle childhood, but there is little evidence about how it is computed by the brain during this age range. To move forward in this topic, event-related potentials (ERPs) were measured in children (3 to 6 years-old) while they were assigned to the "receiver" role in a Dictator Game (DG) task. Assets' (i.e., candies) division were shown in a computer screen and could be under three categories: (a) AI: advantageous unequal, (b) DI: disadvantageous unequal, and (c) FA: fair. In each offer, participants had to indicate how s(he) would feel, ranging from very sad to very happy. Behavioural results show that children felt more sad with DI offers when compared to AI and FA offers. Regarding ERP analyses, comparison of FA and DI offers led to the emergence of a very early positive ERP after FA offers in occipital areas. Contrasting AI and DI offers, an early negative ERP happens after DI offers in the left parietal-occipital area. Finally, comparison of FA and AI offers showed an early positive ERP after AI offers in the right centro-parietal area and a late positive ERP in the right frontal area. Altogether these results show that differences in neural processing right after the exposure to the offers indicates the involvement of fast sensorial processing in a first moment of fairness appraisal. In addition, differences in ERPs occurring later in time may indicate increased recruitment of cognitive resources that can influence the emotional evaluation of the different outcomes.

Funding: Work funded by The Singapore's Ministry of Education Social Science Research Thematic Grant (MOE2016-SSRTG-044).

Poster 1-062

INFANTS OF MOTHERS WITH INCREASED DEPRESSIVE SYMPTOMS SHOW BLUNTED NEURAL RESPONSES TO EMOTIONAL FACES PORTRAYED BY THEIR MOTHER, AND NOT BY A FEMALE STRANGER

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Descriptors: Infant, Emotion, Negative Central (Nc)

Maternal depression during the postpartum period can adversely affect infant development in multiple ways—including increasing the risk that those infants will develop depression later in life. In particular, affective exchanges between mothers and infants play an important role in socioemotional development during the first year of life, possibly through adaptations in infant neural responses to affective stimuli. The Negative Central (Nc) is an event-related potential component that indexes infant attention to salient stimuli and is sensitive to emotional expression. The present study, therefore, examined the association between maternal symptoms of depression, parenting behaviors, and the Nc elicited by happy, fearful, and neutral facial expressions portrayed by their mother and female strangers in fifty-eight infants (mean age = 28.46 weeks; 59% female). We collected mother-reported symptoms of depression, and coded videos of mother-infant free play interactions for maternal sensitivity and warmth, as well as infants' positive engagement with the mothers. Mothers reporting higher levels of depressive symptoms were rated by coders as less sensitive ($r = -.26$) and warm ($r = -.33$), and their infants showed decreased positive engagement with the mothers ($r = -.32$). In addition, infants of mothers reporting greater depressive symptoms exhibited a smaller Nc to happy and neutral mother faces—but not stranger faces ($N = 28$; partial eta squared = .18). Together, these results point to a potential pathway by which risk for depression may be transmitted from mother to child.

Funding: This work was supported by a Doctoral Training Award—Fonds de recherche du Québec-Santé awarded to Aislinn Sandre.

Poster 1-063

PHYSIOLOGICAL COREGULATION DURING MOTHER-CHILD INTERACTIONS: MODERATING EFFECTS OF PARENTAL EMOTION REGULATION AND PARENTING

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Descriptors: Physiological Coregulation, Parent-child, Emotion Regulation

Physiological coregulation between parent and child is characterized as the bidirectional linkage of oscillating biological states, and it has impacts on children's development of self-regulation. This study examined the dynamic relations between changes in parent and child respiratory sinus arrhythmia (RSA), as well as the moderating effect of parents' emotion regulation and parenting. Participants consisted of 140 mother-child dyads with children aged 4–12. Dyads participated in a 5-min conflict resolution task when interbeat intervals (IBIs) were collected. High-frequency powers were calculated in each 30-s as indicators of parent/child RSA. A multilevel, coupled autoregressive modeling approach was used, where an individual's concurrent RSA was predicted by RSA coregulation and intra-individual variability in RSA. The coregulation parameters were then predicted by parental emotion regulation and parenting. Coregulation was positively associated with mothers' current RSA. Mothers' parenting was negatively associated with coregulation. Coregulation was positively predictive of children's current RSA, and it was positively associated with mothers' difficulties in emotion regulation. Mothers and children showed stronger concordance in RSA among mothers with more emotion regulation difficulties. This study found positive coregulation processes and greater coregulation might be related to parental emotion dysregulation and ineffective parenting behaviors. The findings suggested the influence of parents' characteristics on parent-child concordant physiological dynamics.

Funding: The original study was funded by grants from NIDA R01 DA030114 to Abigail H. Gewirtz.

Poster 1-064

EFFICACY OF A BRIEF, COMPUTERIZED INTERVENTION TO DECREASE THE ERROR-RELATED NEGATIVITY (ERN) IN YOUNG CHILDREN: A PILOT STUDY

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Descriptors: Error-related Negativity, Children, Computerized Intervention

The error-related negativity (ERN) has been proposed as a neural marker of anxiety. A number of studies have demonstrated that the ERN is larger amongst anxious adults and children. Moreover, an elevated ERN in children has been shown to index risk for later anxiety disorder onset. *Punishing* error commission is associated with acute increases in the ERN amplitude, indicating that this neural marker may be modifiable. Additionally, harsh or authoritarian parenting styles have been associated with a larger ERN amongst offspring. Finally, the ERN is associated with higher *error sensitivity*, or the degree to which an individual experiences making mistakes as aversive. In a group of 5–7-year-old children ($n = 10$), we measured the ERN using a Go/No-go task before and after a brief, computerized intervention. The intervention focused on reducing error sensitivity by teaching concepts such as, "making mistakes is OK," "mistakes are a chance to learn," and "stand up to your mistake bully!" Post-intervention, the ERN was significantly reduced, $t(9) = -3.00$, $p < .05$. These pilot study findings provide preliminary evidence that a brief, computerized intervention aimed at reducing error sensitivity can reduce the ERN amplitude, a risk marker for anxiety disorders. Future research should evaluate whether disseminable, computerized, cognitive-behavioral interventions targeting error sensitivity can reduce risk for developing anxiety psychopathology via reductions in the ERN.

Poster 1-065

EMOTION AND SEMANTIC RELATEDNESS AS ORGANIZING PRINCIPLES PROMOTING ASSOCIATIVE RECOGNITION

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Descriptors: Associative Recognition, Emotion, Semantic Relatedness

Our memory can be both enhanced and diminished by emotions. Associative "emotion interference", i.e., impaired remembering of associative emotional content, is one example of the latter. The current study aimed to uncover the neurocognitive mechanisms that drive this effect. In two experiments, negative and neutral picture-pairs that were either semantically related or unrelated were presented. Participants studied those stimulus-pairs by performing study task either relevant (Experiment 1) or irrelevant (Experiment 2) to the emotional content, and subsequently discriminated between intact, rearranged, and new pairs in an associative recognition test, while EEG was recorded. We observed an associative emotional interference effect in both experiments, but this effect was attenuated by semantic relatedness when emotions were relevant to the study task. Moreover, the early associative memory effect showed robust modulation for negative pairs when emotions were relevant, but only for semantically related pairs when emotions were irrelevant. The modulation of the late associative memory effect occurred in all experimental conditions and in both experiments, indicating a more general pattern. These results suggest that both emotions and semantic relations can act as organizing principles that promote associative memory. Their ability to contribute to successful retrieval depends on specific task demands.

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Poster 1-066

AFTER-EFFECTS OF THETA TRANSCRANIAL ALTERNATING CURRENT STIMULATION (TACS) ON WORKING MEMORY PERFORMANCE AND RESTING-STATE EEG

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Descriptors: EEG, tACS, Working Memory

Transcranial alternating current stimulation (tACS) is a non-invasive brain stimulation technique allowing to induce changes in oscillatory activity. Theta activity has been reported to play a major role in maintenance of information in working memory (WM). The current study had initial goal to check the effect of theta tACS on accuracy in a set of match-to-sample WM tasks. In the first experiment, 31 participants were tested in the WM task after 20-min tACS applied at Fpz and CPz at 6 Hz, 1 mA. After-effects of the stimulation did not produce any significant changes either in behavior (accuracy in the task) or resting-state EEG (theta frequency band spectral power). In the second experiment, we aimed to compare the after-effects and online effects of the stimulation in a sample of 25 individuals. Five similar 25-min blocks filled with the same working memory task were distributed over 3 days. The same group of participants were assessed in all three sessions. On the Training day the participants performed one block without stimulation. On the Sham-Verum day (SV), there were two blocks: the first block with Sham stimulation and the second block with Verum stimulation. Finally, on the Verum-Sham day (VS), there were also two blocks: one block with Verum stimulation, and then the block with Sham stimulation. 6 Hz tACS delivered before the WM task was not able to produce any observable changes in working memory performance. The same hold true for online stimulation. Theta frequency tACS applied to Fpz-CPz electrodes is not an efficient method to improve WM.

Funding: Study was supported by Russian Foundation for Basic Research (RFBR) #19-013-00027.

Poster 1-067

THE ROLE OF BRAIN RHYTHMS IN STORAGE OF VERBAL WORKING MEMORY: A SYSTEMATIC REVIEW OF M/EEG STUDIES

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Descriptors: EEG, Working Memory, Systematic Review

Brain oscillations likely play a significant role in storage of information in working memory (WM). Despite the wide popularity of the topic, available attempts to summarize the research in the field are narrative reviews, known to be prone to bias and selectivity. We address this gap by providing a descriptive systematic review, in which we investigated oscillatory correlates of maintenance of verbal information in WM. The systematic approach enabled us to challenge a number of common views, popularized by narrative reviews and individual studies. The identified literature (100 EEG/MEG studies) highlighted the importance of theta oscillations in verbal WM: frontal midline theta enhanced with load in the majority of verbal WM studies, but much less in visual WM studies. Increasing WM load affected alpha activity in most studies but the direction of the effect was inconsistent (alpha increased with load in 80% and decreased in 20% of verbal WM studies). The effect of posterior alpha asymmetry (left < right) was found to be common in verbal WM studies. The reviewed studies do not provide enough evidence that alpha activity saturates at higher levels of verbal WM load. Beta and gamma activity studies yielded least convincing data: a diversity in spatial and frequency distribution of beta activity prevented us from making a coherent conclusion; we found no systematic support for sustained gamma changes during delay in EEG studies.

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Poster 1-068

THE IMPACT OF ADVERSE CHILDHOOD EXPERIENCES AND SOCIAL THREAT LEARNING ON ELECTROCORTICAL FACE PROCESSING AND RECOGNITION

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Descriptors: Adverse Childhood Experiences, Face Encoding and Recognition, ERP

Having experienced adversity in childhood (ACE) increases the risk of developing stress and anxiety-related disorders in adulthood. A possible link between ACE and psychopathology is an impairment in learning and memory, associated with decreased discrimination between threat and safety due to a generalization of threat. While emotionally arousing stimuli enhance memory in healthy participants, this is assumed to be reduced in participants with ACE. We examined the impact of contextual threat and safety on encoding and recognition of faces using event-related brain potentials. In Study 1, 30 healthy participants passively viewed 60 neutral faces either within an instructed threat or safety context (encoding session). Following, the 60 old and 30 new faces were presented intermixed and participants had to decide in which context the face had been presented previously or if it was new (recognition session: old/new source memory task). Results show that face perception varied as a function of contextual source information during encoding in neural correlates. Memory performance was very poor. Still, brain activity differentiated previously seen from newly presented faces (old/new ERP effect). In Study 2, 48 individuals with ACE underwent a similar experimental procedure. Preliminary results indicate that an explicit learning instruction and prolonged picture presentation boosted face recognition. Moreover, a threatening context was generally recognized more than a safe one. Further behavioral and ERP findings will be discussed within the framework of stress-related disorders.

Funding: This work was supported by the German Research Foundation (BU 3255/1-1) and the Studienstiftung des Deutschen Volkes.

Poster 1-069

FRONTAL ASYMMETRY IN AN APPROACH AVOIDANCE CONFLICT PARADIGM

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Descriptors: Motivation, Frontal Asymmetry

Recent research suggests that greater relative right frontal cortical activity is associated with greater motivational control, but not withdrawal motivation. However, this past work has been predominantly limited to correlational evidence. The current experiment sought to empirically test whether motivational control is causally related to greater relative right frontal activity. Subjects completed an approach avoidance conflict task while EEG was recorded. To elicit approach-avoidance conflict, participants chose between seeing a negative image for a reward (1, 3, or 6 points) or a positive image for no reward. Avoidance only trials consisted of a choice between seeing a negative image for no reward or a positive image for no reward. Results revealed that participants were more likely to choose to view a negative image when points were higher. Participants' relative right frontal activation was greater during approach-avoidance conflict trials relative to avoidance only trials. Furthermore, while viewing negative images, participants exhibited greater relative right frontal activation when approach-avoidance conflict was highest relative to when it was the lowest. Together, these results suggest that motivational conflict is causally associated with relative right frontal activation.

Poster 1-070

MOTIVATED ACTION: CENTRAL AND PERIPHERAL PHYSIOLOGY DURING AVOIDANCE, ESCAPE, AND APPROACH PREPARATION

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Descriptors: Coping, Autonomic Physiology, EEG

When preparing to cope with avoidable (uncertain) vs. escapable (certain) aversive exposure, motive activation (e.g., galvanic skin response; GSR) is larger in an escape context whereas attentional responding (e.g., cardiac deceleration) is similar across contexts. Here, we test if certainty affects motive responding and attention similarly during appetitive (e.g., approach) coping. 30 community participants completed an appetitive coping task where cues signaled if a fast button press at cue offset would turn on (approach), lengthen (extend), or not affect pleasant picture presentation. Participants also completed an aversive task where cues signaled if a button press would block (avoid), shorten (escape), or not affect unpleasant scenes. GSR and heart rate were measured throughout each cue, and electroencephalography was recorded to derive event-related potentials (ERPs) to brief noises that probed attention capture by the coping task. Similar modulation for each task showed: (a) late-cue GSR was larger specifically in extend, $t(29) = 1.9$, $p = .05$, or escape, $t(29) = 2.3$, $p = .03$, contexts than in no-control contexts, (b) late-cue cardiac deceleration was enhanced for both active contexts in appetitive, $F(2, 28) = 6.4$, $p = .003$, and aversive, $F(2, 28) = 3.5$, $p = .04$, tasks, and, (c) probe ERPs (175–225 ms post-probe onset) were *reduced* in active contexts for appetitive, $F(2, 25) = 4.2$, $p = .03$, and aversive, $F(2, 25) = 12.9$, $p < .001$, tasks. Just as with aversive coping, then, exposure certainty increases sympathetic arousal but does not impact attention during appetitive coping.

Funding: Medical University of South Carolina Internal Pilot Project Award.

Poster 1-071

APPLICATION OF THE MUSE PORTABLE EEG SYSTEM TO AID IN RAPID DIAGNOSIS OF STROKE

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Descriptors: Stroke, EEG, TreeBagger

In this pilot study, we investigated the use of electroencephalography (EEG) as a stroke diagnostic method with the hopes of decreasing time between stroke symptoms onset and diagnosis and treatment. Prehospital stroke scales, used by emergency medical services, miss up to 30% of acute strokes and often miss stroke from large vessel occlusions that benefit from endovascular thrombectomy. Thus, there is a need for rapid technologies to improve diagnosis of prehospital strokes. We used the Muse™ EEG system by InteraXon Inc. to record EEG, accelerometer, and gyroscope data from 25 participants, including 16 who had recently had an acute ischemic event and compared the results with age-matched controls that included stroke mimics. We have found an increased Delta/Alpha Ratio (DAR) and increased (Delta+Theta)/(Alpha+Beta) Ratio (DBATR) in stroke patients that increases with stroke severity ($p < .01$, partial $\eta^2 = 0.293$; $p < .01$, partial $\eta^2 = 0.234$). Pairwise-derived Brain Symmetry Index (pdBSI), a measure of brain symmetry, decreased in low frequencies and increased in high frequencies in stroke patients ($p < .05$, partial $\eta^2 = 0.177$). There are significant differences in DAR, DBATR, and pdBSI between patients with ischemic stroke when compared to controls; results correlate with severity. Using classification trees, we were able to distinguish between subgroups of stroke patients and controls. Our results show the feasibility and utility for the Muse™ EEG system to aid in patient triage and diagnosis as an early detection tool for strokes.

Poster 1-072

A LONGITUDINAL STUDY OF ACUTE AND ONE-YEAR INTER-HEMISPHERIC TRANSFER TIME IN ADULTS WITH CONCUSSION: EVIDENCE FROM EVENT-RELATED POTENTIALS

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Descriptors: Concussion, Inter-hemispheric Transfer Time, Corpus Callosum

The corpus callosum (CC) is a possible site of microscopic axonal damage following concussion. In most individuals, clinical symptoms of concussion tend to remit within three months; yet, physiological deficits may persist long past this time frame. One possible physiological marker of damage to the CC is interhemispheric transfer time (IHTT). IHTT is the speed in milliseconds at which visual information is passed from one hemisphere to the other and serves as a direct marker of CC integrity. We aimed to quantify IHTT in individuals with concussion compared to healthy controls both acutely following injury and a year following injury using event-related potentials. Concussed ($n = 27$) and control ($n = 27$) participants completed a letter-matching task during which electroencephalogram data were recorded. IHTT was calculated using latency of the peak of the P1 and N1 at ipsilateral and contralateral occipital electrode sites. A 2-time (3 weeks, 1 year) × 2-group repeated measures ANOVA for P1 IHTT revealed a main effect of group, with concussed participants having slower IHTT regardless of time ($p = .006$). There was no main effect of time nor a significant group by time interaction ($ps > .22$). When examining N1 IHTT, there was a significant group by time interaction ($p = .04$), with IHTT becoming slower from time one to time two for concussed participants, but no change in the control participants. Overall, results suggest that IHTT may be slowed following a concussion; however, results are heterogeneous.

Poster 1-073

ASSOCIATIONS BETWEEN DIFFERENT FACETS OF ANHEDONIA AND NEURAL RESPONSE TO MONETARY, SOCIAL, AND FOOD REWARD IN EMERGING ADULTS

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McGill University

Descriptors: Reward Positivity (RewP), Anhedonia

The reward positivity (RewP), a neural index of reward processing, has been associated with anhedonia, the inability to derive pleasure from rewards. Most of this research has employed monetary rewards; however, it is unclear whether anhedonia and neural responses to reward are domain general (the same across all incentives) or category specific (sensitive to different incentive types). The present study ($N = 119$) used multiple incentive types and measures of anhedonia to investigate associations between the RewP to monetary, food, and social reward, as well as multiple self-report measures. Results indicate that the RewP to monetary reward is positively correlated with the RewP to food and social reward, but that the latter two are not associated with one another, suggesting that there are domain-general *and* category-specific aspects to reward processing. Our data also suggest that social anhedonia is uniquely associated with neural response to positive social feedback, such that individuals with a smaller social RewP report heightened social anhedonia, and that food RewP magnitude is uniquely correlated with self-reported consummatory pleasure, such that individuals with a larger RewP to food reward report greater "liking" when consuming rewards. Our findings extend prior work by investigating associations between neural responses elicited by different incentive types. The data suggest that neither anhedonia nor neural reward insensitivity are unidimensional constructs, and that distinct neural reward processing pathways may be involved in specific symptoms of anhedonia.

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Poster 1-074

VAGAL REGULATION IN A NOVEL INFANT CRY TASK AMONG SUBSTANCE-USING PREGNANT AND PERIPARTUM WOMEN

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Descriptors: Parenting, Respiratory Sinus Arrhythmia, Substance Use

Substance-using mothers may be at an increased risk for insensitive parenting. Maternal vagal regulation, which has been linked to parenting-relevant constructs like emotion regulation (ER), is a promising candidate mechanism but is understudied in substance-using populations. We measured respiratory sinus arrhythmia (RSA), an indicator of cardiac vagal influence, at rest and during an infant cry task among substance-using pregnant and peripartum women (N = 78). Women were predominantly white (68%) and poor (50% reported an annual income below $10,000). After a 3-min resting baseline, women completed a novel 9-min computer task (Crybaby) that involves responding to infant cries. Resting RSA and RSA reactivity (task–resting RSA) were calculated. Women also completed the Maternal Self-Efficacy Scale (Schoppe-Sullivan et al., 2015) and Difficulties in Emotion Regulation—Short Form (Kaufman et al., 2015). Linear regressions were used to predict RSA from maternal self-efficacy, emotion dysregulation, and covariates as indicated (pregnancy status, income, resting RSA). High resting RSA was associated with high maternal self-efficacy (β = .25, p = .048) and reduced ER problems (β = −.27, p = .035). High RSA withdrawal during Crybaby was associated with elevated ER problems (β = −.28, p = .038). Resting RSA and RSA reactivity to infant cries were associated with psychological measures linked to substance use and parenting. Results support the use of a novel tool to measure vagal reactivity to infant cues and suggest ER as an intervention target for substance-using parents.

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Poster 1-075

EFFECTS OF LOW-INTENSITY TRANSCRANIAL FOCUSED ULTRASOUND NEUROMODULATION ON RESTING STATE ELECTROENCEPHALOGRAPHIC FRONTAL ALPHA ASYMMETRY

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Descriptors: Neuromodulation, Low-Intensity Transcranial Focused Ultrasound, Resting State Electroencephalographic Frontal Alpha Asymmetry

Low-intensity Transcranial Focused Ultrasound (TFUS) is a non-invasive neuromodulation technique with potential advantages compared to other approaches (e.g., more focused application, no side effects like headache). TFUS has been pointed out as promising for future research, with several reviews highlighting the need for more insight on its underlying neuromodulative mechanisms (e.g., Bystritsky & Korb, 2015; Tyler & Fini, 2017). We focused on TFUS targeting the right prefrontal cortex (RPFC), which has been associated with positive changes in self-reported mood (Hameroff et al., 2013; Sanguinetti et al., 2020). Based on the TFUS mood effects as well as current TFUS models on neuronal intramembrane cavitation excitation (Plaksin, Kimmel, & Shoham, 2016), we hypothesized that TFUS should lead to RPFC inhibition. This should be reflected in increased right frontal alpha asymmetry (RFA) measured by electroencephalography (EEG) and would be consistent with theories discussing RFA (Hewig, 2017). We conducted a within-subjects comparison with three different TFUS conditions on three different days: TFUS-Real, TFUS-Sham, TFUS-None. RFA was examined via resting EEG (8 min), on average 30 min after TFUS (the time found to be most promising for detecting TFUS effects in earlier studies, most recently Sanguinetti et al., 2020). We found a small effect in the hypothesized direction at electrodes AF4—AF3. Future studies should expand these findings and interpret them in the context of other phenomena like TFUS decreasing resting state network connectivity (Sanguinetti et al., 2020).

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Poster 1-076

COMPARING VISUAL, AUDITORY AND TACTILE P300 BRAIN-COMPUTER INTERFACES IN A SINGLE-CASE-STUDY WITH A LOCKED-IN SYNDROME PATIENT

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Descriptors: P300 Brain-computer Interfaces, Modality Differences (Visual vs. Auditory vs. Tactile), Locked-in Syndrome

Locked-in syndrome (LIS) has been described as a condition of almost complete or even total paralysis of the human muscular system, therefore severely affecting the ability of interacting with the outside world (Bauer, Gerstenbrand, & Rumpl, 1979). Brain-computer interfaces (BCIs) have emerged as a possibility for LIS patients to maintain a certain level of activity, e.g., via enabling them to engage artistically via "Brain Painting" and thus improving quality of life (Holz, Botrel, Kaufmann, & Kübler, 2015). However, various BCI approaches rely on visual stimulation, in case of "Brain Painting" on visual flashes evoking an electroencephalographic event-related P300 response. Since loss of vision has been pointed out as a limiting factor in various LIS cases, alternative BCIs have been developed, for example using auditory or tactile stimuli to elicit P300 responses (Riccio, Mattia, Simione, Olivetti, & Cincotti, 2012). Halder, Käthner and Kübler (2016) could show successful use of an auditory P300 BCI in paralyzed patients, but BCI research regarding potential LIS end-users remains scarce (Kübler, Müller, & Guan, 2017). This contribution aims to further explore P300 BCI use in LIS patients by comparing visual, auditory and tactile P300 BCI approaches in a single-case-study. Performance was best using the visual P300 BCI, but especially the tactile paradigms were well received by the patient as alternatives should a loss of vision occur in the future. More sessions are planned to examine long-term development of BCI home use and possible training effects.

Poster 1-077

THE MODERATING ROLE OF THE MUSIC LISTENING STYLE FOR ACUTE STRESS AND PAIN RESPONSES

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Descriptors: Music Listening Style, Pain, Acute Stress Responses

Objective: Listening to music is a potent and easily applicable non-pharmacological tool in stress and pain management. As it is unclear how music listening styles may influence beneficial effects of music, we aimed to investigate whether acute stress and pain responses differ in music empathizers (ME) and music systemizers (MS). Due to expected differences in stress and pain reactions between male and female ME/MS, we also investigated the role of gender. Methods: Healthy ME and MS listened to auditory stimuli during a cold pressor test (CPT) on 3 days (day 1: researcher-chosen music, day 2: participant-chosen music, day 3: lapping water; randomized order). We measured repeatedly: Pain intensity, pain tolerance, subjective acute stress, heart rate (HR), heart rate variability parameter RMSSD, salivary alpha-amylase (sAA) and salivary cortisol. Multilevel modelling was used for data analyses. Results: In preliminary analyses (n = 56; age: M = 24.2, SD = 3.89), ME and MS did not differ in pain intensity nor tolerance, sAA after CPT, HR and RMSSD during and after CPT. ME and MS differed in subjective stress (ME > MS; p = 0.044) and cortisol after CPT (MS > ME; p = .005). Male ME and female MS showed lower cortisol after CPT than female ME and male MS (p < .001). Final analyses will be presented at the conference. Conclusion: Pursuant to our preliminary findings, music listening styles do not affect pain perception. Yet, they might modulate pain-related stress responses (subjective stress and endocrine, but not autonomic reactivity). This might entail new approaches for stress and pain coping.

Poster 1-078

CALLOUSNESS AND AFFECTIVE FACE PROCESSING IN ADOLESCENTS

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Descriptors: Adolescents, Callousness, Affective Face Processing
Trait callousness is a liability factor for the development of severe antisocial behavior (Frick & White, 2008; Perkins et al., in prep). Thus, improving early assessment of callousness is crucial for prevention efforts and targeted intervention programs. Callousness has been linked to impaired socioemotional processing in adults, in terms of reduced ERP response to affective faces (Brislin & Patrick, 2019; Brislin et al., 2018). However, such studies have used non-naturalistic (close-cropped, grayscale) face stimuli, and no work of this kind has been conducted with youths to date. To address these gaps in the literature, we asked adolescent subjects to complete one of two emotion recognition tasks that used uncropped, full-color faces. In one, subjects categorized mid-intensity morphs of angry/neutral, fearful/neutral, or sad/neutral faces; ERP responses in this task were smaller than expected and unrelated to callousness. The other task used full- as well as mid-intensity faces (angry, fearful, sad) along with control images (clock faces). In this task, ERP amplitudes were more comparable with past work, and callousness was consistently associated with attenuated ERPs to affective faces, as found in prior adult studies using less naturalistic face stimuli. Our work highlights how task design choices can affect ERP responses and their relations with trait variables. It also extends adult research on callousness and affective face processing to a younger sample using more ecologically valid stimuli, with implications for early assessment of risk for antisocial behavior.

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Poster 1-079

STRONGER PERSONAL CONTROL BELIEFS ASSOCIATED WITH QUICKER CARDIAC VAGAL RECOVERY AFTER A COGNITIVE CHALLENGE

Charisse Tay
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Descriptors: Control Beliefs, Stress, Heart Rate Variability
Aim: Strong personal control beliefs have been found to be associated with lower levels of perceived distress, yet little is known about how these beliefs affect autonomic reactions to stress. This study evaluates the associations between dimensions of personal control beliefs and cardiac vagal control (CVC), as indexed by laboratory-assessed heart rate variability (HRV). Methods: Data on 507 socioeconomically diverse participants aged 35 to 85 years were obtained from the Midlife Development in the United States (MIDUS) study. HRV was measured from electrocardiograph recordings taken at rest, during cognitive and emotional stressors, and during post-stress recovery. The Self-Control Scale was used to measure beliefs regarding the extent of internal locus of control over one's cognition and emotions. Hierarchical linear regression models were used to evaluate the associations between dimensions of personal control and natural log-transformed high-frequency HRV (HF-HRV) at baseline and during recovery. Results: Quicker vagal recovery was found to be significantly associated with increased scores on the cognitive dimension of self-control beliefs, but not the emotion dimension. The association remained significant after controlling for demographic (age, sex), clinical (BMI, diseases, medications, and menopausal status), and health behavior (exercise, smoking) variables. Conclusion: Higher internal locus of control may result in greater resilience in responding to stressors, and may suggest that psychotherapeutic intervention may improve HRV downstream.

Poster 1-080

CHILD ERROR-RELATED NEGATIVITY MEDIATES THE RELATIONSHIP BETWEEN OVERPROTECTIVE PARENTING AND GENERALIZED ANXIETY DISORDER IN KIDS AGES 5 TO 7

Danielle Becker; Alexandria Meyer
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Descriptors: Overprotective Parenting, ERN, Anxiety
A heightened neural response to errors (i.e., the error-related negativity or ERN) has been shown to be increased in more anxious individuals compared to healthy controls. Previous work suggests the utility of the ERN as a prospective predictor of childhood anxiety disorders prior to symptom onset. Additionally, children with overprotective parents have been shown to have an increased ERN—suggesting that child-rearing styles may influence risk for the development of an anxiety disorder. This study aims to assess the prospective ability of the ΔERN to mediate the relationship between overprotective parenting style and risk for Generalized Anxiety Disorder (GAD) in 72 children, aged 5 to 7 years old. The correct-response negativity and the error related negativity (measured during a Go/NoGo task with parent in the room) were quantified as the average activity between 0 and 100 ms at the Cz electrode site. Parenting styles were assessed by the PSDQ and the presence of GAD was assessed using an adapted version of the KSADS interview. Results showed that overprotective parenting and the ERN both significantly predicted a current diagnosis of GAD. The results of this mediation indicate that an increase in overprotective parenting relates to an increase in the presence of GAD, and this relationship is mediated by increased error processing. These findings align with previous literature suggesting that overprotective parenting may influence the risk of the development of childhood anxiety disorders by shaping children's neural processing of errors.

Poster 1-081

INCREASED NEUROPHYSIOLOGICAL CONNECTIVITY AND ORBITOFRONTAL-TEMPORAL COUPLING ASSOCIATIONS WITH PTSD SYMPTOMS

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Descriptors: Posttraumatic Stress Disorder (PTSD), Neuroconnectivity, Magnetoencephalography (MEG)
Posttraumatic stress disorder (PTSD) is a severe psychiatric illness with a high lifetime prevalence, inflicting functional impairments across psychological and behavioural domains. Previous CT and MRI research have identified neurostructural biomarkers of PTSD. However, neurostructural PTSD differences are only seen at the group level, and have significant spatial overlap with other disorders, and are thus insufficient for diagnostic purposes. Alternatively, functional connectivity is a proposed approach to biomarker identification. This study aimed to use the spatiotemporal acuity of magnetoencephalography (MEG) to identify resting state network (RSN) changes associated with PTSD and symptom severity. Military personnel who were deployed as part of the Afghan mission (12 PTSD, 20 trauma-exposed controls) completed a PTSD symptom severity assessment (PTSD Check-List; PCL) and a resting-state MEG protocol. In comparison to trauma-exposed controls, those with PTSD had significantly increased functional connectivity primarily across left frontal, temporal, and occipital regions. Multilevel modelling analyses revealed a significant positive association between the connectivity strength of the right frontal superior orbital—temporal medial gyri, and behavioural PTSD symptoms (specifically, hyperarousal and avoidance symptoms). Results bolster PTSD RSNs found in fMRI and PET studies and contribute novel neurophysiological PTSD characteristics associated with specific symptoms in areas previously implicated in the disorder.

Poster 1-082

THE PREDICTIVE VALUE OF REPORTED COMPLEX PTSD AND STRESS SYMPTOMS ON RESTING HFHRV

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Virginia Polytechnic Institute and State University

Descriptors: Complex PTSD, hfHRV

Research has highlighted a negative correlation between baseline high frequency heart rate variability (hfHRV, a marker of cardiac vagal control) and severity of posttraumatic stress disorder (PTSD) symptoms, particularly in individuals who have experienced complex trauma. Lower hfHRV may be related to chronic dysregulation in cardiac vagal control, thus explaining some posttraumatic responses to stressors. Given these associations, it is important to examine the connection between trauma outcomes and hfHRV following exposure to traumatic events or extreme stress. In this study, log hfHRV power derived from ECG recordings, was collected during resting baseline in an unselected sample of female college students (n = 35). Prior to the session, participants completed the Self-Report Inventory for Disorders of Extreme Stress survey, designed to capture functional patterns indicative of complex trauma and extreme stress. Multiple regression tested whether complex trauma symptoms predicted hfHRV, with racial identity and age tested as covariates. Contrary to hypotheses, participant-reported complex trauma and stress symptoms neither correlated with (r = −.004), nor predicted (p > .05) baseline RSA. Nonsignificant results may be reflective of an unselected versus diagnostic PTSD sample, or may indicate that psychological symptoms other than those reflective of extreme stress may better predict variation in hfHRV. Further analyses will investigate the presence of a predictive relationship between comorbid symptoms of stress and trauma (i.e., anxiety; depression) and hfHRV.

Poster 1-083

ASSOCIATION OF LATENT TRAUMA WITH DISTINCTIVE PATTERNS OF CORTICAL THICKNESS IN CHILDREN

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Descriptors: Trauma, Psychopathology, Cortical Thickness

The developing brain is marked by high plasticity which can lead to vulnerability to early life stressors, such as trauma. Trauma has been shown to affect brain structure and to increase the risk of developing psychopathology later in life. However, previous studies on the relationship between trauma and brain structure are limited by small sample size, case-control designs, and heterogeneous age groups. Thus, the present study aimed to investigate how trauma is associated with cortical thickness and gray matter volume (GMV) in the early developmental stage by leveraging a large sample of 9 to 10-year-old children (N = 9,326) from the Adolescent Brain and Cognitive Development (ABCD) Study. Results of analyses using structural equation modeling indicate that a latent trauma variable was associated with reduced cortical thickness in bilateral superior frontal gyri and right caudal middle frontal gyrus (p values < .001, FDR-corrected) and increased cortical thickness in left isthmus cingulate and left posterior cingulate (p values ≤ .014, FDR-corrected). Sensitivity analyses after controlling for income and parental education showed consistent results with the primary analysis. Conversely, the relationship between latent trauma and GMV was largely non-significant. Follow-up analyses with dimensional psychopathology factors indicated that regional cortical thickness was not significantly associated with psychopathology. The present results suggest that trauma may be an important risk factor for aberrations specific to cortical thickness in the frontal and cingulate regions.

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Poster 1-084

THE RELATIONSHIP BETWEEN SLEEP DIFFICULTIES, THE ERROR-RELATED NEGATIVITY, AND ANXIETY IN YOUTH

Lushna Mehra; Alexandria Meyer
Florida State University

Descriptors: Error-related Negativity, Anxiety, Sleep

The error-related negativity (ERN) is a neural marker that indexes anxiety and risk for its onset. Sleep difficulties occur across anxiety disorders, but little is known about how the ERN relates to chronic sleep problems. The present study examines the relationship between sleep difficulties and the ERN, and how sleep difficulties and the ERN interact to predict anxiety severity. 225 females ages 8 to 15 completed self-report measures of sleep problems (PSQI) and anxiety (SCARED), and a Flankers task during EEG. An ERN regression-based difference score was used. Results suggested associations between the ERN and sleep duration, $r(225) = -0.13$, p = .023, daytime dysfunction, $r(225) = -0.12$, p = .038, and sleep quality, $r(225) = -0.15$, p = .012, such that a greater ERN related to less sleep, more daytime dysfunction, and worse sleep quality. A hierarchical regression indicated that sleep duration, daytime dysfunction, and sleep quality together uniquely predict the ERN, F_{change} (3, 216) = 3.41, p = .018, ΔR^2 = .044. There were also ERN-anxiety correlations such that a larger ERN related to greater social and total anxiety, and anxiety-sleep relations such that greater anxiety generally related to more sleep problems. Finally, there was a sleep quality-ERN interaction predicting total anxiety, such that the relationship between sleep quality and anxiety was significant only for those with a larger ERN, even controlling for depression. Thus, sleep problems may contribute to shaping the ERN in youth. Further research is needed on this relationship's direction to inform early anxiety treatments.

Funding: This work was supported the National Institute of Mental Health (NIMH): R01 MH097767 (PI: Hajcak).

Poster 1-085

ESTABLISHING NORMS FOR THE REWARD POSITIVITY (REWP) FROM CHILDHOOD TO OLDER ADULTHOOD IN A SAMPLE OF 3,222

Helena Renault[1]; Kreshnik Burani[2]; Emma Mumper[3]; Greg Perlman[3]; Katherine Jonas[3]; Roslyn Harold[4]; Greg Hajcak[2]; Daniel Klein[3]; Roman Kotov[3]; Autumn Kujawa[5]; Daniel Foti[4]; Annmarie MacNamara[6]; Anna Weinberg[1]
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Descriptors: Normative Data, Event-related Potentials, Reward Responsiveness

The RewP is an event-related potential that is sensitive to reward, and has been associated with multiple forms of psychopathology. The RewP is frequently used in individual difference research and has been proposed for inclusion in psychological assessment batteries, in hopes of improving accuracy and predictive ability, but population norms have yet to be established, making it difficult to define an abnormal RewP. The establishment of norms would not only help with assessments but also allow for novel recruitment techniques in research (e.g., recruiting based on RewP amplitudes). Moreover, since evidence suggests that the neural systems that generate the RewP change substantially across development, normative data for individuals at different developmental stages is critical. In this poster we will present normative data for the RewP measured from 3,222 participants from seven lab sites around North America, all of whom completed the Doors task, a standardized guessing task used to elicit the RewP. We will present overall norms, as well as norms stratified by gender, ethnicity, and developmental stage (i.e., childhood (4–9 years), early adolescence (10–12 years), middle adolescence (15–17 years), late adolescence/emerging adulthood (18–25 years), middle adulthood (25–50 years), and older adulthood (50–80 years) in order to offer benchmarks against which individual RewP amplitudes can be compared, thus facilitating classification efforts.

Poster 1-086

HEART RATE VARIABILITY MODERATES THE RELATIONSHIP BETWEEN TRAIT NEUROTICISM AND INCREASED DISTRESS SYMPTOMS DURING THE COVID-19 PANDEMIC

Aline Szenczy; Brady Nelson
Stony Brook University

Descriptors: Heart Rate Variability, COVID-19, Neuroticism

Early evidence suggests that life changes as a result of the novel coronavirus (COVID-19) pandemic have resulted in elevated depression and anxiety symptoms. There is a pressing need to identify *predictors* of within-person changes in psychopathology. Trait neuroticism and (low) heart rate variability (HRV) are both well-established transdiagnostic risk factors for psychopathology. The present study examined whether pre-COVID-19 trait neuroticism and/or (low) HRV predicted changes in psychopathology symptoms during the COVID-19 pandemic. The sample included 206 undergraduate students (M_{age} = 19.70, 75.7% females) at Stony Brook University in Long Island, NY. Between May 2018 and February 2020, participants completed the Big Five Inventory and Inventory of Depression and Anxiety Symptoms—Expanded Version (IDAS-II). Participants also had an electrocardiogram recorded during an eyes closed resting period. Between April 15th to May 30th, 2020 participants again completed the self-report IDAS-II. Participants reported increased distress and fear/obsession symptoms during the COVID-19 pandemic. Additionally, results indicated a Neuroticism X HRV interaction in relation to increased distress symptoms, such that greater neuroticism was associated with increased distress symptoms, but only in the context of low HRV. These results demonstrate that transdiagnostic psychological and autonomic biomarkers of risk interact to predict heightened psychopathology symptoms during the COVID-19 pandemic.

Poster 1-087

THE INTERACTION BETWEEN CARDIAC CYCLE AND PSYCHOPHYSIOLOGICAL PROCESSING OF AUDITORY TONES: AN ERP AND HEP STUDY

Yuto Tanaka[1]; Yuichi Ito[2]; Yuri Terasawa[1]; Satoshi Umeda[1]
[1]Keio University, [2]Kwansei Gakuin University

Descriptors: Interoception, Heartbeat Evoked Potential, Cardiac Cycle

An interoception is an ability to perceive an internal bodily state. Cardiac interoception is especially crucial since the cardiac cycle affects the perception of the affective stimulus, and interoceptive brain region activates when phase-shifted cardiac like rhythmical stimuli were presented. To examine the further interaction between the rhythmical signal of interoception and exteroception, we consider how the response to the auditory tones change by the phase of the cardiac cycle. We recorded event-related potentials (ERP) as the measures of perceiving auditory stimuli and heartbeat evoked potential (HEP) as the measures of afferent interoceptive signals. Participants conducted a simple oddball task, in which auditory stimuli were presented 10 ms after the r-peak was presented at Electrocardiogram (ECG) or shifted to the 200 or 500 ms after the r-peaks. ERP was recorded when participants listened to this auditory tone, while HEP was recorded based on the r-peaks after auditory stimuli were presented. At the parietal EEG channel, higher ERP amplitude was observed when the auditory tone was presented 500 ms after the r-peaks than 200 ms, which suggests that the phase of the cardiac cycle affects the perception of non-affective stimuli. The result of HEP amplitude showed the same tendency at the frontal channel, which its amplitude was higher when the stimuli were presented 500 ms after the r-peaks. These results indicate that the processing of interoceptive signals interacts with the processing of the exteroceptive stimulus.

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Poster 1-088

DOES ONGOING OSCILLATORY ACTIVITY PREDICT CORTICAL EXCITABILITY AND BEHAVIOR? ASKING 29 STUDIES AND 100,000 TRIALS

Andreas Keil; Kierstin Riels; Maeve Boylan; Matt Friedl
University of Florida

Descriptors: Brain Oscillations, EEG, Modeling

What is the role of ongoing oscillatory brain activity in perceiving and responding to a transient stimulus? Over the past decades, many competing views have been advanced to address this question. Hypotheses range from notions that consider ongoing brain oscillations as noise or idling signals to deterministic views in which instances of perception and behavior are strongly constrained by the phase or amplitude of ongoing oscillations in different frequency bands. Empirical observations reflect this lack of consensus, with conflicting findings seen in different paradigms, populations, and measurement modalities. Here, we address this issue using a meta-analysis across 29 EEG studies (n = 706 participants) of low-level perception, in which observers viewed Gabor patches. We implemented a hierarchical model that characterizes ongoing brain oscillations pre-stimulus and relates it on a trial-by-trial bases to electrocortical excitability (measured as visual evoked potentials) and behavioral performance (measured as detection and discrimination peed/accuracy). Across more than 100,000 trials of EEG, we found little evidence for a role of oscillatory phase in predicting behavior. We found however strong evidence for a predictive value of (a) the shape of the baseline power spectrum and (b) baseline inter-area, cross-frequency interactions on behavioral indices and cortical excitability, measured by evoked potentials. Computational models are discussed that use this information for testing fundamental hypotheses regarding the temporal organization of cognition and behavior.

Poster 1-089

CARDIAC TIMING MODULATES THE EFFECT OF THREATENING STIMULI ON RESPONSE INHIBITION

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Descriptors: Threat Processing, Response Inhibition, Cardiac Timing

Threatening stimuli are prioritized in information processing (Lang et al, 1998). Task-irrelevant threats induce motoric freezing and improve response inhibition (Grillon et al., 2017). Moreover, threat processing may vary with cardiac timing (Garfinkel et al., 2014). However, it is unclear whether cardiac timing influences the effect of threatening stimuli on response inhibition. Thirty (M_{age} = 19.3 years; 21 female) and 34 (M_{age} = 19.4 years; 29 female) subjects performed auditory choice reaction time (CRT) and Go/No-go (GNG) tasks, respectively. Task stimuli, and concurrent neutral and fearful faces were presented at cardiac systole or diastole. Errors in CRT responses and GNG No-go trials were submitted to 3 (no face, neutral or fearful face conditions) × 2 (cardiac systole or diastole) repeated measures ANOVAs. Although stimulus condition interacted with cardiac phase in both tasks, Fs > 4.05, ps < .026, error patterns were different between the two tasks. In the GNG task, fear faces decreased inhibition errors compared to neutral faces during diastole, $t(33) = -2.96$, $p = .018$, while inhibition errors did not differ between neutral and fearful faces during systole, $p = .45$. CRT errors were not influenced by emotional content at cardiac systole or diastole, ps > .64. These results suggest that task-irrelevant threatening stimuli selectively enhance response inhibition but not general sensorimotor processing. Importantly, these effects were specific to cardiac diastole. These findings highlight embodied threat processing and its effects on goal-oriented behavior.

Poster 1-090

RELATIONSHIP SATISFACTION MODERATES THE NEURAL RESPONSE TO HANDHOLDING IN THE ABSENCE OF THREAT

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University of Virginia

Descriptors: Social Touch, Relationship Satisfaction, fMRI

Handholding attenuates neural response to threat in the dlPFC, dACC, anterior insula, and hypothalamus. Without threat, brain activity in the occipital pole, lateral occipital cortex, and somatosensory cortex increases when experiencing or anticipating social touch. We investigated the neural circuits of social regulation in the *absence* of threat to determine the effects of supportive social contact on brain activity. Using functional magnetic resonance imaging (fMRI), blood oxygen level dependent (BOLD) activity was monitored in 26 participants as they held hands with their romantic partners and rested alone. Participants viewed a fixation cross while their partners viewed a computer monitor next to the scanner that alternated between displays indicating when the partner should hold or release the participant's hand. Relationship satisfaction was measured using the Dyadic Adjustment Scale (DAS). BOLD activity during handholding was compared with that during no handholding and a covariate model determined if handholding BOLD activity is associated with relationship satisfaction. Compared to no handholding, we found that handholding was associated with greater BOLD signal in the postcentral gyrus, precentral gyrus, lateral occipital cortex and temporal pole regions. Moreover, compared to no handholding, greater handholding BOLD activity in the occipital pole and lateral occipital cortex corresponded with higher self-reported relationship satisfaction, suggesting higher relationship satisfaction is associated with greater sensitivity to supportive social touch.

Poster 1-091

DISTINCT PUPILLARY AND NEURAL RESPONSES TO SEMANTIC AND SYNTACTIC VIOLATIONS IN SENTENCE PROCESSING

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Descriptors: P600, EEG, Pupillometry

There is a growing literature characterizing the cognitive utility of the pupillary dilation response (PDR). For example in psycholinguistics, the PDR has been used as an on-line measure of cognitive workload during sentence processing. In the current study, we simultaneously examined event-related brain potential (ERP) and PDR responses to pragmatic, morphosyntactic, and animacy violations during sentence processing in order to better characterize the neural correlates of the language-related PDR. In the ERP literature, semantic and syntactic violations yield dissociable N400 and P600 responses. Many have also documented the existence of a P600 response that is sensitive to animacy violations (i.e., the semantic P600). There is currently ongoing debate as to whether the semantic and syntactic P600 response are functionally dissociable, and whether these language responses are part of a broader class of P3b responses. We observed an N400 to pragmatic violations, and a P600 to both syntactic and animacy violations. However, the PDR only showed a sensitivity to animacy violations, suggesting a dissociation between the semantic and syntactic P600. We argue that this dissociation may reflect differential involvement of the locus-coeruleus norepinephrine system in resolving animacy violations, given the strong link between LC-NE activity and phasic pupil dilation. These findings suggest that the semantic and syntactic P600 may reflect functionally distinct neurocognitive processes.

Funding: NIA grant R01 AG026308.

Poster 1-092

PSYCHOPHYSIOLOGICAL EFFECTS OF PROSODY STYLE ON RADIO NEWS

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Descriptors: Prosody, Radio

Radio reaches 90% adults a week in the United States, and 25% of the audience gets information from the radio. These data show the relevance of effective news delivery. On the radio, this delivery depends on the broadcaster's prosody style. The goal of this study was to compare two different prosody styles and their effects on the listeners' cognitive processing by using psychophysiological measures. The first prosody style was the typical pattern that journalists usually employ in news bulletins, characterized by a sing-song intonation and fast speech rate (SS). The second one was a more paused style with a smooth intonation (SI). Two professional broadcasters (male and female) recorded six pieces of news in a bulletin with these two styles. Fifty subjects listened to these bulletins with the different patterns while we registered their heart rate and skin conductance. We also collected immediate recall and self-reported data after each message. As expected, the SI pattern achieved better results than the SS style. The skin conductance was higher for SI than SS. Visual inspection of the ECG signal showed larger deceleration for the SS condition. In the self-reported data, SI led to higher ratings in the effectiveness index, higher negativity, and lower positivity for two of the three message repetitions, but the SS condition was rated as more adequate. There was not an effect on recall. These results make us question if the current pattern to deliver the news is the most effective.

Poster 1-093

P3B AS AN ELECTROENCEPHALOGRAPHIC INDEX OF AUTOMATIC ASSOCIATIONS OF EXERCISE-RELATED IMAGES

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Descriptors: Physical Activity, Implicit Attitudes, Dual-process Models

Interest in automatic associations of exercise as contributors to behavior is rising. Yet, the measurement of these associations presents a challenge since the reliability and validity of behavioral tests is unsatisfactory. As a possible alternative, an EEG index (P3b amplitude) was examined in the present study. We used a mixed-factor design, with one group of insufficiently and one group of sufficiently physically active participants being compared across different experimental conditions. Thirty-seven insufficiently and thirty-six sufficiently active participants viewed exercise-related images presented within series of negative, neutral, or positive images and rated all images as negative (unpleasant) or positive (pleasant) while EEG recordings were obtained. The amplitude of the P3b ERP component, time-locked to the onset of exercise images in each context (series), was extracted as the dependent variable. Insufficiently active participants rated the exercise-related images as neutral-to-positive, whereas sufficiently active participants rated the images as positive. Yet, all participants exhibited the smallest P3b amplitude when the images were presented in the neutral context, suggesting the images were registering as neutral. Exercise-related images may evoke neutral automatic associations, but these associations may differ from how individuals explicitly rate the same images. P3b amplitude may be useful in detecting such discrepancies although, in the present study, it could not differentiate insufficiently physically active from sufficiently active participants.

Poster 1-094

TACTILE P300 TO UNPREDICTABLE ELECTRIC SHOCKS: ASSOCIATION WITH NEUROTICISM, INTOLERANCE OF UNCERTAINTY, AND ANXIETY SYMPTOMS

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Descriptors: Electroencephalography, Anxiety, Unpredictability

Anxiety disorders are primarily characterized by maladaptive cognitions and heightened emotional reactivity in anticipation of impending or potential threat (e.g., panic attacks, perceived judgment or embarrassment). The no, predictable, and unpredictable threat (NPU-threat) task is an experimental paradigm that has been used to examine attention and defensive motivation in anticipation of predictable vs. unpredictable threat. A growing literature suggests that heightened defensive motivation in anticipation of unpredictable (but not predictable) threat is associated with anxiety disorders and increased symptoms. Few investigations have examined whether a heightened response to the actual threat is also associated with anxiety-related phenomenology. The present study examined the relationship between the tactile P300 in response to shock delivery during the NPU-threat task and individual differences in neuroticism, intolerance of uncertainty, and anxiety symptoms. Overall, the tactile P300 was enhanced in response to unpredictable shocks relative to predictable shocks. Further, greater tactile P300 enhancement to unpredictable shocks was associated with greater neuroticism, intolerance of uncertainty, and anxiety symptoms. Tactile P300 enhancement to unpredictable shocks was not independently associated with any individual difference measure. The present study suggests that temporal unpredictability enhances attentional engagement to the actual delivery of threat, which is greater in individuals characterized by both broad and narrow anxiety-related phenomenology.

Poster 1-095: Late-breaking Student Poster

TARGET-DISTRACTOR SPATIAL AND FEATURE RELATIONSHIPS AFFECT ERP MEASURES OF ATTENTION: EVIDENCE FROM THE N2PC/P2PC, N2PB/P2PB, AND THE PPP

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Descriptors: Visual Spatial Attention, Visual Hemifields, ERPs

We examined differences in mechanisms of attention across upper vs lower hemifields using event-related potentials. The N2pc is thought to be larger for stimuli in the lower visual field (LVF) than for those in the upper visual field (UVF). Research in our lab found that UVF stimuli actually produce a positive contralateral response we called P2pc (rather than N2pc, for LVF attention). Here, a target and a salient distractor of varying similarity could be in the same vertical hemifield or different hemifields, with one lateral and one on the vertical midline to separate their lateralised activity. Each trial had six sequential visual search frames containing 12 stimuli (squares with a vertical or horizontal bar; 6 in each U/L VF; with zero, one, or two colored items among grey place holders). Subjects reported the number of frames with a target (a particular color and bar). When the lateralized item (target or salient distractor) was in LVF, N2pc was larger when the midline item was in UVF (vs. LVF). When the lateralized item was in UVF, the activity was slightly more positive when the midline item was in LVF. However, the contralateral and ipsilateral waveforms showed that the vertical position of the midline item strongly influenced the processing of the lateral item regardless of target-distractor similarity. The midline item added a bilateral positivity (P2pb, if in UVF) or negativity (N2pb, if in LVF) to lateral activity of the target or salient distractor, regardless of their similarity (same vs different color), followed by a posterior processing positivity (PPP).

Funding: The research was supported by grants from the Canada Foundation for Innovation, the Canada Research Chairs program, the Natural Sciences and Engineering Research Council of Canada (NSERC) awarded to PJ, and the Undergraduate Student Research Awards (from NSERC) awarded to MEP.

Poster 1-096: Late-breaking Student Poster

EXPLORING THE RELATIONSHIP BETWEEN INFANT RSA AND INFANT HR OVER TIME IN A SOCIOEMOTIONAL EXPERIMENTAL PARADIGM

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Descriptors: Physiology, Infant, RSA

This study explores intergenerational differences of physiological and psychological measures of prosocial behaviors. We compared the response trajectories of both heart rate (HR) and respiratory sinus arrhythmia (RSA), a measure of vagal activity in infants (N = 32) throughout the duration of a two-hour visit to the laboratory. Previous research suggests that infants typically show a decrease in RSA, release of the vagal break, along with an increase in HR during nursing (Suess, 2000). In this study, eight periods of activity were analyzed for patterns in RSA and HR. Repeated measures (RMANOVA) analyses reveal both HR and RSA change significantly over time during specific segments of our paradigm. Infants' RSA while breastfeeding was significantly lower than any other time point during the visit. In terms of heart rate (HR), infants showed a different pattern than RSA when compared to different segments of the visit, which include baseline, prosocial induction, infant heel prick, and nursing. Subsequent analyses will explore the relationship between infants and mothers' synchronous autonomic responses, as well as cortisol and oxytocin levels during different segments of the visit. Altogether, this exploration into the sympathetic and parasympathetic rhythyms of mothers and their babies sheds light on psychophysiological and neuroendocrine patterns during maternal and infant behaviors.

Funding: National Science Foundation BCS 1555596.

Poster 1-097: Late-breaking Student Poster

POST-TRAUMATIC STRESS SYMPTOMS PREDICT LATE POSITIVE POTENTIAL RESPONSE IN COCAINE USE DISORDER

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Descriptors: Late Positive Potential, Cocaine Use Disorder, Post-traumatic Stress

The late positive potential (LPP) is a measure of reactivity to emotional stimuli and is increased to unpleasant images in those with PTSD. As PTSD is comorbid with substance use, it is possible that PTSD symptoms also predict increased LPP to drug images in substance users experiencing PTSD symptoms. The current study investigated differences in the LPP to emotional and drug images in a cocaine-using sample. We recorded EEG on 43 participants diagnosed with cocaine use disorder while they viewed pleasant, unpleasant, neutral, and cocaine images. The pleasant images included subcategories of sweets, erotic scenes, and romantic scenes, while the unpleasant images included mutilations, accidents, and violence. We hypothesized that individuals with more PTSD symptoms, as determined by the PTSD Checklist (PCL-5), would have larger LPPs in response to unpleasant and drug images. We also explored whether specific PTSD clusters were associated with the subcategories. Linear mixed modeling revealed an interaction between PCL scores and image type (p = .008). The interaction indicated that individuals with higher PCL scores had greater reactivity to cocaine images (p = .04), but only marginally greater reactivity to unpleasant images (p = .06). Participants with intrusive thoughts and arousal symptoms were more reactive to mutilations and participants with negative alterations in mood symptoms were more reactive to cocaine images. The results indicate that PTSD is also related to reactivity to drug images in cocaine users and should be replicated in other substance use samples.

Funding: This poster was funded by the National Institute on Drug Abuse F32DA048542 and R01 DA039125-01A1.

Poster 1-098: Late-breaking Student Poster

THE EFFECT OF THE MAIN MELODY ON THE NEURAL PROCESSING OF HARMONIC SYNTAX: AN EXAMINATION OF A BASS MELODY SEQUENCE

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Descriptors: Early Right Anterior Negativity (ERAN), Event-related Potential (ERP), Music Perception

The early right anterior negativity (ERAN) is an event-related potential elicited by a harmonically irregular chord and thought to reflect syntactic processing in Western tonal music. A recent study proposed that the main melody influences the syntactic processing of harmony because the ERAN amplitude is larger when a pitch deviance occurs in the soprano voice part (main melody), compared to the other voice parts. However, it is also possible that the treble voice, rather than the main melody, affects the ERAN, as another line of research suggests that treble voices are processed predominantly in auditory sensory memory. In this study, we examined the effect of the main melody on ERAN amplitude by using chord sequences with a bass main melody. The final chord of a three-bar homophonic sequence was manipulated in six ways: an expected chord and five types of deviant chords, each of which had a pitch deviance in different voice parts: B (bass); TB (tenor and bass); SAT (soprano, alto, and tenor); ATB (alto, tenor, and bass); and SATB (all voice parts). Eleven musicians participated in the study. To examine the relative strength between the effect of the main melody and the effect of the treble voice, two deviant chords, SAT (an irregular chord without a pitch deviance in the melody part) and ATB (an irregular chord without a pitch deviance in the treble voice), were compared. The results showed that the ERAN amplitude was larger for SAT than for ATB, suggesting that the treble voice part influences the harmonic processing of music more dominantly than the main melody part.

Poster 1-099: Late-breaking Student Poster

PERCEIVED STRESS IS RELATED TO HYPOACTIVATION OF DIURNAL CORTISOL RHYTHM AND BLUNTED CORTISOL RESPONSE TO A COGNITIVE CHALLENGE

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Marquette Univeresity

Descriptors: Stress, Cortisol, MIDUS

In healthy individuals, cortisol secretion follows a diurnal rhythm, peaking approx. 30 min after waking and then steadily declining; in response to an acute stressor, cortisol increases. Prior research shows that perceived stress negatively impacts daily cortisol rise and its response to stress, although these studies have used small ($n < 25$) or convenience samples. We sought to validate this effect using two separate large, community-based samples. Data were obtained from the publicly-available MIDUS Boston Longitudinal of Cognition in Midlife Study. In $N = 87$, seven cortisol samples were collected before, during, immediately after, and 15, 30, and 45 min post cognitive challenge. In a separate group of $N = 95$, four samples were collected at waking, 30 min later, before lunch, and before bedtime. Current perceived stress was assessed in both groups. Latent growth mixture modeling was used in R (*lcmm*) to detect sub-group trajectories of cortisol in each sample; time of day of first sample was a covariate. BIC was used for model selection. Subgroups were assessed for differences in perceived stress. Two groups emerged in each sample—Diurnal cortisol rhythm: group 1 ($N = 80$) exhibited expected diurnal rhythm; group 2 ($N = 15$) exhibited hypoactivation. Response to stress: group 1 ($N = 22$) exhibited elevated cortisol immediately, 15, and 30 min post challenge; group 2 ($N = 65$) exhibited blunted response. In both samples, Group 2 reported more perceived stress (rhythm: $p = .002$; response: $p = .014$). We provide additional evidence that perceived stress negatively impacts cortisol secretion.

Funding: John D. and Catherine T. MacArthur Foundation. Research Network on Successful Midlife Development.

POSTER SESSION 2

Poster 2-001

LOSS OF CEREBRAL ARTERIAL ELASTICITY MAY BE CAUSALLY RELATED TO CHANGES IN WHITE MATTER AND ASSOCIATED AGE-RELATED COGNITIVE DECLINES

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Descriptors: Fluid Cognition, White Matter Integrity, Arterial Elasticity

A decline in cognitive function as a result of normal aging is well documented, with performance in measures of fluid cognition seemingly most affected. Alongside such declines we also see associated neural changes such as increases in white matter lesions, and recent work has added to this picture, providing evidence that a loss of elasticity in cerebral arteries is also associated with both factors. Here, we present a novel, yet simple method of charting cognitive and neural declines using a running average of standardised data from individuals sorted by age to assess trajectories of change in measures of fluid cognition, white matter integrity (as measured by white matter signal abnormalities; WMSAs), and widespread cerebral arterial stiffening (as measured by optical measures of pulse relaxation function; PReFx) in cross-sectional samples of individuals with age ranging from 18 to 80+. Analysis of these measures indicated that the decline of arterial elasticity becomes evident at about 50 years of age and precedes by a few years the increase in white matter lesions and change in fluid cognition, suggesting a potential Granger-like causal relationship between cerebrovascular elasticity, white matter integrity, and cognition. This is consistent with a cascade model proposing that changes in arterial function occurring in aging lead to changes in brain anatomy and cognition (Kong et al., 2020). Taken together these results provide target areas for interventions that may aid in the slowing of cognitive decline with aging.

Funding: This work was supported by NIA grant R01AG059878 to M. Fabiani and G. Gratton.

Poster 2-002

IMPROVEMENT THROUGH MOVEMENT: INVESTIGATING FITNESS, FUNCTIONAL CONNECTIVITY, AND COGNITION IN OLDER ADULTS

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Descriptors: Exercise, Cognition, Neuroimaging/fMRI

As the U.S. population has grown older, it has become crucial to understand age-related brain alterations in an effort to ameliorate and protect against decline. Physical activity (PA) acts on and benefits similar cognitive constructs commonly affected by aging. The purpose of this investigation was to determine if increased fitness lead to increased functional connectivity (FC), acting as neurobiological mediators between exercise and cognition. Seventy-seven older adults took part in either walking or stretching and toning exercise three times a week for six months, and had pre- and post-intervention MRI scans, fitness data, and behavioral data. Using multi-voxel pattern analysis, a region of the precuneus cortex had increased FC at a voxel level (height threshold $p < .001$, cluster threshold $p < .05$). Using the MVPA results as a seed, a post-hoc ANCOVA compared the two exercise groups. When the voxel level was $p < .001$, the walking group showed that regions of the precuneus network had increased FC to the MVPA precuneus seed compared to the stretching and toning group. In a double-mediator analysis, regressions showed that the walking group improved in fitness ($p = .02$) and FC in the right lateral occipital cortex ($p < .001$). Increased fitness did not lead to increased FC, as predicted, but as single mediators, they independently lead to better performance on an executive function task (fitness $p = .05$, FC $p = .02$). We hope to add to the understanding of the mechanisms by which PA protects and restores brain function, which could prevent and improve age-related cognitive decline.

Funding: Departmental funding stipend.

Poster 2-003

PHYSICAL ACTIVITY, BUT NOT VO2PEAK, PREDICTS CEREBROVASCULAR BLOOD FLOW AND OPERATION SPAN IN AGING FEMALES

Benjamin Zimmerman; Grace Clements; Daniel Bowie; Hannah Jones; Daniela Mejia; Samantha Rubenstein; Emily Erlenbach; Neha Gothe; Bradley Sutton; Kathy Low; Gabriele Gratton; Monica Fabiani
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Descriptors: Aging, Arterial Spin Labeling, Cardiorespiratory Fitness
Cerebrovascular health is an important predictor of cognitive integrity in aging, but the relative contributions of lifestyle factors and genetic predispositions are still debated. Magnetic resonance imaging (MRI) measures of perfusion are often used to study gross effects of aging on cerebrovascular health. However, sex differences in perfusion and VO_{2peak} (a standard measure of cardiorespiratory fitness) can complicate the interpretation of cerebral blood flow (CBF) measures. Here, we investigate how MRI measures of CBF, cerebral blood volume (CBV), and arterial arrival time relate to measures of cardiorespiratory fitness in a cohort of middle-aged to older adults (aged 51–70). CBF was significantly greater in females, while there was a trend of greater CBV in males. After splitting the sample by sex, we found that self-reported physical activity levels significantly predicted CBF in females. Further, in females, CBF significantly predicted performance on an operation-span executive function task. Interestingly, although VO_{2peak} was correlated with a separate estimated measure of cardiorespiratory fitness, which incorporated the physical activity scores, VO_{2peak} did not significantly predict CBF or cognitive performance. The results presented here demonstrate the importance of physical activity level as a key element in predicting cerebrovascular health and cognitive performance in aging and suggest that genetic factors that play a role in determining VO_{2peak} do not overshadow actionable habits in promoting long-term health in aging.

Funding: This work was supported by NIA grant R01AG059878 to M. Fabiani and G. Gratton, and a Beckman Institute Postdoctoral Fellowship (University of Illinois at Urbana-Champaign), with funding provided by the Arnold and Mabel Beckman Foundation, to B. Zimmerman.

Poster 2-004

THE PD COMPONENT REFLECTS DISTRACTOR INHIBITION WITHIN AND OUTSIDE OF THE FOCUS OF ATTENTION

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Descriptors: P_D Component, Distractor Suppression
P_D components in visual search tasks are believed to reflect distractor suppression. This hypothesis was recently challenged by Kerzel and Burra (2020), who observed a contralateral negativity (N2pc) following the P_D to lateral distractors, which is at odds with theories of distractor suppression because it suggests that attentional capture occurs after successful distractor suppression. These authors proposed that small search displays where all locations are potentially task-relevant are scanned systematically, beginning with lateral items, and that the P_D might actually be an N2pc elicited when the context item opposite to the distractor attracts attention. We tested this hypothesis, using a paradigm similar to Kerzel and Burra (2020), with two lateral and two midline items, including a salient distractor. In separate blocks, the target was either always on the midline (focused attention), or could appear at any position (diffuse attention). Critically, we observed P_D components to lateral distractors not only in diffuse attention blocks, but also in focused attention blocks, where participants had no reason to scan lateral items. Systematic scanning resulting in the selection of a lateral context item opposite to a salient distractor therefore cannot explain the P_D component elicited with small set search displays. Instead, our results suggest that the P_D reflects distractor inhibition processes that are triggered by salient distractors even when they appear at task-irrelevant unattended locations.

Funding: We acknowledge the support of the Natural Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellowships program, the Fonds de recherche du Québec—Nature et technologies (FRQNT) Postdoctoral research scholarship program, and grant ES/R003459/1 from the Economic and Social Research Council (ESRC), UK.

Poster 2-005

INTERACTIONS OF TRANSIENT AND OSCILLATORY EVOKED POTENTIALS DURING VISUAL SEARCH: REVISITING THE CLASSICAL SUPERPOSITION THEORY WITH STEADY STATE VISUAL EVOKED POTENTIALS (SSVEPS)

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Descriptors: Visual Search, Superposition Theory, ssVEP
Superposition theory of oscillatory evoked potentials proposes that transient evoked potentials summate linearly, contributing to the generation of oscillatory evoked signals such as the steady state visual evoked potential (ssVEP). Very little research has tested this empirically due to experimental challenges. The current study revisited the superposition theory as an explanation of ssVEP signal generation in a visual search task, capitalizing on a lateralized ERP component, the N2pc. One target (capital "T") and three distractors (capital "L") were embedded in flickering checkerboards in the four cardinal positions (right/left/bottom/top) that were frequency-tagged, evoking target and distractor-specific ssVEPs. Interactive effects of transient N2pc on ssVEP evolution, if any, are expected for lateral positions due to the lateralized nature of N2pc, while ssVEP enhancements to attentional biases are non-specific to spatial target position. Data (n = 25) supported the hypothesis of interactive effects: amplitude, but not phase, of the ssVEP response to lateral targets was enhanced compared to distractors and compared to medial targets. These findings do not support the classical superposition theory due to (a) timing differences of N2pc and ssVEP windows, (b) the inherent problem that N2pc is not actually 'repeated' to generate ssVEPs. However, they do implicate transient ERP influence on ssVEP amplitude changes due to attentional demands. Future work should be devoted to revising the mechanistic conceptualization of the superposition theory through empirical examination.

Funding: The current work was funded by the National Institute of Health (R01-EY025275, R01-EY019882, R01-MH110378, and P30-EY08126) awarded to Geoffrey F. Woodman, who provided laboratory space and assisted with the experimental design.

Poster 2-006

ALCOHOL HANGOVER AND REDUCED P300 TO FEEDBACK IN A GAMBLING TASK

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Descriptors: P300, Alcohol, Feedback
Alcohol intoxication and the subsequent hangover have been related to deficient attentional allocation and decision-making abilities. These prolonged reductions in executive functioning have been shown behaviorally, as well as with event-related potentials (ERPs). One study found that individuals have blunted reward-related activity (i.e., reward positivity or RewP) on the day following alcohol consumption, compared to controls that did not drink on the previous day. Another study found reduced amplitude of the P300 response in an alcohol hangover versus non-hangover state. These findings suggest prolonged attentional deficits on the day following alcohol consumption. However, no prior ERP studies have explored the within-subject changes in reward-related activity between an alcohol hangover and non-hangover state. The current study included 16 undergraduate students and examined ERPs following reward and loss feedback the day following alcohol consumption and on a control day, in a counter-balanced order. Reduced P300 amplitude to outcome feedback (i.e., across both win and loss feedback) was observed on the day that followed alcohol consumption; no differences in the RewP were observed between the two assessments. The present findings provide further support for attentional deficits to outcome feedback evaluation following alcohol consumption. Results suggest those experiencing an alcohol hangover may have reduced attentional allocation to feedback and could be at increased susceptibility for risky behavior.

Poster 2-007

INFORMATION FLOW OF THE RIGHT ANTERIOR INSULA REVEALED BY FMRI-CONSTRAINED EEG SOURCE ANALYSIS

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Descriptors: Stimulus-Preceding Negativity (SPN), Anticipation, Connectivity
We aimed to elucidate the information flow from and to the right anterior insula (rAntIns) during anticipation of a feedback stimulus. We conducted two separate electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) experiments, and performed an fMRI-constrained EEG source analysis of the connectivity using Granger Causality Analysis (GCA). Participants were 29 and 31 healthy adults for the EEG and fMRI experiments, respectively. They performed a time estimation task, where they had to press a button 4 s after a cue stimulus. A feedback stimulus was presented 2 s after the button press to inform participants if the button press was correct or incorrect. There were two experimental conditions: Feedback (FB) condition and No Feedback (NoFB) condition as a control condition where the feedback stimulus was omitted. In the fMRI-constrained EEG source analysis, we modeled the sources of the EEG in the following seven regions identified in the fMRI analysis: rAntIns, ACC, left AntIns, midcingulate cortex, precuneus, left middle occipital gyrus, and right middle occipital gyrus. The present results showed that the connectivity from the seven regions to the rAntIns was stronger than that from the rAntIns. These results suggest that the rAntInsula receives information from the seven regions rather than the rAntIns sends information to the seven regions in order to send interoceptive prediction.

Poster 2-008

MEDIAL PREFRONTAL CORTEX AND POSTERIOR CINGULATE SUPPORT THE VISUOCORTICAL REPRESENTATION OF COMPETING STIMULI: EVIDENCE FROM CONCURRENT FREQUENCY TAGGING AND HEMODYNAMIC RECORDINGS

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Descriptors: Emotion, fMRI, EEG
Sensory systems must prioritize information based on behavioral goals while remaining sensitive to intrinsic biological relevance. Signals from the amygdala are thought to selectively amplify visuocortical representations of arousing biologically-relevant stimuli. More recent evidence, however, suggests that fronto-parietal cortical networks and the anterior insula may provide bias signals, and their precise contributions may depend on task-demands and stimulus characteristics. To investigate the brain regions involved in selecting task- and biological-relevance, concurrent hemodynamic and evoked electrocortical potentials were recorded while participants reported instances of coherent motion of a random-dot kinematogram overlaid on a picture varying in emotional content. These two concurrently presented stimuli flickered on-and-off at separate frequencies to drive two steady-state visual evoked potentials (ssVEPs) which quantify independent measures of visuo-cortical engagement. Replicating previous work, when background pictures were arousing, dot-evoked ssVEPs were diminished during an early time-window while picture-evoked ssVEPs were enhanced for the late time-window. For negative arousing pictures, the interaction between dot- and picture-evoked ssVEPs during the late time-window predicted blood-oxygen changes in the calcarine fissure, posterior cingulate, and medial prefrontal cortex. These regions may communicate with visuocortical regions to maintain representations of competing task- and biologically-relevant stimuli.

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Poster 2-009

FEELING OF STRANGENESS AND COGNITIVE PROCESS DURING A MATCH-MISMATCH TASK: AN EVENT-RELATED POTENTIAL (ERP) STUDY

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Hiroshima University

Descriptors: ERP, Feeling of Strangeness, Match-Mismatch Task
The feeling of strangeness might indicate that something is not right, which could be caused by inconsistency between stimuli (Kawabata, 2006). We investigated the cognitive processing of inconsistency between stimuli during a face-matching task by using ERP. It is known that N2 amplitude is larger for deviant stimuli than for standard stimuli, and the N400 relates to semantic unpredictability in the context. University students ($N = 21$, 11 females, mean age 20.7 ± 0.7 years) participated in this study. Participants judged whether two facial pictures were matching or not by pressing different keys (S1-S2 paradigm). We presented three conditions, consisting of the fully-matching (S2 is identical to S1), the matching (mismatching-nose, mismatching-mouth), and the mismatching (fully-mismatching, mismatching-eyes) conditions. S2 pictures were presented in a pseudorandom order. We conducted a one-factor (3 conditions) repeated measures ANOVA for the correct response rate, reaction times (RTs), and ERP amplitudes. We recorded the EEG from 26 scalp sites. Results indicated that the correct response rate decreased and RTs increased in the fully-matching and the matching conditions compared to the mismatching condition ($ps < .01$). The amplitudes of N2 ($p < .10$) and N400 ($p < .05$) increased for mismatching key-responses, compared to matching key-responses, irrespective of the conditions. We suggest that matching stimuli with inconsistencies that are challenging to detect might be related to the feeling of strangeness. Moreover, N2 and N400 could be an index for detecting feelings.

Poster 2-010

FUNCTIONAL SKIN IMAGING: TOWARDS CONTACTLESS ESTIMATION OF ELECTRODERMAL ACTIVITY CORRELATES

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Descriptors: Skin Conductance, Contactless, Autonomic Nervous System
Under suitable environmental and lighting conditions, changes in the electrodermal activity (EDA) of skin become clearly visible in video frames captured using a regular RGB camera. These visible effects are due to the appearance of micrometre sized sweat droplets on the surface of the skin. These tiny surface sweat droplets are a result of the eccrine sweat gland function being modulated by the sympathetic nervous system (SNS). The aforementioned effects are seen as specular dots in the video frames and are quite well pronounced. Therefore, simple statistical analysis of the video frames can be used to quantify said effects. To this end, a study with a well-planned paradigm which included a mix of audio-visual and physical stimuli, was conducted. EDA was recorded from the palm of the non-dominant hand along with video frames of the same under quickly varying lighting conditions. Following analysis showed that a metric derived from structure tensor (also known as second moment matrix), which we call *specular activity*, shows good relation to the EDA data from electrodes which are placed in contact with skin. This metric also reflected changes in the phasic EDA at various points. Such contactless methods can be useful for evaluating autonomic nervous system function in situations where contact-based methods may not be suitable.

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Poster 2-011

COMPUTATIONAL MODEL OF DISTINCT CONTROL SYSTEMS THAT REGULATE PAIN AND OTHER COSTS IN THE BRAIN

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University of Victoria

Descriptors: Cognitive Control, Pain, Computational Model
The anterior cingulate cortex (ACC) has been investigated extensively in the last two decades. Recent theories of ACC function propose that this brain region plays a key role in effort and pain processing. Various types of effortful costs, like pain and monetary losses, are represented by a single reinforcement signal in standard reinforcement learning (RL) theories. By contrast, we propose that distinct control systems in the brain process these costs and that there is something unique about pain that makes its modulation different and more computationally challenging. We proposed a computational model of ACC function by applying a recent effortful control model of ACC to the domain of pain processing. We asked subjects to execute a task that required them to withstand immediate punishments in order to attain long-term rewards. We extended an existing hierarchical RL model (HRL-ACC) to address the distinction between effortful control signals that suppress the costs associated with physical punishments and monetary losses when achieving long-term goals. Our model successfully captured modulation of control throughout the task as the need for control varied. It also distinguished between choice behavior and response times for tasks involving pain vs. monetary loss, even when these costs were equated to have equal subjective values. As frontal midline theta (FMT) is known to be the signature of cognitive control, future studies could examine how well the model predicts FMT activity in the ACC during EEG experiments that require pain management or effortful decision-making.

Funding: Natural Sciences and Engineering Research Council (NSERC).

Poster 2-012

IMPACTS OF RECRUITING ATTENTIONAL CONTROL WHILE ENGAGING IN THREAT PROCESSING IN TRAUMA EXPOSED ADULTS

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Descriptors: Attentional Control, N2, PTSD
Poor attentional control (AC), particularly in threatening emotional contexts, is associated with Post-traumatic stress disorder (PTSD) symptoms. Thus, training patients to recruit AC while processing threat stimuli may improve PTSD symptoms. In this study, the N2, a negative-going event-related potential sensitive to AC demand, was used to test the impact of training trauma-exposed individuals to recruit AC during threat vs. non-threat stimuli. 26 trauma-exposed adults were randomized to one of two conditions in which a flanker task (50% congruency) was overlaid on fearful and happy faces (50% for both). In the threat condition, 85% of the incongruent (IC) and congruent (CO) stimuli were overlaid over fear and happy faces, respectively. In the non-threat condition, pairings were reversed. To test for AC+emotional (ACE) context learning, a test block at the end of the training used novel fear/happy faces and 50% IC/CO stimuli were overlaid over both emotions. The training condition*emotion*congruency interaction was non-significant. However, there was an interaction between congruency, training condition, and PTSD symptoms. Greater symptoms were associated with an enhanced N2 congruency effect in the threat condition, but reduced effect in the non-threat condition. Learned ACE context associations were not found in the N2 amplitude during the test block. However, PTSD symptoms moderated AC recruitment during the test block differentially by training condition, possibly reflecting greater AC demand in the threat vs. non-threat conditions for those with elevated symptoms.

Poster 2-013

A REVIEW OF EVENT-RELATED POTENTIAL STUDIES ON THE EFFECT OF BILINGUALISM ON EXECUTIVE CONTROL

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University of Cyprus

Descriptors: Bilingualism, Executive Control, Event-related Potentials
It has been proposed that bilingualism enhances executive control (EC), a cognitive system that includes switching, working memory and inhibition. This advantage has been argued to stem from bilinguals' everyday experience in using EC to manage two language systems in the mind and brain. We review 23 published studies (until August 2019) on the effect of bilingualism-related aspects on EC using Event-Related Potentials (ERPs). The majority of these studies focused on the N2 (n = 18) and P3 (n = 15), even though other components have been also investigated (e.g., ERN, N450, N1, P2). Most studies compared groups of bilinguals and monolinguals (n = 20), included young adults (n = 21) and used inhibition tasks (n = 17; e.g., Go/No Go). Our review suggests that there is some consistency only in the findings showing that bilingualism-related experiences are associated with a more negative and earlier N2 and a less negative ERN. There is also some evidence that these effects reflect enhanced functioning (i.e., ERP results were related to more accurate and/or faster behavioral performance). However, these results are still not conclusive. First, a non-negligible number of studies do not report these effects (especially for the N2). Second, various methodological issues limit the conclusions we can draw: low statistical power, task-specificity of the reported effects, non-sensitivity of the ERP measures to task manipulations related to EC and presence of confounds (e.g., no control of group differences in immigration and socioeconomic status). We make related recommendations for future research.

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Poster 2-014

THE RELATIONSHIP BETWEEN THE ERROR-RELATED NEGATIVITY AND GRAY MATTER VOLUME IN INDIVIDUALS WITH HIGH TRAIT ANXIETY IS MODERATED BY SEX

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Northern Michigan University

Descriptors: Error Monitoring, Anxiety, Structural MRI
Enhanced error monitoring is associated with anxiety. This has been consistently demonstrated in its most reliable electrophysiological index, the error-related negativity (ERN), such that increased ERN is related with elevated anxiety symptomology. Recently, this relationship has been suggested to be moderated by sex. However, this moderation effect remains equivocal. Therefore, the present study investigated whether gray matter volume (GMV) relates to sex differences in error monitoring in individuals with high trait anxiety. Error monitoring was measured (via ERN) while individuals performed a Flanker task, during which they were asked to respond to the target at the center and ignore the peripheral irrelevant stimuli. ERP amplitudes were extracted separately for correct and incorrect trials, and the amplitude difference between them was used as the index of error monitoring during the task (i.e., ΔERN). To obtain GMV, whole brain structural T1-weighted MRI scans were conducted within a week (before or after) the flanker task, and then voxel based morphometry (VBM) was used for the voxel-wise measurement. The results showed a sex-specific relationship between ΔERN amplitudes and GMV in the anterior cingulate cortex (ACC) and an extended error monitoring network, including brain regions such as precentral gyrus and superior frontal gyrus. Our findings are in accordance with an ACC extended network serving as the neural substrate of error monitoring. It also provides further evidence for sex-specific associations with brain structures related to error monitoring.

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Poster 2-015

HEART RATE VARIABILITY AND IMPULSIVENESS: PREDICTING PHYSICAL AGGRESSION

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Descriptors: Heart Rate Variability

Impulsiveness is characterized by acting spontaneously, without prior planning or thought of consequences. High impulsivity influences a variety of problematic behaviors including substance use, risk-taking, and physical aggression. Heart rate variability (HRV) is a non-invasive index of self-regulation and has been linked with impulse control. The following investigation examines the association between resting HRV and self-reported impulsiveness. In a sample of 164 subjects (59% female, mean age 19), the root mean square of successive differences (RMSSD) was assessed during a 5-min baseline period as the index of resting HRV. Subjects then completed the 30-item Barratt Impulsiveness Scale (BIS-11), a measure of impulse control which has exhibited sensitivity to individual differences in levels of aggression (e.g., differing significantly between violent and non-violent criminal offenders). HRV was negatively associated with total BIS scores ($r = -.15$, $p = .02$) and attentional ($r = -.23$, $p < .01$), self-control ($r = -.18$, $p = .02$), and non-planning ($r = -.20$, $p < .01$) subscales. These novel results provide a deeper understanding of the association between resting HRV and impulsiveness; HRV may serve as a biomarker for unpredictability in controlling thoughts and focusing attention. Importantly, HRV may predict perseverant impulsiveness (lack of self-discipline). Such data have real-world implications, as HRV may be used to identify more impulsive and aggressive individuals within important societal roles such as policing; additional research is warranted in this regard.

Poster 2-016

EEG MEASURES OF CONFLICT ADAPTATION IN WORKING MEMORY

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Descriptors: Conflict Monitoring, Working Memory, EEG

WM is conceived as a system for short-term maintenance, updating and manipulation of representations required for goal-directed action. Conflict adaptation refers to the finding of flexible adjustments of control processes in face of conflict. For instance, conflict on the previous trial leads to a higher level of cognitive control on the current trial (congruency sequence effect, CSE). The present study considered behavioral data and event-related potentials (ERPs) to investigate whether conflict adaptation is elicited by conflict during WM retrieval in a modified Sternberg paradigm. Participants had to perform a recognition task on two differently colored memory lists with four digits each (i.e., 2 5 7 1 and 4 5 9 1). Each list contained two congruent items (the same digit at corresponding positions) and two incongruent items (different digits at corresponding positions). Incongruent items are supposed to evoke retrieval conflict as retrieving these digits from WM is subject to interference from the corresponding digit in the alternative list. Behavioral data indicated a conflict adaptation effect, that is, responses to incongruent probe items were slower and this congruency effect was reduced following trials with incongruent probe items. In ERPs, conflict adaptation in WM was associated with a modulation of a frontal slow wave. These results demonstrate that conflict in WM retrieval leads to an adaptation of control processes and link the respective mechanism to WM-related neural activity.

Funding: German Research Foundation.

Poster 2-017

THE IMPACT OF SYMPTOMS OF DEPRESSION AND FEAR OF NEGATIVE EVALUATION ON SOCIAL ECONOMIC DECISION-MAKING

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Descriptors: Emotional Feedback, Ultimatum Game, Individual Differences

Emotional feedback in social decision-making situations is an important aspect of human social interaction. In addition to existing research on the influence of approach- and avoidance-related personality traits, we investigated the role of subclinical depression and fear of negative social evaluation in a modified ultimatum game. Here, proposers reacted with different facial expressions to the acceptance and rejection of monetary offers in the ultimatum game. In this context, the following facial expressions were particularly relevant for subclinical depression and fear of negative social evaluation: Firstly, a smile in response to acceptance; secondly angry and sad feedback in response to rejection. While participants with stronger symptoms of depression rejected more offers as the size of the offer increased, participants with greater fear of negative evaluation accepted more of the relatively higher offers. At the neural level, positive emotional feedback (i.e., a smiling face) was associated with a reward positivity that did not occur in participants with higher symptoms of depression. In individuals with higher fear of negative evaluation, we found that the P2 amplitude was enhanced after ultimatum game offers, especially when they interacted with proposers who reacted angrily in case of rejection. The results suggest specific behavioral as well as neural response patterns that can be used for a subclinical differentiation of depression and fear of negative evaluation.

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Poster 2-018

INTEROCEPTIVE AWARENESS MAY TRIGGER ERROR POSITIVITY ON PARTIAL ERROR TRIALS

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Descriptors: Interoceptive Awareness, Error-related Negativity, Error Positivity

Recent studies have suggested that both error-related negativity (ERN) and error positivity (Pe) may be modulated by interoceptive awareness. It remains unclear whether interoceptive awareness can trigger error monitoring in partial-error trials that are behaviorally classified as correct trials but preceded by covert muscular activities. We addressed this issue by recording electromyograms to detect partial errors. Thirty-two participants performed a spatial Stroop task in three conditions. In the punishment condition, error responses were penalized (10 yen per error), whereas in the reward condition, correct responses were rewarded (10 yen every 4 accumulated corrects). In the neutral condition, participants neither lost nor earned money due to their performance. They performed 4 blocks of 72 trials in each condition. According to the scores of a heartbeat counting task (HCT), we recruited participants high in interoceptive awareness ($N = 12$) and low in interoceptive awareness ($N = 12$). Individuals high in interoceptive awareness exhibited larger ERNs than individuals low in interoceptive awareness on overt error trials. Pe amplitudes did not differ between the groups in overt error trials. ERN elicited by partial errors did not differ between the groups. However, Pe amplitudes on partial error trials were larger for individuals who were high in interoceptive awareness. These results suggest that the trait of interoceptive awareness may be associated with triggering error awareness.

Poster 2-019

AGE-RELATED DIFFERENCES IN VISUAL OBJECT RECOGNITION IN CHILDREN

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Descriptors: Visual Perception, Neuropsychological Assessment, Children
Processing of visual information involves different brain mechanisms. The goal of this study was to check hypothesis that brain mechanism responsible for recognizing overlapping objects is maturing earlier in children than brain mechanism responsible recognizing incomplete objects. The sample consisted of 54 7-years-olds and 48 9-years-olds. We used Visual Recognition Tasks. A first task investigates the recognizing overlapping objects. Second task requires recognition of incomplete visual objects. Multilevel modeling was used to address the study hypotheses, with the amount of correct identified objects as the dependent variable, with age as between-participants factors and the task condition type as levels of repeated within participant factors. The main effect of age was significant $F(1, 100) = 50.21$, indicating that there are age-related differences in visual recognition between two age groups. The main effect of type task was also significant $F(1, 100) = 35.52$, indicating that children had better results for identification of overlapping objects. Most interestingly, we have revealed significant interaction between type of task and age $F(1, 100) = 24.88$. 9-years-olds had better results for identification of incomplete objects in comparison to 7-years-olds. However, we did not find the same tendency between these age groups for identification of overlapping objects. It can be assumed that brain mechanism responsible recognizing overlapping objects is maturing earlier than brain mechanism responsible for recognizing incomplete objects.

Poster 2-020

NEGATIVE ALTERATIONS IN COGNITION AND MOOD MODERATE STRESS-RELATED THETA RESPONSE CHANGES IN TRAUMA EXPOSED INDIVIDUALS

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Descriptors: Trauma, Affect, Cognition
Existing literature suggests acute stress influences the etiology and maintenance of PTSD symptoms (PTSS; Kellner et al., 2018). Thus, understanding and targeting the mechanisms responsible for elevated PTSS within the context of acute stress is imperative. Growing evidence suggests that individuals with deficits in facets of cognitive control may be more vulnerable to PTSS (e.g., Aupperle et al., 2012). Frontal midline resting theta power, which is believed to be an index in the need to engage cognitive control, may be related to PTSS (Begic et al., 2001; Cavanagh & Frank, 2014; Katrin et al., 2017), however research on this relationship within the context of acute stress is lacking. The current study explored how PTSS clusters moderate changes in theta power in response to a stress induction. Trauma-exposed participants ($N = 91$) completed two resting tasks, one as a baseline measurement and one after completing a lab-induced stressor. Repeated measure analysis of variance was used to analyze interactive effects of PTSS clusters on changes in theta power from pre- to post-stress. Results indicated negative alterations in cognition and mood (NACM) significantly moderated an increase in resting theta power after stress induction, $F(1, 85) = 5.46$, $p = .02$. Traumatic intrusions, hyperarousal and avoidance symptoms did not moderate this change. It is plausible that increased sensitivity for the need to use cognitive control during stressful experiences, as measured by frontal midline theta, contribute to negative alterations in cognition and mood in trauma-exposed individuals.

Poster 2-021

INVESTIGATING THE ROLE OF HORMONES IN THE ASSOCIATION BETWEEN WORRY AND THE ERN

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Michigan State University

Descriptors: Hormones, Error-related Negativity, Worry
Previous work has revealed that worry relates to a larger error-related negativity (ERN) in women. The mechanisms underlying this association remain unknown, but emerging evidence from animal models point to the potential role of ovarian hormones. Studies have yet to investigate the moderating role of hormones on the worry-ERN association, however. To test this, the current study sought to examine both between- and within-person interactive effects of worry and ovarian hormones to predict the ERN. Across four timepoints, 136 female participants completed a Flanker task, provided saliva samples from which estradiol and progesterone were extracted, and completed the Penn State Worry Questionnaire. To assess our aims, two multi-level models were conducted with between- and within-centered predictors of the ERN. Models of between person effects revealed worry relates to a larger ERN when progesterone was high, and a smaller ERN when progesterone was low. Conversely, we found that worry predicted a larger ERN when estradiol was low, but not when estradiol was high. Models testing within person effects revealed that hormones did not interact with worry to predict the ERN. Results showcase the importance of considering both average and varying levels of hormones for a better understanding of women's mental health.

Funding: The Brain Cycle Study is funded by the National Institute of Mental Health (NIMH; grant number: 1R01MH108511-01).

Poster 2-022

IS OUR PHYSIOLOGICAL SYNCHRONY IN PHASE? THE STUDY OF TWO COUPLE'S EMOTIONAL REACTIVITY THROUGHOUT A DYADIC SUPPORT EXPERIMENT

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Descriptors: Emotional Reactivity, Dyadic Support, Physiological Synchrony in Couples
Physiological synchrony in couples is linked to various intra-and interpersonal processes, such as conflict and emotional reactivity, as well as social support and empathy. Moreover, interpersonal touch is associated with increased in-phase physiological synchrony (e.g., similar changes in arousal) between romantic partners, suggesting that touch promotes mutual comfort. However, romantic support is not always soothing, including in couples where one partner lives with chronic pain. In this study, we examined how the variability in physiological synchrony in the context of interpersonal touch can be understood via an examination of the underlying relational and psychological processes in couples where one partner is living with chronic pain. Using a single-case repeated measures design, two couples watched a chronic pain and a neutral video during which they alternated every 2.5 min between holding and not holding each other's hand. Skin conductance level was recorded throughout the experiment. Compared to the couple who demonstrated consistent physiological synchrony during hand holding, the couple who demonstrated inconsistent physiological synchrony reported higher attachment anxiety or attachment avoidance in both partners, as measured by the Experiences in Close Relationships Scale, and greater difficulties with emotional regulation, as measured by the Difficulties in Emotional Regulation Scale. Our findings demonstrate that some couples have a shared emotional reactivity during interpersonal touch, and some do not, and this may be explained by attachment theory.

Funding: An internal operating grant was received from the Institut du savoir Montfort to conduct this research.

Poster 2-023

DO THE COMMUNICATION PATTERNS IN MY ROMANTIC RELATIONSHIP IMPACT HOW I FEEL WHEN PROVIDING SUPPORT TO MY PARTNER WITH CHRONIC PAIN?

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University of Ottawa

Descriptors: Chronic Pain, Couples, Psychophysiological Reactivity

Positive interactions in a romantic relationship are important to the well-being of those living with chronic pain (Burns et al., 2018), yet communication is not always positive (e.g., mutual discussion and expression) and can be destructive (e.g., demanding and withdrawing; Futris et al. 2010). Research shows that destructive communication can lead to relationship distress in both partners (Eftekhari et al., 2018), but little is known about how communication can affect the caregiver from a psychophysiological perspective. The aim of this study was to examine the association between self-report communication patterns used during conflict, as measured by the Communication Patterns Questionnaire-Short Form (CPQ-SF) and psychophysiological reactivity in the caregiver. We predicted that the inter-beat intervals (IBIs) would be shorter in caregivers who report more negative communication, and longer in caregivers who report more positive communication when providing contact comfort during a stressful condition. A single case repeated measures design was used where 6 couples watched a stressful chronic pain video during which the partner alternated every 2.5 min between holding and not holding the patient's hand. IBIs were recorded throughout the entire experiment. The majority of participants reported more positive communication patterns while IBI tended to vary when holding versus not holding the partner's hand. Findings suggest that whether caregiving is distressing or not might depend on different combinations of positive and negative communication patterns.

Poster 2-024

IMPLEMENTING A NOVEL ERP VERSION OF THE EEFRT IN A STUDY OF REWARD-RESPONSIVITY: A PILOT STUDY

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Descriptors: EEfRT, Win-probability, Event-related Potentials (ERPs)

The Effort Expenditure for Reward Task (EEfRT) is a behavioral paradigm that assesses effort-based decision making, in which greater rewards require greater effort. Although the EEfRT has been repeatedly and reliably used in empirical research, electrophysiological responses (such as ERPs) on this task have been neglected, and the neural underpinnings of performance are not yet known. Here, we report a novel version of the EEfRT that allows for the extraction of decision-based ERPs. We explore (a) how reward-responsivity influences decision-making in the EEfRT, (b) the neural correlates of decision-making in the EEfRT, (c) the effectiveness of an ERP version of the EEfRT in a laboratory experiment, and (d) associations between self-reported personality traits and behavior. Twenty-eight participants completed a battery of self-report questionnaires, followed by the EEfRT. Participants were most likely to choose the hard task when there was an 88% chance of winning and least likely to choose the hard task when there was a 12% change of winning. Using a temporal principal component analysis to extract ERPs, we observed a factor corresponding to the P3a that was significantly sensitive to win-probability; this P3a was largest on 12% trials and smallest on 50% trials. Elevated depressive symptoms were associated with more hard task choices on 88% (vs. 50%) trials and a reduced P3a on 88% (vs. 50%) trials. Although our results are preliminary, we replicate behavioral findings and additionally identify an ERP component sensitive to win-probability.

Funding: This research was funded by the University of Southampton.

Poster 2-025

INFLUENCE OF RESTING HEART RATE VARIABILITY ON AFFECT PROCESSING IN DIFFERENT INDUCTION CONTEXTS

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University of Potsdam

Descriptors: HRV, Emotion, Startle

Heart rate variability (HRV) is considered as a psychophysiological index of individual adaptability to changing environmental demands. Supporting this view, previous studies observed that low HRV scores are related to dysfunctional processing of neutral images in the context of an emotional passive picture viewing task, as measured by the startle response. Based on these findings, we investigated whether altered affect processing in individuals with low HRV levels extends across emotion induction contexts (i.e., visual and auditory perception, imagery). In a within-subject, counterbalanced design, healthy participants (N = 64; mean age = 23 years) were presented with pleasant, unpleasant, and neutral images, sounds and imagery scripts. During emotion induction, the subjective report of perceived valence and arousal as well as the startle reflex, electrodermal activity and heart rate were measured. Preliminary results replicated the emotional modulation of the startle reflex (magnitude increased in unpleasant context, reduced in pleasant context), particularly during visual and auditory perception. An effect of HRV as a continuous variable was not found. However, exploratory median-split analysis revealed that individuals with low HRV (in comparison to individuals with high HRV) showed an increase in startle amplitude exclusively for neutral images. This pattern however was not observed for sound perception or imagery. These results indicate that HRV-related differences in affective differentiation are rather subtle and may emerge only in visual emotion induction contexts.

Poster 2-026

THE ASSOCIATION BETWEEN RESTING HEART RATE VARIABILITY AND DEPRESSION FOR BLACK AMERICANS VARIES AS A FUNCTION OF GENDER

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Descriptors: Gender Differences, Depression, HRV

Evidence consistently indicates that lower resting heart rate variability (HRV), an indicator of parasympathetic nervous system cardiac modulation, is associated with depression. However, this relation may be inconsistent among Black Americans, given that research shows that HRV may be positively associated with depressive symptoms for Black Americans (Keen et al., 2013). Additionally, studies have shown that HRV and depression were inversely associated for men, but positively associated for women (Thayer, et al., 1998; Chambers & Allen, 2007). Thus, in the present study, we explored the relationship between baseline HRV and depression in a sample of Black adults (N = 195, Mean Age = 20.97, 69% female) and the moderating effect of gender. HRV was collected during a 5-min baseline and depressive symptoms were assessed using the Depression, Anxiety & Stress Scales (DASS-21). Controlling for BMI and age, lower resting HRV marginally predicted greater depressive symptoms (B = −.06, SE = .03, p = .051); however, gender significantly moderated the association between resting HRV and depression (B = .04, SE = .02, p = .048). Specifically, Black women exhibited a positive association between baseline HRV and depressive symptoms (B = .03, SE = .02, p = .12); while Black men showed an inverse relationship between baseline HRV and depressive symptoms (B = −.03, SE = .03, p = .19). This suggests that although higher baseline HRV may reflect greater resources to regulate emotions, the protective health benefits of greater resting HRV are not clear for Black women.

Poster 2-027

A WEARABLE HEART MONITOR FOR MEASURING CHANGES OF THE SYMPATHETIC NERVOUS SYSTEM

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Descriptors: Impedance, Methods, Autonomic

Quantifying sympathetic nervous system activity (SNS), including cardiac mobilization, provides insight into motivational states, stress reactivity, reward sensitivity, task engagement and decision making. Typically, electrocardiogram (ECG) and impedance cardiography (ICG) are combined to estimate pre-ejection period (PEP) and index changes in SNS. Current methods of ICG are time intensive and vulnerable to non-reproducible subject-specific electrode configuration. Analysis of impedance waveforms can also suffer from experimenter bias. Here we present a simple wearable heart monitor that includes ECG, but replaces the 8 ICG electrodes with a single accelerometer (ACC). The ACC indirectly measures movement of the heart by sensing the arterial pulse as blood is ejected into the aorta. The final ACC waveform consists of two smooth waves, the first peak indicating the opening of the aortic valve, and the second indicating its closing. To test the ACC's reliability, participants were fitted with ECG, ICG, and ACC as they engaged in classic physical stress tasks known to modulate SNS: the Valsalva maneuver and cold pressor. Linear mixed effects models showed significant associations between ICG and ACC's PEP derivatives with respect to time (p less than .01). These findings support ACC as an improved method for tracking SNS that is robust, time efficient, and accessible to all researchers.

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Poster 2-028

REDUCED HEART RATE VARIABILITY IS ASSOCIATED WITH VULNERABILITY TO DEPRESSION AND IMPAIRED ATTENTIONAL CONTROL TO UNPLEASANT AFFECTIVE STIMULI

Carola Dell'Acqua; Elisa Dal Bò; Simone Messerotti Benvenuti; Ettore Ambrosini; Antonino Vallesi; Daniela Palomba
University of Padua

Descriptors: Heart Rate Variability, Depressive Symptoms, Cognitive Control of Emotional Information

The autonomic nervous system is implicated in cognitive and affective modulation. Heart rate variability (HRV) reflects cardiac autonomic modulation and it is reduced in psychopathology. Dysphoria and remitted depression are conditions of vulnerability to depression. The study investigated whether reduced HRV may represent an indicator of vulnerability to depression and its implication in the association between HRV and attention control of emotional information. Two at-risk populations [dysphoria (n = 27), remitted depression (n = 16)] and a healthy control group (n = 25) performed an emotional Stroop task (EST) and three-minute resting-state ECG. Analysis of covariance was conducted to detect between-groups differences. Correlation analysis was conducted between response times (RTs) and interference indexes at the EST and HRV. Standard Deviation of Normal to Normal intervals (SDNN) and High Frequency (HF) power of HRV were reduced in both at-risk groups as compared with controls, whereas no significant effect in the EST was noted. Correlation analysis on the whole sample revealed significant inverse correlations between both HRV parameters and RTs and interference index for unpleasant words. The findings suggest that vulnerability to depression is characterised by reduced vagal tone. In the whole sample, reduced vagal tone was correlated with cognitive-emotional interference for unpleasant words. Thus, parasympathetic prevalence might facilitate the ability to overcome interference from unpleasant emotional distractors and to direct attention on relevant stimuli.

Funding: This work was supported by two grants from MIUR [Dipartimento di Eccellenza DM 11/05/2017 n. 262] and PRIN [protocol n. 2017BC4MST] to the Department of General Psychology, University of Padua.

Poster 2-029

DISTINCT INFLUENCE OF ANXIETY AND ALEXITHYMIA ON THE OBJECTIVE AND SUBJECTIVE ESTIMATES OF INDIVIDUAL EFFICACY IN HEARTBEAT DETECTION TASK

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Descriptors: Interoception, Anxiety, Alexithymia

Currently, there is an increasing body of data linking interoception and emotion. The same time, there is a call for separate evaluation of the role of emotion in different aspects of interoceptive processing. In a sample of 25 females undergoing fMRI-based heartbeat detection task, we evaluated both an objective behavioral measure of task-related efficacy—interoceptive accuracy (IAc), and a subjective estimate of the efficacy in heartbeat detection (SEf), self-rated by a questionnaire after the task. The same day participants completed the Spielberger State-Trait Anxiety Inventory and Toronto Alexithymia Scale 20. The IAc and SEf appeared to show no correlation (R_o = –0.1, p = 0.6), and only the IAc was associated with typical fMRI interoceptive activation. Path analysis revealed that the IAc was positively influenced by the state anxiety and negatively—by the trait anxiety and alexithymia. The same time, SEf was positively influenced by the alexithymia and negatively—by the both state and trait anxiety. Higher levels of state anxiety resulted in increased IAc but decreased SEf, which can be related to the increased attention to internal signals and, the same time, to lower self-efficacy. Higher level of alexithymia resulted in decreased IAc but increased SEf. We propose that alexithymia may interfere with the ability to judge one's own performance during the interoceptive task, leading to a mismatch in subjective and objective estimates of efficacy.

Poster 2-030

CEREBELLAR SEEDED FUNCTIONAL CONNECTIVITY NETWORKS IN ANXIOUS INDIVIDUALS

Katherine Elwell; Lin Fang; Joshua Carlson
Northern Michigan University

Descriptors: Anxiety, Cerebellum

New and converging research provides empirical evidence that the cerebellum's functional connectivity and shared network structure with threat processing regions have a direct impact on anxiety and its symptomatology. The aim of the current study was to assess the functional role of the cerebellum in anxiety and its symptomology by assessing its functional connectivity to threat processing regions, as well as its connectivity patterns within resting-state networks. Participants (N = 100) were between the ages of 18 and 42, right-handed, free of any neurological history, and were not undergoing any form of psychological therapy or medications. The current study utilized resting-state functional magnetic resonance imaging (rsfMRI) collected over a 10-min time span. The scans were then used to analyze data to assess general cerebellar connectivity in this high anxiety sample, as well as associations between cerebellar activity and variability in anxiety symptoms. The results showed strong, widespread cerebellar functional connectivity with regions previously implicated in both motor and cognitive processing. Moreover, there was a connection between cerebellar seed regions and regions associated with threat processing. In addition, levels of cerebellar connectivity within this network were related to levels of anxiety. The results provide empirical evidence demonstrating strong functional connectivity between the cerebellum and threat-processing regions as well as evidence for the role of the cerebellum in anxiety symptomatology.

Poster 2-031

EMOTIONAL AROUSAL ATTRACTORS DURING VIDEO VIEWING

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Descriptors: Nonlinear Dynamical Systems, Skin Conductance, Chaotic Attractor

Consistent with research demonstrating that human electrodermal activity (EDA) can be construed as a nonlinear dynamical system, we posit that arousal is not merely linearly increasing or decreasing over time but may consist of a set of qualitatively different states. The goal of this study is to identify qualitatively different states in emotion arousal, as indicated by EDA, and to understand the contexts in which these qualitative states occur. We hypothesized that emotional arousal has two attractor states: a calm state that behaves as a fixed point attractor and an arousing state that behaves as a chaotic attractor. We expected that increased arousal would be associated with more complex dynamics in the form of chaotic attractors, and that these dynamics would be observed more often during video viewing than baselines, during post viewing than prior to viewing baseline, and during arousing than calm videos. We used phase space reconstruction to identity non-chaotic and chaotic attractors. Using secondary data analysis, 26 participants' skin conductance data were analyzed when they watched eight videos that varied in message valence and arousal and when they sat alone in the lab before and after viewing videos. Results of logistic regression support the first two hypotheses but not for the third. The chaotic attractor also appeared more often during positive compared to negative videos. This study suggests that arousal during video viewing exhibits hallmarks of chaotic attractors, providing a new way of understanding complex dynamics of skin conductance activity.

Poster 2-032

HEDONIC PROCESSING AND DEPRESSION: A JOINT ERP AND BEHAVIORAL STUDY

Kelsey Irvin; Bruce Bartholow; Debora Bell
University of Missouri, Columbia

Descriptors: Reward Processing, Emotion Regulation, Depression

Major Depressive Disorder is widely believed to be a disorder of impaired affective and hedonic processing. Conceptual overlap between psychophysiological responses to reward and self-reported reaction to affective experiences suggest that examining both constructs together may advance understanding of depression as a disorder of affect regulation. There is some evidence that hedonic impairment in individuals with MDD may not simply be due to reduced sensitivity to a single reward, but to difficulties in integrating reinforcement history over time (Pizzagalli et al., 2009). In the current study, participants ($N = 90$) completed (a) a computerized guessing task while ERPs were recorded to assess psychophysiological reward sensitivity, (b) a probabilistic selection task to assess reward learning, and (c) a battery of questionnaires assessing affect, affect regulation, and depressive symptoms. Half of participants were given a savoring intervention and instructed to savor wins during the guessing task. Findings indicate that consideration of both reward processing and affect regulation may provide a unique understanding of depressive symptoms, and that for participants who reported successful implementation of a savoring intervention, psychophysiological reward sensitivity predicts behavioral reward learning. Understanding relationships between depressive symptoms, affect regulation, and multiple facets of reward processing may help explain how implementation of affect regulation strategies (i.e., savoring) may improve hedonic processing to reduce symptoms of/risk for depression.

Funding: This research was supported in part by the University of Missouri, Columbia Life Sciences Fellowship, and by grant R01AA025451 from the National Institute on Alcohol Abuse and Alcoholism.

Poster 2-033

BLUSHING SYNCHRONY IN PERCEIVING FACES TURNING RUDDY WITH ANGER

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Descriptors: Synchrony, Blushing, Angry

Perceiving a particular reaction in empathetic situations sometimes induces similar synchronous responses in the observer. Previous studies reported the synchronous effects in facial muscle and pupil size, and the associated impacts on emotional recognition. Although blushing conveys one's emotional and healthy states, little is known about the blushing synchrony. The goal of the present study was to examine the presence of the psychophysiological phenomena. Healthy participants ($n = 30$) first rated the emotional intensities of neutral, angry and embarrassment expression of the models whose facial color reddening or not. We had therefore 6 types of stimuli (3 emotional expressions × 2 color changes). As measures for physiological responses, we used facial Skin Blood Flow (SkBF), finger SkBF, and heart rate during the experiment. No participant noticed the blushing of the models. Physiologically, only facial cheek SkBF decreased when the participants observed angry faces with blushing, compared to those without blushing and to neutral faces with blushing. There was no correlation between facial SkBF and heart rate when observing angry faces with blushing. No significant differences in heart rate and finger SkBF were found between all types. These results indicated the presence of blushing synchrony to specific emotional facial stimuli, which was elicited by the vasoconstriction confined to facial vessels. Further study is required to clarify the possibility of the cross-direction blushing synchrony.

Poster 2-034

EMOTION REGULATION STRATEGIES AND AFFECTIVE DISORDERS: AN ERP STUDY

Elena Koumi; Emily Effe; George Spanoudis; Savvas Avraam
University of Cyprus

Descriptors: Emotion Regulation, Affective Disorders, ERP

Affective disorders are among the most frequently presented in the general population with Emotion Regulation (ER) constituting a predominant transdiagnostic deficit across the specified disorders. The aim of the current study was to examine differences in the use of three emotion regulation strategies: reappraisal, suppression and distraction among individuals presenting with and without affective disorders symptom, in a sample consisting mainly of students, via both psychometric, behavioural and electrophysiological (ERP) measures. Correlations among the specified measures, as well as the temporal dynamics involved in the implementation of each strategy among groups with and without psychopathology, were also explored. 120 participants (33 male and 87 female) were voluntarily recruited from the University of Cyprus, with their mean age being 23.31 ($SD = 4.66$). A classic experimental Emotion Regulation Task (adapted by Thiruchselvam, Blechert, Sheppes, Rydstrom, & Gross, 2011), as well as the Emotion Regulation Questionnaire (ERQ) and Difficulties in Emotion Regulation Questionnaire (DERS) were employed as measures of Emotion Regulation, while clinical symptomatology was assessed via the Symptom-CheckList-90-R and PDSQ . Changes in LPP amplitude were recorded as a direct index of EE. Both groups exhibited differences in the implementation of each ER strategy. Differences in the temporal dynamics of each strategy, as well as in the timing of which it was implemented were also recorded. Findings yield significant clinical and methodological implementations.

Poster 2-035

PICTURE YOURSELF: STRESS-RELATED FACIAL MUSCLE REACTION AS AN INDEX FOR SOCIAL STRESS RESPONSE

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Center for Social and Affective Neuroscience, Linköping University

Descriptors: Facial EMG, Stress, Self-perception

Maladaptive stress response and impaired social function are key features of anxiety disorder, depression, and addiction. However, literature about stress effects on social behavior is inconsistent. Therefore, we investigated psychophysiological and behavioral responses of 35 healthy subjects to a social evaluation task after stress/non-stress exposure in a within-subject design. The stress task consisted of alternating cold pressure and arithmetical trials with negative social feedback. The social evaluation task was a simulation of an online social interaction, where participants liked or disliked pictures of other putative players. Similarly, they saw their own picture being judged by other players. After stress exposure compared to non-stress, corrugator (frowning) muscle activity was significantly increased when participants saw their own picture during anticipation of judgment from others. Activation of the corrugator was positively associated with self-reported stress. Overall, no between-session difference was found in how participants liked/disliked pictures of other players. However, corrugator reactivity significantly predicted negative evaluation of others (dislikes) after stress compared to non-stress. Reported findings suggest that stress increases negatively-valenced affective reactions to one's own face indexed by increased corrugator activity. Importantly, corrugator reactivity predicted increased negative feedback to others suggesting that facial muscle activity might be a psychophysiological index for stress-modulated social behavior.

Funding: Swedish Medical Research Council to MH.

Poster 2-036

PLEASE SHOW ME YOUR EYES: THE INFLUENCE OF EYE CONTACT ON EMOTIONAL MIMICRY

Heidi Mauersberger; Till Kastendieck; Ursula Hess
Humboldt-Universität zu Berlin

Descriptors: Emotional Mimicry, Electromyography

Emotional mimicry (i.e., the imitation of our counterpart's emotional expression) is an automatic but goal dependent process that both fosters and depends on an affiliative link between mimicker and mimickee. Limited eye contact reduces mimicry, probably as it creates a social distance between interaction partners. So far, mimicry research has used unnaturally covered eyes (with censor bars) or averted-gaze faces to analyze the effect of eye contact on mimicry. In our study, we used a more ecologically valid approach: A total of 40 participants were asked to rate the emotional expressions of (and interpersonal closeness to) different actors either wearing clear glasses that do not obstruct or sunglasses that do obstruct eye contact while facial EMG at the Corrugator Supercilii (Cor), Orbicularis Oculi (Ocl) and Zygomaticus Major (Zyg) was measured to assess mimicry. For each type of emotion (negative and positive), we calculated a linear mixed model on the EMG values and found that for negative emotions the contrast between Cor and the mean of Ocl and Zyg indicating mimicry was more pronounced in the glasses compared to the sunglasses condition. This was not the case for happiness. However, for both types of emotion, closeness acted as a moderator. The closer participants felt to the targets, the more they mimicked targets' expressions in the glasses condition (negative emotions) or overall in both conditions (happiness). Our results suggest that it is indeed the impaired affiliative link between mimicker and mimickee that explains why obstructed eye contact impedes mimicry.

Poster 2-037

UNTANGLING THE RELATIONSHIP BETWEEN HEART RATE VARIABILITY AND SELF-REPORT ANXIETY

Alix Gondringer; Jared McGinley
Towson University

Descriptors: Anxiety, Heart Rate Variability

Dominant theoretical models have postulated the unique role that vagally mediated heart rate variability (vmHRV) serves in anxiety. Most studies designed to assess the relationship between these constructs, however, take a piecemeal approach to testing it. For example, assessment of anxiety has often separately been measured as either a trait or a state, while vmHRV has been assessed at rest, reactivity, or recovery. With 176 (53 male) participants, the current study was designed to identify which vmHRV metrics (or timepoints) were most strongly correlated with self-report measures of trait and state anxiety. To do this, a measure of trait anxiety was collected at one timepoint, state anxiety was measured at four timepoints, and vmHRV was recorded during resting, reactivity, and recovery periods. Additionally, two metrics of vagal flexibility were calculated to capture the individual variability in vmHRV. Of all the tested relationships, the only significant anxiety-vmHRV pairing was with trait anxiety and resting vagal tone (r = .17). Follow-up regression analyses, including relevant health and demographic variables, did not significantly improve the tested relationships. Although affective and behavioral characteristics of anxiety are often explained mechanistically via vmHRV dynamics, we recommend careful reconsideration of the conditions under which these hypothesized relationships should be expected. We also recommend a more thoughtful selection of anxiety measures for future research.

Poster 2-038

EMOTION REGULATION AND EMOTIONAL REACTIVITY OF CHILDREN INVOLVED IN BULLYING AND VICTIMIZATION

Emmanouela Milaki; Chrysostomos Lazarou; Chrysanthi Leonidou; Elena Constantinou; Kostas Fanti; Georgia Panayiotou
University of Cyprus

Descriptors: Bullying, Victimization, Emotion Regulation

School Bullying is a common phenomenon and a real challenge for the school community. Although many factors are known to be implicated in the manifestation of bullying, very few studies have examined the psychophysiological activity of children involved in bullying and victimization. Nevertheless, understanding the affective mechanisms associated with bullying and victimization may be an important contribution to the development of appropriate school-based prevention and intervention programs. The present study's aim is to examine whether bullying and victimization are differentially associated with emotion regulation ability, in a way that victimization is associated with lower emotion regulation ability, while bullying is associated with higher emotion regulation ability. We further investigated if emotion regulation predicts fear reactivity of children involved in bullying and victimization. In particular, we hypothesized that the association of low emotion regulation with victimization would predict higher fear reactivity, while the association of high emotion regulation with bullying, would predict lower fear reactivity. For this reason, startle reflex magnitude responses of 82 children and adolescents (Mage= 13.0) were measured during a tone-cued imagery paradigm experiment of fear scripts. In addition, indexes of heart rate variability (HRV) during a 5-minute resting period were used for measures of emotion regulation. Results showed that children with lower HRV scored higher on victimization compared to those with higher HRV. However, no significant results were noted for bullying. Finally, HRV did not significantly predict fear reactivity neither in bullies nor in victims. Limitations are discussed.

Poster 2-039

RELATIONSHIP BETWEEN BLINK AND EMOTION IN INDIVIDUALS WITH SEVERE MOTOR AND INTELLECTUAL DISABILITIES

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Descriptors: Severe Motor and Intellectual Disabilities, Brink, Sound
Purpose: Individuals with severe motor and intellectual disability (SMID) have serious problems with caregivers and teachers having difficulty reading their emotions. We examined the evaluation of emotions by blinks of SMID. Subjects: 4 SMID participated. Procedure: We used environmental sounds that evoked pleasant and unpleasant emotions (pleasant: harp, music box, bird, and favorite sounds of each participant; unpleasant: noodle, blackboard, tooth drill, and dislike sounds of each participant). Intensity was from 55 to 70 dBHL. First, 4 pleasant sounds were presented, followed by 4 unpleasant sounds. The duration of each stimulus was 40 s and the interstimulus interval was 20 s. For each of the pleasant and unpleasant series, 4 sessions were held at intervals of 1 hour or more. Baseline were measured before and after each session. Analysis: Blink by video and ECG were measured. Brink rate (Brinks per minutes: BPM), inter-blink interval (IBI), and LF/HF in heart rate changes were analyzed. Results: In all subjects, the BPM of the unpleasant series was more than 30% higher than that in the baseline and pleasant series. Also, the BPM of the pleasant series fell below the baseline. The IBI showed a tendency of extension in the pleasant series. In sub A and B, LF/HF was high in the unpleasant series and low in the pleasant series. Discussion: BPM seemed to reflect emotions of SMID, especially unpleasant emotions. Furthermore, changes in IBI may be associated with emotional changes. Since blink rate and IBI can be observed directly, they can be used to support SMID in daily life.

Funding: This study was supported by the Grant-in-Aid for JSPS Fellows from the Japan Society for the Promotion of Science (JSPS) (No. 18K02751).

Poster 2-040

ONLY TIME WILL TELL: DEFENSIVE PHYSIOLOGY AS A TIME SERIES

Brittany Nackley; Bruce Friedman
Virginia Polytechnic Institute and State University

Descriptors: Defense Cascade, Autonomic Balance, Cardiac Control
The defense cascade (DC) describes the sequence of responses to a perceived survival threat (Lang et al., 1997), and is currently conceived as having six stages: *freeze, flight, fight, fright, flag, and faint* (Bracha, 2004; Schauer & Elbert, 2010). Research typically isolates one of the DC stages and maps physiological data to the target stage. However, the dynamic nature of survival behavior leaves wanting the typical method of taking physiological "snapshots" or averages. Our study examined average vs. time series measurements for 19 undergraduates (5 male) exposed to a virtual reality (VR) simulation of an approaching threat. ECG, respiration, and impedance cardiography were recorded continuously throughout baseline, threat, and recovery and used to calculate respiratory sinus arrhythmia (RSA) and pre-ejection period (PEP). Initial data suggest that mean RSA and PEP showed relatively small changes from baseline to stimulus conditions (−8.0% and −3.2%) and from stimulus to recovery (13.3% and 0.3%). However, time series analysis revealed significant intra-period variation. Further, a pattern of reciprocal SNS-PNS activation was suggested during baseline and recovery (averaged PEP-RSA correlation for baseline $r = .501$, and for recovery $r = .256$), while apparently uncoupled activation occurred during the stimulus period ($r = -.024$). Self-reported Subjective Units of Distress (SUDS) suggest that the stimulus was experienced as threatening, with SUDS ratings consistently increasing during the stimulus period and significantly above baseline and recovery levels.

Poster 2-041

THE RELATIONSHIP BETWEEN HRV AND THE EMOTION-MODULATED EYEBLINK STARTLE REFLEX

Laurel Quinlan; Anna Finley; Lauren Gresham; Jeanette Mumford; Richard Davidson; Stacey Schaefer
University of Wisconsin, Madison

Descriptors: Eyeblink Startle Reflex (EBR), Heart Rate Variability (HRV), Emotion Regulation
We explored the relationship between two indexes of emotion regulation, emotion-modulated eyeblink startle reflex magnitude (EBR) and heart rate variability (HRV), during an emotional image viewing task in the MIDUS Refresher study ($n = 96$; age mean = 47.86 (11.57)). EBR was measured at two probes: 2,900 ms after picture onset or 1,900 ms after picture offset. Image presentations were for 4 s of positive, negative, and neutral IAPS. EBR was related to 4 resting baseline HRV measures: root means squared of successive differences between normal beats (RMSSD), standard deviation of normal to normal beats (SDNN), high frequency band (HF) and low frequency band (LF). There were no significant correlations between EBR and any of the HRV measures for either probe time on positive, negative, or neutral trials with or without adjusting each regression for age, gender, race, blood pressure, and diabetic status. These results are contrary to our hypothesis that there would be a significant negative relationship between HRV and EBR in the second epoch of the negative and positive valence trials, consistent with enhanced emotion regulation. These findings do not support a significant relationship between RMSSD, SDNN, LF, or HF HRV and emotion-modulation of the eyeblink startle reflex.

Funding: The MIDUS Neuroscience Project was funded by the National Institute on Aging (P01- AG020166, U19-AG051426) and by the Waisman Intellectual and Developmental Disabilities Research Center (U54-HD090256) awarded by the National Institute of Child Health and Human Development.

Poster 2-042 (Moved to Poster 3-099 for Virtual Meeting)

DIFFERENTIAL SENSORIMOTOR MU SUPPRESSION TO OBSERVATION OF EMOTIONAL AND AFFECTIVELY NEUTRAL BODY MOVEMENTS

Alison Harris; Catherine Reed
Claremont McKenna College

Descriptors: Mu Suppression, Movement Simulation, Emotion Perception
Reductions in EEG "mu" rhythms (8–14 Hz) over sensorimotor cortex have been found both for executed and observed movements, leading researchers to propose a role for mu suppression in understanding others' intentions and emotions. Yet many studies infer emotion simulation from mu suppression in response to actions with little emotional content or from emotional stimuli without associated body movements, whereas emotional action observation and motor execution are seldom directly compared. Here we used high-density EEG to measure mu suppression associated with observation of emotional vs. affectively neutral actions relative to motor execution. In separate blocks, participants (n = 39) completed a finger-tapping task and observed point-light displays of emotional and neutral whole-body movements. Although both action execution and observation produced significant mu suppression over central electrodes, action observation was additionally associated with suppression at anterior temporal and frontal sites. Significantly, neutral action observation showed a higher correlation with action execution, relative to emotional action observation, along with enhancement in the beta band (17–20 Hz) previously linked to motor inhibition. In contrast, emotional action observation showed a more frontal distribution of activity, with less beta enhancement. These results support the role of sensorimotor systems in action simulation, while suggesting that neutral and emotional movements may differentially engage central and frontal networks depending on relative ease of motor simulation.

Funding: NSF BCS 1923178.

Poster 2-043

DARK AGENCY: A PSYCHOPHYSIOLOGICAL STUDY INVESTIGATING THE INFLUENCE OF DIFFERENT EMOTIONAL STATES ON INTENTIONAL BINDING CONSIDERING PSYCHOPATHY AND TRAIT ANXIETY

Anna Render[1,2]; Hedwig Eisenbarth[1]; Matthew Oxner[1]; Petra Jansen[2]
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Descriptors: Intentional Binding, Sense of Agency, Sexual Arousal
This study investigates the feeling of control over action and consequences (Sense of Agency) in emotional states considering personality. Emotional states have been highlighted to affect Sense of Agency resulting in a function of valence, arousal and dopaminergic activity. 59 participants were randomly assigned to in either a sexually arousing, a pleasant or an emotionally neutral condition. Sense of Agency was measured implicitly using the intentional binding task. Analyses included the participants' subjective affective ratings, physiological arousal (Pupillometry, GSR, HR) and personality traits (trait anxiety, psychopathy). Blink rates were indexed for dopaminergic activity. Physiological measures during the film clip confirmed arousal manipulation. Physiological arousal during each intentional binding task run predicted respective subjective arousal ratings. Linear Mixed Models confirmed reduced Sense of Agency over actions in sexual arousal, revealed an increase in the neutral condition and no change in the pleasant condition. Trait anxiety was linked to decreased agency over actions in all conditions, most pronounced in sexual arousal, and to increased awareness over the consequences in the neutral and pleasant conditions but not in sexual arousal. Interaction between psychopathy, condition and time showed intact agency over actions but impaired agency over consequences in sexual arousal. A reduced feeling of control over actions in aroused states has implications for evaluations of criminal responsibility.

Funding: DAAD short term scholarship (6 months) for a Person.

Poster 2-044

NO DIFFERENCES IN ATTENTIONAL BIAS AND WORKING MEMORY FILTERING BETWEEN THREATENING AND NEUTRAL DISTRACTER WORDS

Richard Ward[1]; Salahadin Lotfi[1]; Daniel Stout[2,3]; Sofia Mattson[1]; Han-Joo Lee[1]; Christine Larson[1]
[1]University of Wisconsin, Milwaukee, [2]VA San Diego Healthcare System, [3]University of California, San Diego

Descriptors: Attention, Working Memory, Filtering Efficiency
Evidence suggests that threatening stimuli induce attentional biases compared to neutral stimuli, an effect enhanced for anxious individuals. This enhanced attentional processing of threatening information can lead to storage in working memory, even when stimuli are task-irrelevant. Others have found that negative words also influence attentional processing, suggesting that such stimuli may also be inefficiently filtered from working memory. We examined how threatening versus neutral word distracters influence attentional processing, and how this effects one's ability to filter these stimuli from gaining access to working memory. We measured the N2pc and contralateral delay activity (CDA), two event-related potential (ERP) that index attentional selection and the number of items maintained in WM, respectively, as participants completed a lateralized change detection task using word stimuli. The task included low and high working memory loads, a low load plus neutral distracter condition, and a low load plus threatening distracter condition. We found null differences for N2pc attentional selection and CDA filtering efficiency between neutral and threatening distracter words. In addition, we did not observe any differences in terms of behavioral measures of accuracy, response time, and Pashler's K scores. Furthermore, our measures showed no association with trait anxiety, indicating these effects were absent in high trait anxious individuals. We conclude that threatening distracter words do not yield attentional capture or influence downstream working memory processes.

Poster 2-045

SAVOR THE MOMENT: AN ERP INVESTIGATION OF SAVORING AND ITS LASTING EFFECTS

Kayla Wilson; Annmarie MacNamara
Texas A&M University

Descriptors: Upregulation, Late Positive Potential, Emotion Regulation
Knowing how to increase positive emotion may be just as important to psychological health as knowing how to decrease negative emotion, though this aspect of emotion regulation has received little attention. Moreover, the durability of these effects—i.e., whether willful increases in positive emotion can persist across time to affect subsequent encounters with the same stimuli—has not been examined. Here, we report on the first laboratory test of savoring, an emotion regulation strategy aimed at increasing, sustaining, and deepening positive emotions. Participants (n = 49) were trained in the technique of savoring; next, they viewed positive and neutral pictures, which they savored or viewed on a trial-by-trial basis. In a subsequent task, participants viewed the same pictures again without instructions to view or savor. Subjective valence and arousal ratings and the picture-elicited late positive potential (LPP) were assessed during both tasks. During the first task, savored pictures were rated as more pleasant and more arousing; additionally, LPP amplitudes were larger for savored pictures. Moreover, in the subsequent task, pictures that had originally been savored were rated as more pleasant and arousing compared to those that had not been savored. LPP amplitudes were also larger for previously savored pictures in the early portion of picture viewing; during later picture viewing, this effect was limited to savored positive pictures. Results indicate that savoring is an effective and durable means of increasing positive emotion and motivated attention to pictures.

Funding: A. MacNamara was supported by the National Institute of Mental Health grant, K23 MH105553.

Poster 2-046

ELECTROMAGNETIC RADIATION IN THE 5G RANGE INCREASES EEG BRAIN ACTIVITY IN ELECTROMAGNETIC HYPERSENSITIVE SUBJECTS AND HEALTHY CONTROLS

Diana Henz
University of Mainz

Descriptors: EEG, 5G, Electromagnetic Hypersensitivity
Current literature shows increases in EEG brain activity induced by electromagnetic fields (EMFs). To date, there are no systematical studies on the effects of EMFs emitted in the 5G range. In the present study, we investigated the effects of EMFs emitted by a smartphone operating in the 5G range. We tested four experimental conditions with a smartphone operating in 5G mode applied 1.0 cm from the right ear: (a) pretest smartphone switched off, (b) phone call, (c) WIFI in 5G mode, (d) posttest smartphone switched off. Electromagnetic hypersensitive (EMHYP) subjects and healthy controls were tested in all experimental conditions. High-density EEG was recorded continuously from 128 electrodes applied according to the international 10–20 system. Electromagnetic high frequency (HF) emission was recorded continuously in all experimental conditions. Results showed increases in EEG beta and gamma activity in the right temporal area as well as in frontal, central, parietal, and occipital areas when exposed to the smartphone call and to WIFI in 5G mode compared to pretest. Comparing both tested groups, increases in brain activity were significantly higher in the right temporal as well as in parietal, occipital, and subcortical areas in the EMHYP group compared to the control group. A further analysis revealed correlations of EM HF and timely patterned brain activations in parietal areas in the EMHYP group. Results indicate that both groups showed alterations in brain activity in 5G exposition with EMHYPs showing stronger activations than healthy controls.

Poster 2-047

APPLICATION OF HEART RATE VARIABILITY TO ASSESS AROUSAL IN SEMI-AUTOMATED VEHICLES

Monika Lohani; Joel Cooper; Gus Erickson; Trent Simmons; Amy McDonnell; Amanda Carriero; Kaedyn Crabtree; David Strayer
University of Utah

Descriptors: Driving Research, Cognition

Semi-automated technology can support driving functions, but during unexpected conditions drivers are required to immediately take control and manually drive the vehicle. Very little is known about potential differences in drivers' cognitive states during manual driving compared to semi-automated driving. Any differences may raise concerns about drivers' readiness to safely switch from automated to manual driving. The current study investigated whether drivers' physiological arousal (known to impact driving performance) was different in manual versus semi-automated driving modes. Root mean square of successive differences in normal heartbeats (RMSSD) and the Detection Response Task (DRT; ISO, 2015) were used to measure driving-related cognitive arousal and workload. 39 younger (21–42 years old) and 32 older (43–64 years old) drivers operated four semi-automated vehicles (Cadillac CT6, Nissan Rogue, Tesla Model 3, and Volvo XC90) in manual and semi-automated conditions on real highways. The results indicated no significant differences in RMSSD or DRT as a function of driving conditions (manual versus semi-automated) or age (younger versus older adults) across the four vehicles. A follow-up Bayes Factor analysis implied very strong evidence in favor of the null hypothesis. Together, these novel findings suggest similar arousal and workload states in manual and semi-automated real-world driving.

Funding: Support for this work was provided by a grant from AAA Foundation for Traffic Safety.

Poster 2-048

THE CONTINGENT NEGATIVE VARIATION IN ANTICIPATION OF REWARD IS RELATED TO INDIVIDUAL DIFFERENCES IN DEPRESSION AND IMPULSIVITY IN ADOLESCENTS

Micaela Rodriguez; Aline Szenczy; Brady Nelson
Stony Brook University

Descriptors: Depression, Impulsivity, Reward

The processing of rewards is a dynamic operation characterized by anticipatory and consummatory phases. The monetary incentive delay (MID) task allows for the delineation of these phases and the examination of neural activity. In adults, greater depression symptoms have been associated with a larger contingent negative variation (CNV) in anticipation of reward and a blunted reward positivity (RewP) in response to monetary reward, and both associations were stronger in the context of high impulsivity. However, these results have not been replicated and it is unclear whether they are also present in adolescents, who experience increases in reward sensitivity, impulsive behaviors, and risk for depression. In a sample of 90 10–17 year-old girls, the present study examined the association between the CNV and RewP during the MID task and individual differences in depression symptoms and impulsivity. Participants completed the MID task while electroencephalography was recorded and questionnaires of current depression symptoms and impulsivity. Results indicated a Depression × Impulsivity interaction in relation to the CNV in anticipation of reward, such that greater depression symptoms were associated with a larger CNV, but only in the context of high impulsivity. There was no relationship between depression symptoms, impulsivity, or their interaction in relation to the RewP. The present study supports the importance of examining the time course of reward processing and extends previous research by demonstrating stage-specific links with depression and impulsivity in adolescents.

Poster 2-049

NEURAL CORRELATES OF CONFLICT MONITORING: RELATING THE CONTROL SYSTEM TO THE ERROR-RELATED NEGATIVITY

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Florida State University

Descriptors: Error-Related Negativity, Reinforcement Sensitivity Theory, Individual Differences

The Reinforcement Sensitivity Theory (RST) proposes three core personality systems: the behavioral approach system (BAS), the fight-flight-freeze system (FFFS), and a regulatory control system known as the revised behavioral inhibition system (rBIS). These systems have been used to examine traits, including anxiety. However, many personality scales continue to utilize older models of the RST that combine the FFFS and rBIS to reflect the originally proposed behavioral inhibition system (BIS; Carver & White, 1994). Past research has linked the error-related negativity (ERN)—an ERP that occurs as a sharp negative peak after the commission of an error—to higher scores on the original BIS scale. However, this prior work has not examined the relationship between the ERN and systems delineated in the revised RST that uncouples the BIS into the FFS and the rBIS. To test this, participants completed Carver and White's (1994) self-report BIS/BAS measure. A flanker task was then completed while EEG was recorded. BAS, FFFS, and rBIS scales were calculated from the BIS/BAS measure according to the Heym et al. (2008) revised RST factor analysis. Results indicated that greater rBIS, but not FFFS, was related to larger ERN amplitudes. Thus, regulatory control processes associated with the rBIS appear to be closely related to the ERN, potentially explaining relationships with anxious threat monitoring and apprehension, but not acute fear responses and arousal.

Funding: National Institutes of Health (MH097767).

Poster 2-050

PSYCHOMETRIC PROPERTIES OF THREAT-RELATED ATTENTIONAL BIAS IN YOUNG CHILDREN USING EYE-TRACKING

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Florida State University

Descriptors: Attentional Bias, Children, Anxiety

Anxiety is one of the most common forms of child psychopathology and is associated with impairment across the lifespan. Researchers have linked selective attention towards threat with anxiety. However, previous work on attentional bias has used less reliable, reaction time-based measures of attention, and no work has used eye-tracking to measure attentional bias in young children. In this study, we investigated the psychometric properties of an eye-tracking measure of attentional bias using a free viewing task in 69 children between 6 and 9 years old and explored if trait and clinical anxiety were related to attentional bias to threat. We obtained parent-reported child anxiety using the Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997) and temperamental characteristics of fearfulness and shyness using the Child Behavior Questionnaire (CBQ; Rothbart et al., 2001). Parents were also interviewed using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS-PL; Kaufman et al., 1997) to assess for diagnoses of anxiety disorders. Results showed good psychometric properties for threat and neutral attentional biases, comparable to that found in adults. Consistent with existing developmental theories of attentional biases, temperamental and clinical anxiety did not relate to threat/neutral dwell time and attentional biases. Future studies should explore if temperamental or clinical anxiety prospectively predicts threat attentional bias and the onset of anxiety in older children using a longitudinal design.

Poster 2-051

DEVELOPMENT OF BEHAVIORAL AND NEURAL INHIBITION IN CHILDREN DURING A GO/NOGO TASK

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Descriptors: Inhibitory Control, N2, Development
Inhibition is an executive function that changes throughout development and reflects the ability to control one's reactions. Inhibition is vital for normal development and a core deficit in childhood disorders like attention-deficit hyperactivity disorder and autism spectrum disorder. Go/NoGo paradigms require participants to press a button for most stimuli while inhibiting the button press for a specific stimulus and are used to explore the neural correlates of inhibition. This study examines data from 29 neurotypical children between the ages of 4–8 during a Go/NoGo task with zoo animal stimuli. Reaction time on correct go trials, number of correct trials, amplitude and latency of event-related potential (ERP) components were analyzed to determine the degree of change in behavioral inhibition and ERP components as a function of age. Average amplitudes and latencies for three components were obtained: the N1 associated with attention; N2 associated with inhibition; and P3 associated with evaluation of successful inhibition. A Pearson correlation between N2 amplitude of NoGo trials and age indicated a significant association, $r(24) = .479$, $p = .013$. The amplitude of N2 decreased with increasing age suggesting decreasing cognitive effort necessary for inhibition. Additionally, the results demonstrated that younger children have later N2 NoGo latencies than older children suggesting the maturation of neural networks, $r(29) = -.552$, $p = .002$. N2 may be a good candidate for exploring neural inhibition in children and possibly as a biomarker for inhibition in clinical studies.

Poster 2-052

MATERNAL HISTORY OF DEPRESSION AND PARENTING BEHAVIORS: ASSOCIATIONS WITH INFANT NEURAL RESPONSE TO NOVEL STIMULI

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McGill University

Descriptors: Maternal Depression, Parenting Behavior, P3
Maternal depression has been linked to less positive or more disengaged parenting. Children of depressed mothers are also more likely to show early signs of temperament marked by behavioral inhibition and increased vigilance to novelty. However, it is not clear to what extent these child tendencies follow from a genetic familial liability and to what extent they reflect parenting behaviors. We investigated respective associations between maternal history of depression, parenting behavior, and infant neural response to novel stimuli ($N = 54$, prior to interrupted data collection by COVID-19). Mother-infant dyads were observed during free play where mother and infant behaviors were rated. ERP data was collected from 7-month-old infants during a three-stimulus oddball task. Frequent non-target (80%), target (10%) and nontarget novel tones (10%) were presented to elicit the P3 component at frontocentral sites. Behavioral results indicated infants of mothers with depression history had lower levels of positive engagement with their mothers, $t(52) = 2.3$, $p = .03$, $d = .63$. A repeated-measures ANOVA ($N = 28$ with usable ERP data) revealed infants of mothers with depression history had numerically larger P3 magnitude than infants of never-depressed mothers across all stimulus conditions, though this difference was not significant. There were no main or interaction effects of parenting on the magnitude of the P3. Findings suggest that biological risk for depression might be a stronger influence on infant neural responses than parenting behaviors, although a larger sample is needed.

Poster 2-053

REDUCED FLANKER P300 PROSPECTIVELY PREDICTS INCREASES IN DEPRESSION IN FEMALE ADOLESCENTS

Nicholas Santopetro; Alexander Kallen; A. Threadgill; Greg Hajcak
Florida State University

Descriptors: Depression, P300, Adolescence
Past research has found that the P300 is smaller in currently depressed adults as compared to adults with no current depression. Research involving adolescent samples and depression is much more limited and inconsistent; most studies fail to find P300 amplitudes differences between currently depressed adolescents and healthy controls. Previous studies have not examined the potential predictive utility of P300 amplitude in regards to adolescent depression. Therefore, the current study sought to investigate the relationship between P300 amplitude and depression symptoms both at baseline and two years later in a sample of 199 female adolescents. At baseline, participants first completed measures of depression, followed by a speeded response task (i.e., arrow version of flankers) while EEG was recorded. Two years later, participants completed the same depression measures. Reduced baseline P300 predicted increased depression at two-year follow up. Additionally, we observed a significant interaction between baseline depression and the P300, such that individuals with high depression scores and a small P300 amplitude at baseline had the largest increase in depression scores. Baseline P300 was mostly related to anhedonia and negative self-esteem subscales of depression. Our study suggest that reduced P300 amplitude can be utilized as a potential risk marker for adolescents at risk for later increases in depressive symptoms.

Funding: National Institutes of Health (MH097767).

Poster 2-054

THE DEVELOPMENT OF PHYSIOLOGICAL REGULATION OF SOCIAL FEAR: A TRANSACTIONAL MODEL WITH MATERNAL ANXIETY AND INFANT TEMPERAMENTAL FEAR

Anna Zhou[1]; Elizabeth Youatt[1]; Kristin Buss[1]; Vanessa LoBue[2]; Koraly Perez-Edgar[1]
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Descriptors: Respiratory Sinus Arrhythmia, Social Fear, Maternal Anxiety
Early individual differences in physiological regulation during a social fear task is associated with stable, high levels of social fear over time (Brooker et al., 2013). However, it is unclear how maternal anxiety and infant temperament may influence early development of physiological regulation of social fear. This study examined longitudinal transactional processes between maternal anxiety, temperamental fear and respiratory sinus arrhythmia (RSA) reactivity to a stranger in 234 infants. Mothers self-reported anxiety symptoms on the Beck Anxiety Inventory and reported their child's temperamental fear using the Infant Behavior Questionnaire and Toddler Behavior Assessment Questionnaire when infants were 4, 8, 12 and 18-months. RSA reactivity was calculated from a baseline and a Stranger Approach task at 8, 12 and 18-months. An auto-regressive cross-lagged structural equation model from 4 to 12-months ($\chi^2 = .71$, CFI = 1.00,RMSEA < .001, SRMR = .03) noted significant auto-regressive paths for maternal anxiety, infant fear and RSA reactivity. In addition, greater maternal anxiety at 4 m predicted poorer RSA suppression at 8 m, but 8 m anxiety did not predict 12 m RSA. Infant fear at 4m did not significantly predict 8 m RSA, but greater fear at 8 m significantly predicted greater RSA suppression at 12 m. None of the paths with 18 m RSA were significant, and we will discuss stability issues in RSA reactivity in the poster. Results suggest maternal anxiety may shape physiological regulation of social fear from 4 to 8-months, while temperamental fear plays a greater role from 8 to 12-months.

Funding: This study was funded by a grant from NIH (R01MH109692) to Perez-Edgar, Buss and LoBue.

Poster 2-055

MINDFULNESS PROGRAMS AND PROLONGED PHYSIOLOGICAL ACTIVATION DURING STRESS: INTERVENTIONS EFFECTS ON THE SYMPATHETIC, CARDIAC PARASYMPATHETIC AND HPA-AXIS

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Descriptors: Stress, Mindfulness, TSST

Mindfulness interventions (MI) and other forms of contemplative training have been studied in scientific research as a potential approach for effective stress buffering. Even though the effects of MI on the stress response are robust when measured via self-report, the effects of those programs on the physiological stress reactivity are still questionable. The research in this area lacks studies (1) comparing the stress-buffering effects of different MI programs, (2) focusing on the stress response across multiple physiological systems, and (3) considering expanded theory of stress by assessing prolonged physiological activation related to a stressor. Our aim was to compare the effects of two MI programs on the sympathetic, cardiac parasympathetic and HPA-axis response during anticipatory and recovery periods of a laboratory stress task. The psychophysiological stress response (salivary cortisol, alpha-amylase and heart rate variability) to the Trier Social Stress Test (TSST) was assessed after two MI programs, a standard Mindfulness Based Stress Reduction program (MBSR) and a modified version of this program (MBSR-B), which contained an additional module based on a larger Buddhist framework. The group effect was found in the anticipation period, with both MBSR and MBSR-B showing lesser vagal withdrawal and MBSR-B having lesser alpha-amylase area under the curve (AUC) comparing to the control. No group effect was found in the recovery period. The results suggest that type of MI, phase of the stress and the physiological system activated by stress induction are all important factors in the evaluation of MI effects on the reactivity to acute stress.

Funding: Cogito Foundation, Switzerland The Mind & Life Europe Francisco J. Varela Award Faculty of Theology and Religious Studies, University of Lausanne.

Poster 2-056

RPPG DERIVED HRV PREDICTS PERFORMANCE ON FACILITATIVE INTERPERSONAL SKILLS TASK

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Descriptors: RPPG, HRV, Facilitative Interpersonal Skills

Facilitative interpersonal skills (FIS) is an observer rated coding system that measures transtheoretical relational helping skills. FIS has been empirically associated with improvements in psychological and emotional distress in various therapeutic and other caregiving contexts. This study examined the physiological profiles of clinicians with high and low facilitative FIS performance using Noldus FaceReader facial analysis software. FaceReader uses remote photoplethysmography (RPPG) to detect alterations in skin reflectance due to blood volume changes in the tissue under the skin to capture heart rate (HR) and heart rate variability (HRV). Thus, FaceReader allows researchers to remotely and retrospectively record physiological patterns. This study applies FaceReader's RPPG technology to archival video footage of 30 social workers and psychologists from a large urban hospital setting who completed the FIS task before and after the facilitative interpersonal and relational skills training (FIRST) (2018–2019). Preliminary findings show that increased HRV, an index of autonomic flexibility, is associated with greater and improved performance on the FIS tasks. These findings illuminate a promising direction for future research on the physio-emotional base of facilitative interpersonal skills which may inform the development of novel training methods for emerging therapists.

Poster 2-057

THE REWARD POSITIVITY, DELTA, AND THETA IN A SAMPLE OF 500 PARTICIPANTS

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University of Victoria

Descriptors: Reward Positivity, Delta, Theta

Human learning appears to be dependent on evaluation of how the outcomes of our actions align with our expectations. Over the past twenty-three years, electroencephalography (EEG) has been used to probe the neural signatures of feedback processing. Seminal work demonstrated a difference in the human event-related potential (ERP) dependent on whether people were processing correct or incorrect feedback. Since then, these feedback evoked ERPs have been associated with reinforcement learning and conflict monitoring, have been tied to subsequent behavioural adaptations, and have been shown to be sensitive to a wide range of factors (e.g., depression). Recently, research has also turned to frequency decomposition techniques to examine how changes in the EEG power spectra are related to underlying learning mechanisms. Although the literature on the neural correlates of reward processing is vast, there are still methodological discrepancies and differences in results across studies. Here, we sought to provide an investigation of methodological considerations for the ERP (reward positivity) and frequency (delta, theta power) correlates of feedback evaluation in a large sample size research study. Specifically, participants (n = 500) performed a two-armed bandit task. We analyzed component amplitudes, timing, and topography of the reward positivity, delta, and theta EEG power. Our findings provide key information about the data characteristics and relationships that exist between the neural signatures of feedback evaluation and will provide a solid reference of future research.

Funding: The Natural Sciences and Engineering Research Council of Canada (Discovery Grant & CGS-D).

Poster 2-058

TWO NEURAL MECHANISMS SUPPORTING SERIAL CONDITIONING IN THE HUMAN BRAIN

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Descriptors: Serial Conditioning, EEG, Alpha

In a serial compound conditioning paradigm, a sequence of several conditioned stimuli (CS) is predictive to an unconditioned stimulus (US) (e.g., CSA->CSB->US). Animal research showed that, when the US is aversive, CSA elicits the strongest conditioned response, while CSB appears redundant. These effects of primacy and proximity have never been investigated in humans. We studied them in an aversive serial compound conditioning experiment using EEG and ERP responses. Twenty two participants were presented with sequences [CSA->CSB->CSC->CSD]. In 55 trials all four CS were identical vowels (e.g, [oh]), and no US was presented. In the other 55 trials, the CSA was different (CSA+, e.g., [uh]), and the CSD was followed by an electrical shock (US) 2.5 times higher than the individual pain threshold. No ERP component distinguished between CS- and CS+ for the first three stimuli in the sequence (i.e., CSA, CSB, CSC). The last CS (CSD) elicited a strong fronto-central CNV only when it was followed by US. Moreover, already after the CSA- (which signalized that no shock would be presented on that trial) the power of alpha oscillations over the somatosensory cortex significantly increased, particularly on the side contralateral to the hand that was electrically stimulated on US trials. The alpha increment lasted up to the onset of the US. The data indicate two possible mechanisms of adjustment to predictable threat, one of which relies on safety signals (manifested in alpha increment), and the other is related to flight response (manifested in the CNV immediately preceding the shock).

Funding: The study was supported by the German Research Society (Deutsche Forschungsgemeinschaft, DFG), Grant KO-1753/13.

Poster 2-059

MEDIOFRONTAL PREDICTION ERRORS DRIVE BEHAVIORAL IMPROVEMENT DURING NEGATIVE REINFORCEMENT

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Descriptors: FRN, Prediction Error, Reinforcement Learning
Prediction errors (PEs) represent the deviation of received outcomes from expected outcomes. The feedback-related negativity (FRN), a mediofrontal component of the scalp-recorded evoked potential, is thought to signal PEs, but there is disagreement as to whether the FRN encodes signed or unsigned PEs. Additionally, if the FRN encodes PEs as a RL mechanism, it should also predict behavioral improvement, but FRN studies typically omit behavioral analysis. We recorded EEG while participants engaged in a task with matched positive and negative reinforcement outcome modalities. We manipulated outcomes in single trials to produce positive and negative PEs in positive and negative reinforcement. As expected, prediction errors drove behavioral improvement. We used single-trial regression to map signed and unsigned PEs onto the ERP. In negative reinforcement conditions, mediofrontal ERPs signaled unsigned PEs in a time window encompassing the P2 potential, and signaled signed PEs for an extended time window encompassing the P2 and the FRN. The P2 also showed an interaction between signed and unsigned PEs. FRN activity correlated with behavioral improvements on the following trial (controlling for task effects on behavior), suggesting mediofrontal PEs guide behavior during RL. Interestingly, all PE results were significant only for negative reinforcement. These results are in line with recent evidence that separable neural systems drive positive and negative reinforcement learning, and demonstrate that the FRN is a mechanism underlying negative reinforcement learning.

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Poster 2-060

ON THE WAY TO THE ACTIVE LIFE: THE CHANGES IN THE AMATEUR ATHLETE`S BRAIN ACTIVITY

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Descriptors: EEG, Alpha Range, Amateur Sport
It is well known that going in for professional sports contributes to the plastic adaptive changes in the neuronal circuits of the athlete`s brains. The aim of the given research is to detect the changes in brain cortical activity of the university students, who are engaged in amateur sports. 348 healthy volunteers (94 males and 254 females, aged 17 to 23 years old) participated in this study. The amateur sports condition included 67 participants (33 males and 34 females). The control group of non-athletes included 281 participants (220 women and 61 men) with no prior sports experience. EEG was registered during the rest state (3 min) in all frequencies from 0.2 to 45 Hz. We found that the EEG changes in the resting brain that connected to the physical activities are more pronounced in the alpha range. There were a higher level of activation of the short-term and semantic long-term memory (lower and upper alpha respectively) in amateur athletes. At the same time, non-athletes demonstrated an enhanced attentional process such as expectancy (medium alpha). Increased short-distant lower alpha connectivity between anterior frontal–frontal cortical regions may be regarded as an indicator of enhanced external attention (alertness/vigilance) in amateur athletes. An analysis of the alpha asymmetry in both groups revealed that both groups are in a tension state, at that emotion-related arousal is more pronounced in amateur athletes. The revealed association of alpha activity with engagement in sport indicate mechanisms of higher readiness of amateur athletes to respond to new challenges.

Poster 2-061

EPISODIC CONDITIONING: A NEW TOOL TO STUDY THE PHYSIOLOGICAL EXPRESSION OF ASSOCIATIVE EPISODIC MEMORIES

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University of Amsterdam

Descriptors: Associative Memory, Emotion, Conditioning
Our insights in emotional modulation of memory mostly stem from two areas of research that rarely meet: episodic memory and Pavlovian conditioning. This disconnect has left a gap in our understanding of how the memory systems involved in either field interact. To enable the simultaneous investigation of the episodic and psychophysiological components of a single associative memory, we sought to construct and validate a novel experimental paradigm able to create a multitude of emotional memory associations that at the same time elicit strong physiological responses. We created 60 unconditioned stimuli (US) consisting of neutral, negative, and positive images of scenes and people in various settings. Crucially, these can be presented together with corresponding sounds for a multimodal experience of enhanced vividness and emotional charge. By pairing images of neutral objects (conditioned stimuli, CS) with these multimodal US-stimuli across three learning rounds, we tested whether this paradigm would result in conditioned responses to the CS-images. Results show that the negative US stimuli elicit considerable responses on skin conductance, facial EMG, and pupil dilation, which towards the end of learning carry over to the associated CS stimuli. In the positive condition, despite the US-stimuli eliciting physiological responses, these did not transfer to the CS images. The development and validation of this experimental paradigm and stimulus set will open a wide range of new possibilities to do work on the intersection of Pavlovian conditioning and episodic memory research.

Poster 2-062

TO REMEMBER MEANS TO RELIVE: MEMORY RETRIEVAL LEADS TO THE PSYCHOPHYSIOLOGICAL RE-EXPRESSION OF EMOTIONAL EPISODES

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Descriptors: Memory, Emotion, fEMG
Human episodic memory allows to mentally travel back in time and to vividly relive the past. Intuitively, memory solely relates to the past. Yet, episodic memory may also be a simulative process that employs mnemonic information to guide behavior in the present. For this purpose, memories of emotional events are particularly important because emotions elicited during retrieval may signal desirable or undesirable outcomes and thereby motivate behavior. From the perspective that emotional significance is indicated by psychophysiological responses, episodic memory retrieval should re-instate psychophysiological changes that were associated with the original experience. We conducted two experiments to test whether episodic memory retrieval of emotional events can re-instate psychophysiological responses. The second experiment included a preregistered replication and extension of the first ($N1 = 48$, $N2 = 70$). Participants watched positive, negative, and neutral movie clips and remembered the clips one day later. We measured facial electromyography of the zygomaticus major and corrugator supercilii regions to assess the psychophysiological expression of positive and negative memories. We found that when participants remembered movie clips, they re-expressed the emotions that were elicited during encoding. This effect was particularly pronounced for positive memories. Our results suggest that episodic memory retrieval involves the activation of the emotional response system. Such emotional responses to episodic memories might provide crucial information to guide future behavior.

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Poster 2-063

COGNITIVE OVERLOAD AND PUPIL DILATION: A REPLICATION STUDY OF PEAVLER (1970)

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[1]Ural Federal University, [2]University of Tuebingen

Descriptors: Pupillometry, Cognitive Overload, Replication

In 1970, Peavler published a paper declaring that pupil dilation in a digit span task reaching asymptote at 7 items load even in the task of memorizing 13 digits—far exceeding normal capacity limits load. Twenty years later, Granholm et al. (1996) attempted to replicate this finding but came to a different conclusion: the requirement to memorize a sequence of 13 digits evoked a drop in the pupil size returning it to the baseline level. Here, we aimed to replicate both studies in a larger sample and larger number of trials. We employed the digit span paradigm with auditory serial presentation of the digits. The sequences of five, nine or 15 digits with SOA of 1 second corresponded to three levels of WM load. Thirty participants were presented with eight blocks of 18 trials each: 3 baseline trials with passive listening (one per load) followed by 12 trials of digit span task with subsequent recall (4 trials per load) followed by three more passive listening trials. We found that after 7 items load the pupil diameter reached asymptote in the 9-digits condition, which is similar to Peavler's results. But, in contrast to Peavler, in the 13-digits condition pupil size started declining after presentation of the ninth digit and dropped below baseline level before the instruction to recall the sequence. Thus, our data are more consistent with the results by Granholm et al.: exceeding individual verbal WM capacity limits leads to a drop in pupil response instead of reaching asymptote at 7-digits load.

Funding: Study was supported by Russian Foundation for Basic Research (RFBR) #19-013-00027.

Poster 2-064

FAMILIARITY-RELATED FILLER ITEMS ENHANCE THE RT CIT (BUT NOT THE P300 CIT) WITH DIFFERENTIAL EFFECTS ON EPISODIC COMPARED TO SEMANTIC PROTOCOLS

Joseph Olson; Joel Rosenfeld; Ella Perrault
Northwestern University

Descriptors: Information-detection, P300, Concealed Information Test

The reaction time-based concealed information test (RT CIT) typically uses three types of stimuli: (a) probe (i.e., crime-related item), (b) irrelevant (i.e., crime-unrelated item), and (c) target (i.e., irrelevant item assigned a unique response so as to ensure attention to the test). Lukács, et al., (2017) introduced familiarity-related filler items to the RT CIT, enhancing the efficacy of the test for both single and multiple probe (per block) protocols. Our study aims to (a) replicate the effects of familiarity-related filler items on the RT CIT, (b) use P300 to investigate the mechanisms of the fillers-related enhancement effect on the RT CIT, (c) investigate whether these fillers can enhance the diagnostic accuracy of the P300 CIT, and (d) explore the effects of fillers on the semantic and episodic versions of the P300 and RT CITs. Conducting 2 (stimulus type: Probe vs. Irrelevant) × 2 (group: Fillers vs. No Fillers) mixed ANOVAs, we replicated a clear enhancement effect for the episodic RT CIT, but not for the semantic RT CIT. No effects on P300 amplitude or latency were observed. Our study independently replicates a valuable improvement of the traditional RT CIT, investigates the potential mechanisms of this enhancement effect, and demonstrates important differences between the P300 and RT CITs.

Poster 2-065

RETRIEVING COLOR AND SHAPE INFORMATION FROM WORKING MEMORY: THE ROLE OF THE PHC1, HV4 AND VO1 AREAS

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Lomonosov Moscow State University

Descriptors: Visual Working Memory, Visual Perception, Visual Cortex

We studied the role of the visual cortex areas during retrieving color and shape information from working memory. Methods. $N = 22$. Single blots of different colors and shapes (9 shapes, 8 colors) were presented. There were 3 experimental series in which required to remember different characteristics of the stimulus: color, shape, or both color and shape. Then 4 blots were presented, and the subject had to choose a stimulus with a memorized characteristic. EEG was recorded, visual EPs were calculated for the task of retrieving information. Using Brainstorm (Tadel, 2011), we determined the sources of activation in 25 areas of the visual cortex (the dSPM algorithm (Dale, 2000); the coordinates of areas (Wang, 2015)). A connectivity analysis was performed using the Granger causality method (Seth, 2015). Results. Activation of hV4 areas of visual cortex was detected in all series requiring color retrieval at 200 ms. Activation of VO1 areas was present during shape recognition at 300 ms. At 200–300 ms latency, along with activation of the hV4, activation of the posterior parahippocampal cortex (PHC1) was observed and repeated at 300–400 ms latency simultaneously with the activation of the VO1. Discussion: We suggest that activation of PHC1 areas are associated with retrieving information from visual working memory. The stimulus characteristics are transferred from PHC1 to hV4 and VO1 areas. hV4 probably integrates color information from memory and from the image of perception. VO1 performs a similar function when recalling the shape of the stimulus.

Funding: The research was financially supported by the Russian Science Foundation, project No 19-18-00474.

Poster 2-066

STIMULUS FREQUENCY AND OUTCOME VALENCE MODULATE REWARD-POSITIVITY DURING REWARD AND PUNISHMENT FEEDBACK EVALUATION

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Northwestern University

Descriptors: Reward, Punishment, Feedback

The Reward-Positivity (RewP) is a frontocentral deflection following reward and punishment feedback. Reinforcement learning theories propose the RewP reflects a signed reward prediction error (RPE) sensitive to outcome valence while competing accounts propose this component indexes an unsigned salience prediction error (SPE) sensitive to outcome salience. While SPEs increase for salient outcomes (e.g., monetary losses), RPEs increase for favorable outcomes (e.g., avoided-losses). However, evidence from prior studies is mixed. The current study examined outcome valence and stimulus salience effects on the RewP in reward, punishment, and neutral contexts across two experiments that varied how often feedback stimuli were reused between conditions. Experiment 1 revealed decreased stimulus frequency increased the RewP for monetary gains and losses, consistent with salience encoding. However, controlling for stimulus frequency, experiment 2 revealed increased RewP for favorable outcomes in both reward and punishment contexts (e.g., monetary gains and avoided-losses), consistent with RPE accounts. Together, these results reveal salience encoding sensitive to stimulus frequency that may inflate, occlude, or even reverse consistent outcome valence effects for the RewP. These results resolve several inconsistencies in the literature and have important implications for electrocortical investigations of reward and punishment feedback processing. Future studies should carefully consider the dynamic time course and combinatory interplay between salience- and valence-related processing.

Poster 2-067

A LONGITUDINAL STUDY OF INTERHEMISPHERIC TRANSFER TIME IN ADOLESCENTS WITH CONCUSSION

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Descriptors: Concussion, Interhemispheric Transfer Time, Adolescents
Pediatric concussion is a growing public health concern. Children and adolescents account for approximately one third of concussion related emergency department visits. The corpus callosum (CC) is a possible location of concussion-related white matter damage due to rotational and shearing forces, with damage periodically leading to compromised CC structural integrity. Interhemispheric transfer time (IHTT) of visual information across the CC is a direct measure of CC functioning. Previous literature shows significantly slower IHTT in children with head injury as compared to controls, suggesting a connection between slower IHTT and decreased CC functioning. We used the N1 and P1 components of the event-related potential (ERP) to measure IHTT in 20 adolescents with confirmed concussion and 16 healthy control participants within three weeks of concussion (acute) and approximately one year after injury. Separate 2-Group (concussion, control) by 2-Time (3-week, one-year) repeated measures ANOVAs on IHTT latencies of the P1 and N1 components showed no significant differences by group ($p > .22$) nor by time ($p > .61$), with no significant interactions ($p > .09$). A significant Group × Time interaction for P1 amplitude was driven by an increase in P1 amplitude in control, but not concussion participants over time. Results suggest non-significant changes in IHTT in adolescents with concussion as compared to healthy controls after 3 weeks that did not further change after approximately one year. Thus, IHTT may be unreliable as a potential biomarker to diagnose and assess pediatric concussion.

Poster 2-068

BOYS WITH COMPUTER GAME ADDICTION HAVE A RISK FOR EMERGING DEFICIT IN VISUOSPATIAL FUNCTIONS

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Descriptors: Computer Game Addiction, Visuospatial Functions, NEPSY
Children with computer game addiction have a risk for delay in the development of cognitive functions. The goal of this research was to examine the hypothesis that children at the age of 5 with computer game addiction have a risk for emerging weakness in visuospatial functions at the age of 6. We used questionnaire for parents to reveal children with computer game addiction. Experimental group consisted of 14 5-year-old boys with computer game addiction ($M = 5.14$ years, $SD = 0.34$). Control group consisted of 14 boys without computer game addiction. Children from experimental and control group were matched for age and IQ. In the framework of longitudinal research children at the age of 6 from both groups were assessed by 4 subtests from NEPSY which are designed for assessing visuospatial functions (Arrows, Block Construction, Design Copying, Route Finding). ANOVA has revealed the significant differences ($p < .05$) between groups for scores in 3 visuospatial subtests (Block Construction, Design Copying, Route Finding). Children at the age of 6 from experimental group had low level of performance in these subtests in comparison to children from control group. The findings from this study suggest that computer game addiction can have negative effect on the development of visuospatial functions in children. We are going to do further research for revealing the effect of computer game addiction on cognitive development of children in the framework of longitudinal research.

Poster 2-069

EVOKED AND INDUCED GAMMA OSCILLATION ATYPICALITY IN AUTISM SPECTRUM DISORDER

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Descriptors: Autism, Gamma Oscillations, Oddball Task
Electrophysiological studies in autism spectrum disorder (ASD) suggest the presence of an abnormality of the cortical excitation-inhibition (E/I) balance. Higher E/I ratio in ASD children is expressed as well in the frequently reported abnormal patterns of the EEG gamma activity. In this study, gamma frequency oscillations in 35–45 Hz range in a 3-stimuli oddball task with illusory Kanizsa figures were analyzed and compared in 19 ASD and 19 age/gender matched neurotypical children. Time frequency wavelet analysis allowed for the characterization of both evoked and induced gamma activity in response to rare target and non-target Kanizsa, and frequent non-Kanizsa stimuli. Analysis of gamma oscillations was focused on comparison of magnitudes of ascending and descending slopes of gamma oscillations and their differences. Both task-irrelevant stimuli showed larger magnitude of ascending as compared to descending waves of the evoked and induced gamma oscillations resulting in a statistically significant Stimulus × Group interaction at the frontal sites in the ASD group. Post hoc analysis showed higher magnitude of positive as compared to negative slopes of the gamma oscillations in ASD as compared to neurotypicals. The results are interpreted as reflecting deficits of the decay of the oscillations providing further evidence to abnormalities of E/I balance detectable in gamma responses in ASD. The outcomes of this study replicate findings of our group using ERP measures where children with ASD exhibited excessive reactivity to non-target items in similar visual oddball tasks.

Funding: The study was supported by the GHS Transformative Seed Grant to D. Kelly and E. Sokhadze.

Poster 2-070

DISTINCT NEUROPHYSIOLOGICAL DIFFERENCES IN ATHLETES WHO HAVE RETURNED-TO-PLAY AFTER SPORTS-RELATED CONCUSSION COMPARED TO NON-INJURED PEERS

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Descriptors: Sports-related Concussion, Event-related Negativity
Sports medicine studies show that athletes with recent sports-related concussion (SRC) have an increased risk for re-injury at return-to-play. The underlying cause of this increased risk is not completely understood, although behavioral studies suggest that subtle motor deficits may play a role. We posit that a cognitive neurophysiological marker may also help explain athletes' risk of re-injury after SRC. Here, we evaluated 7 athletes (4 males) who were cleared to return-to-play after SRC and 7 age-, sex-, and sport-matched controls. EEG data were collected during a flanker task. Amplitude and latency of the Event-Related Negativity (ERN) and Positivity Error (Pe) at site Cz were evaluated. We found no significant behavioral differences in error rate or response times between groups. Levene's test showed more variability in ERN peak-to-peak amplitude in the SRC group ($F = 4.67$, $p = 0.052$); this may indicate that athletes with recent SRC have greater inconsistency in their use of neural resources when recognizing errors. Independent samples t-tests showed significantly larger Pe peak-to-peak amplitudes in the SRC group ($M = 18.69$) compared to the control group ($M = 11.48$) $t = 2.42$, $p = .032$; this may represent an increased use of neural resources to evaluate and adapt after making errors. Given these neurophysiological differences and the absence of significant behavioral differences, it is possible that athletes with recent SRC require more neural resources to support behavioral performance, and this feature may underlie their risk of re-injury upon return-to-play.

Funding: NIH National Center for Medical Rehabilitation Research, 1 K01 HD096047-01 National Center for Medical Rehabilitation Research via Comprehensive Opportunities in Rehabilitation Research Training (CORRT) Program, 5 K12 HD055931-12.

Poster 2-071

AUDITORY ERPS AND BEHAVIOR IN AN ANIMAL MODEL OF ADHD: EVIDENCE FOR HYPERACTIVITY AND IMPULSIVITY BUT NOT INATTENTION

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Descriptors: ADHD, Animal Model, ERPs

Rats lacking the latrophilin-3 (*Lphn3*) gene (i.e., knockouts, KO) have been proposed as an animal model of attention deficit hyperactivity disorder (ADHD) based on research with humans linking the gene to ADHD risk and severity. Given event-related potential (ERP) and inhibitory control differences reported between people with and without ADHD, we compared the P1, N1, P2, and N2 ERP components of KO and wildtype (WT) rats during a passive auditory task, along with performance on a differential reinforcement of low rates (DRL) task (a behavioral measure of inhibitory control). Electroencephalographs (EEG) were recorded using subdermal needle electrodes at frontocentral sites (referenced to the postauricular region) while freely-moving rats were presented 5-tone trains (50-ms tones, 400-ms tone onset asynchronies) with varying short (1-s) and long (5-s) inter-train intervals (ITIs). Peak amplitudes of the P1, N1, and N2 did not differ between genotypes, but KOs had attenuated P2s after the first tone following the 5-s ITI. The P1 peaked earlier in KOs than WTs following the 5-s ITI, as did the N1 across conditions. While amplitude differences between the KOs and WTs did not mimic those between people with and without ADHD, the earlier peaks in KOs are indicative of relatively fast automatic processing. DRL performance of the KOs was worse than that of WTs, which is consistent with results from individuals with ADHD. In combination, these results suggest the KO rats may more accurately represent the impulsive-hyperactive ADHD subtype than the inattentive or combined subtypes.

Poster 2-072

A SYSTEMATIC DATA-DRIVEN APPROACH TO ANALYZE SENSOR-LEVEL EEG CONNECTIVITY: SURFACE LAPLACIAN WITH SPECTRAL-SPATIAL PCA IDENTIFIES RELIABLE ALPHA AND THETA NETWORK COMPONENTS

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Descriptors: Functional Connectivity, Resting EEG, Alpha/Theta Networks

Heterogeneous approaches to reducing the complexity of EEG functional connectivity (FC) undercut confidence in their validity and reliability. Extending prior work, we combined scalp current source density (CSD; spherical spline surface Laplacian) and spectral-spatial PCA to identify FC components. Phase-based FC was estimated via debiased weighted phase-locking index from CSD-transformed resting EEGs (71 sites, 8 min, eyes open/closed, 35 healthy adults, 1-week retest) to mitigate volume conduction and improve spatial resolution. Spectral PCA extracted 6 robust alpha and theta factors (86% variance). Subsequent spatial PCA for each spectral factor revealed regionally-focused (posterior, central, frontal) and long-range (anterior-posterior, frontal-temporal) alpha components (peaks at 8, 10 and 13 Hz) and less robust midfrontal theta (5 and 6 Hz) components. These spatial FC components overlapped with well-known networks (e.g., default mode, visual, sensorimotor), with some being sensitive to eyes open/closed conditions. Most FC components had good-to-excellent internal consistency (odd/even epochs, eyes open/closed) and test-retest reliability (ICCs ≥ .8). Moreover, the FC component structure was generally present in subsamples (up to single-subject level), as indicated by similarity of factor loadings across PCA solutions. Apart from systematically reducing FC dimensionality, our approach avoids arbitrary thresholds and allows quantification of meaningful and reliable network components that may prove to be of high relevance for basic and clinical research applications.

Funding: This research was funded by National Institute of Mental Health (NIMH) award MH115299.

Poster 2-073

BAND POWER ANALYSIS: AN EVALUATION OF INTERICTAL MIGRAINE USING AN EYES-OPEN VS. EYES-CLOSED EEG PARADIGM

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Descriptors: Migraine EEG, Headache Disorders

Migraine is a primary headache disorder characterized by abnormal cortical activity; however, less is known about electroencephalographic (EEG) activity during interictal, or asymptomatic, periods of the migraine cycle. We examined the role of resting-state condition (eyes-open vs. eyes-closed) and headache diagnosis (migraine vs. healthy control) on absolute delta, theta, alpha, and beta band power. Continuous EEG was recorded from Cz during symptom-free periods under eyes-open rest (EOR) and eyes-closed rest (ECR) conditions for 5 min each. We hypothesized that migraineurs would have greater alpha power and slow-wave activity than controls. We further hypothesized that band power would differ based on resting-state condition. Our analysis of the delta band did not reveal significant differences, possibly due to a floor effect given the low delta power in both groups. Theta was greater during EOR than ECR in both groups. As predicted, both migraineurs and controls were characterized by an increase in alpha during ECR and a decrease in alpha during EOR, with this difference being greater in migraineurs. Contrary to our prediction, migraineurs had greater beta band power during EOR than ECR, whereas the opposite was true of controls. Consistent with previous research, alpha band power is elevated in migraine, even during resting-states. Overall, resting-state differences present in migraine point to greater alpha activity as a potential cortical marker of migraine; however, our findings point to the need to further investigate other slow- and fast-wave frequency bands.

Poster 2-074

THE INFLUENCE OF SAFETY AND THREAT ON PAIN PERCEPTION

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Descriptors: Learned Safety, Pain Perception, Instructed Conditioning

Threat, e.g., signalled by a stimulus associated with an aversive outcome, was repeatedly found to increase pain perception. On the contrary, the effects of safety, e.g., signalled by a stimulus associated with threat absence, on pain are rather unexplored. Therefore, we compared two experimental groups (N = 87), which underwent either threat or safety conditioning. During the following test phase, the previously conditioned THREAT versus SAFETY cue and a NEWly introduced visual cue were presented simultaneously with pain stimulation. The threat group underwent a classical fear conditioning procedure. In contrast, the safety group experienced a neutral visual stimulus and an aversive electro-tactile stimulation (US) as being unassociated as they were strictly separated in time (ISI: 12–32 s). During the test phase, participants received heat pain stimuli along with the THREAT or SAFETY or NEW visual cue. Affective ratings for threat and safety cues following the conditioning phase demonstrated successful learning. However, the induction of safety was not maintained during the test phase. Furthermore, only the threat group distinguished THREAT and NEW cues. Ratings of the heat pain stimuli were rather similar in both groups, regardless of the THREAT, SAFETY or NEW conditions. SC and HR did not differ between groups, neither. Results demonstrate that the establishment and maintenance of threat and even more of safety is rather fragile in the presence of concurrent pain. This should be addressed in future experiments e.g., by employing aversive US other than somatosensory stimulation.

Poster 2-075

ELECTROPHYSIOLOGICAL CORRELATES OF PERFECTIONISM: ERROR-RELATED NEGATIVITY AND FEEDBACK RELATED NEGATIVITY AND THEIR RELATIONSHIPS WITH SELF-ORIENTED AND SOCIALLY PRESCRIBED PERFECTIONISM

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Descriptors: FRN/ERN, Perfectionism, SPP/SOP

Can aspects of perfectionism be measured electrophysiologically? Two facets of perfectionism that have been identified in the literature are socially prescribed perfectionism (SPP, externally motivated) and self-oriented perfectionism (SOP, intrinsically motivated). There are also two event-related potential (ERP) components of performance monitoring; feedback-related negativity (FRN), which occurs after negative external feedback, and error-related negativity (ERN), which occurs after internally recognized errors. We hypothesized that these two ERP components (FRN/ERN) should map onto these two facets of perfectionism (SPP/SOP), respectively. Measurements of conscientiousness and neuroticism were used as covariates because they have been shown to correlate with ERN and FRN amplitudes as well as SPP and SOP scores. Thirty-one participants (14 female, mean age 21.5 years) completed a Flanker task (ERN) and a modified Doors (gambling) task (FRN). Multiple regression analyses revealed that SOP and neuroticism scores were significant predictors of FRN amplitude. Specifically, lower FRN amplitudes are associated with increased levels of SOP. However, SOP score was not a significant predictor of ERN amplitude but was related to the neuroticism score. To our knowledge, this is the first study to link electrophysiological measures of performance monitoring with SPP and SOP traits.

Funding: Council for Research in the Social Sciences (CRISS, Brock University).

Poster 2-076

A RE-EXAMINING OF THE RELATIONSHIP BETWEEN BIS/BAS SCALE SCORES AND CARDIOVASCULAR MEASURES IN EMOTIONAL DAMPENING STUDIES

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Descriptors: Gray's Reinforcement Sensitivity Theory, Blood Pressure, HF HRV

Cardiovascular emotional dampening refers to a constellation of psychological and behavioral phenomena related to resting cardiovascular functioning. Among these, a propensity towards behavioral approach and engagement in risk-taking behavior have been linked to higher resting blood pressures (BP) in normotensive individuals. Some researchers have questioned the usefulness of self-report measures of motivation in emotional dampening studies due to discrepant findings with previously reported electroencephalographic (EEG) data. The present study is an analysis of a combined dataset from two different emotional dampening studies where self-reported motivational data were either unrelated to resting BP or were related in such a way that was discrepant with the existing literature. Specifically, this was done to determine if a larger sample (n = 169) would demonstrate different relationships between self-reported motivational data and cardiovascular measures than was observed in those studies individually. Each dataset contained measures of resting BP, resting HF HRV, and self-report measures of motivation (via BIS/BAS scales). Results revealed significant relationships between BIS/BAS scores and resting BP that are consistent with previous EEG findings. Notably, BIS was negatively related to resting SBP, $r = -.22$, $n = 169$, $p = .004$, 95% CI [−.36, −.07], while BAS Fun seeking was positively related to resting SBP, $r = .17$, $n = 169$, $p = .021$, 95% CI [.03, .32]. Self-report measures of motivation, like the BIS/BAS scales, might yet be of use in emotional dampening studies.

Poster 2-077

YOUR GUESS IS AS GOOD AS MINE: ASSESSING PHYSIOLOGICAL MARKERS OF FEAR AND ANXIETY TO THE UNKNOWN IN INDIVIDUALS WITH VARYING LEVELS OF INTOLERANCE OF UNCERTAINTY

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University of Reading

Descriptors: Anxiety, Intolerance of Uncertainty, Psychophysiology

Fear of the unknown is thought to underpin individual differences in self-reported intolerance of uncertainty (IU). Over the last decade, IU has gained substantial interest and now sits at the forefront of anxiety and stress research. Despite the emergence of IU as a construct, there is a dearth of literature on the extent to which the known vs. the unknown during threatening contexts induces fear and anxiety in individuals with high IU. To address this question, we manipulated the known and unknown during a classic anxiety task (n = 93). Throughout the task, we measured a variety of physiological indices (i.e., sweating, pupil dilation, startle blink and facial frowning). Higher IU, relative to lower IU, was associated with physiological markers of fear and anxiety (i.e., startle blink and facial frowning) during conditions with known, compared to unknown threat. These findings provide evidence that IU-related fear and anxiety during threatening contexts is driven by the perception that something known isn't correct or complete, rather than when something is entirely unknown. Ultimately, this research will inform future models of IU in relation to anxiety and stress disorders.

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Poster 2-078

ABERRANT PROCESSING OF IMAGINED NEGATIVE SCENARIOS ACROSS THE INTERNALIZING SPECTRUM

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Descriptors: Anxiety, Depression, Late Positive Potential

Despite the potential importance of negative mental imagery (e.g., imagining or avoiding thinking about negative events) to internalizing disorders like anxiety and depression, most work has examined the processing of negative stimuli in these disorders by using emotional percepts (e.g., pictorial stimuli). This work has typically found that anxiety is associated with increased processing of negative stimuli. Increased attention to negative stimuli has also been found in depression; however, a growing body of work also reports blunted processing of emotional stimuli in depression (Bylsma et al., 2008). Here, we used a novel imagery paradigm (MacNamara, 2018) and the late positive potential (LPP) to determine whether anxiety and depression are associated with aberrant processing of imagined scenarios. Fifty-seven participants with mixed internalizing symptoms listened to audio descriptions of negative and neutral scenes prior to imagining these scenes and making valence ratings. Results showed that depression (symptoms and diagnosis) was associated with smaller LPPs to negative versus neutral imagery, whereas a diagnosis of generalized anxiety disorder was associated with larger LPPs to negative imagery. Symptoms of depression were also associated with less unpleasant ratings of negative imagery, whereas social anxiety symptoms were associated with more unpleasant ratings. Therefore, depression is associated with reduced neural and subjective processing of negative imagery, whereas anxiety is characterized by the opposite pattern of neural and behavioral response.

Funding: Annmarie MacNamara was funded by NIMH K23MH105553.

Poster 2-079

EXAMINING THE ROLE OF EVENT-RELATED POTENTIALS DURING SELF-REFERENTIAL PROCESSING IN CURRENT AND REMITTED DEPRESSION

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Descriptors: Depression, Self-Referential Processing, Late Positive Potential
Negative self-referential biases characterize individuals with major depressive disorder (MDD), which have been studied using the late positive potential (LPP), a stimulus-locked ERP that is elicited by emotionally significant stimuli. Previous research has shown a larger LPP to negative words relative to positive words in MDD, in contrast to healthy controls showing the opposite pattern, but few studies have examined whether this bias/LPP effect/aberrant bias resolves upon remission. The current study aimed to determine whether negative self-referential bias, as measured by the LPP, differentiates current MDD from those with a history of MDD (i.e., remitters). Eighty adults (n = 31 current MDD; n = 19 remitted MDD; n = 30 healthy controls [HCs]) completed a self-referential encoding task in which the LPP was elicited by positive (e.g., friendly, hopeful) and negative (e.g., lonely, sad) words from the Affective Norms for English Words. Results indicated that the current MDD group showed a negative self-referential bias as evidenced by a blunted LPP to positive relative to negative words, which was significantly different from the HCs. Although the remitted MDD group failed to differentiate from both the healthy control and current MDD groups, the LPP to positive words in the remitted MDD group was between the current MDD and HC groups—differences which trended toward significance. These findings suggest that the negative self-referential bias may resolve upon remission, which suggests that the LPP may be a potential state marker of depression.

Poster 2-080

DIFFERENTIAL PREDICTION OF CUD ACROSS LATENT FACTORS UNDERLYING THE LATE POSITIVE POTENTIAL TO CANNABIS CUES: A PRINCIPAL COMPONENTS ANALYSIS

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Auburn University

Descriptors: Principal Component Analysis, Late Positive Potential, Cannabis Use Disorder
Cannabis Use Disorder (CUD) has become increasingly prevalent in the US over the past two decades, but our understanding of its neurobiological mechanisms is limited. Recent work demonstrated that acute stress-elicited enhancement of cannabis cue incentive salience, indexed by the late positive potential (LPP) to cannabis cues, may be important to CUD's etiology. Previous principle component analyses (PCA) on emotional modulation of the LPP suggests that scalp-recorded LPP amplitudes to cannabis cues arise from multiple underlying components with differing temporal and spatial properties, indicating a need for a PCA on drug cue modulation of the LPP. We conducted a temporospatial PCA on pre and post-stressor LPP amplitudes to identify latent factors that (a) differentiated cannabis vs. neutral images and (b) were sensitive to CUD pathology. A sample of frequent cannabis users (n = 105) viewed cannabis and neutral images before and after a laboratory stressor during EEG. Our analyses revealed seven factors in the 400–3,000 ms range that differentiated cannabis vs. neutral images, Fs > 10.10, ps < .003; P3-window factors had frontal, central, and parietal-occipital maxima whereas later factors had parietal and frontal-central/frontal maxima. Mixed model ANOVAs revealed that CUD severity, F = 4.18, p = .04, and craving, F = 8.18, p = .005, were only sensitive to post-stressor, late frontal/frontal-central factors. Future research on LPP modulation by drug cues should consider >1,000 ms stimulus durations, frontal-central poolings, and PCA to isolate pathology-sensitive components.

Funding: This research was supported by National Institute on Drug Abuse (NIDA) grant F31DA039644.

Poster 2-081

REACTIVITY IN WOMEN VETERANS: VETERANS STARTLE LESS THAN CIVILIANS, EVEN WITH PTSD

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Descriptors: Fear Potentiated Startle, Heart Rate, PTSD
Veteran women are unique, sharing past military experience with veteran men and day-to-day societal expectations with civilian women. Military service both increases resilience to high stress environments and the risk of developing posttraumatic stress disorder (PTSD). Mixed evidence suggests female sex is associated with increased hyperarousal in PTSD. The present study examined the potential impact of veteran status and sex on fear potentiated reactivity. Skin conductance and heart rate reactivity during a fear-potentiated startle paradigm were compared between veteran women (N = 27), civilian women (N = 25) and veteran men (N = 41). We hypothesized veteran women would be less physiologically reactive compared with civilian women but more reactive than veteran men. We further hypothesized that there would be no group differences among individuals diagnosed with PTSD. Latent growth curve modeling of acoustic startle reactivity across multiple trials revealed significant group differences where veteran women differed from civilian women (Cohen's ds > .8) but not from veteran men (Cohen's ds < .1). This pattern was consistent in PTSD subsample analyses except within an ambiguous threat condition. These physiological differences were present despite no self-reported group differences in perception or fear of the startle probe (ds < .1). The present study suggests veteran status is associated with increased physiological resiliency to a laboratory stressor in women. Veteran status may be an important factor when assessing physiological reactivity in women.

Funding: Veterans Health Administration Advanced Fellowship in Women's Health San Francisco Veteran Affairs Medical Center 4150 Clement St (116H), San Francisco, CA 94121, USA.

Poster 2-082

NEUROPHYSIOLOGICAL PROFILES OF PSYCHOSIS RISK: EXAMINING RELATIONSHIPS BETWEEN COGNITIVE FUNCTION, ERPS, AND SYMPTOM SEVERITY

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Descriptors: Psychosis Risk, Cognitive Profile, Psychophysiology
Cognitive impairments in schizophrenia include abnormalities in executive function, attention, and semantic processing. ERPs are used as neurophysiological measures of cognitive impairment to supplement neuropsychological assessments. While much research exists on schizophrenia, less is understood about profiles of functioning (relationships between ERPs, cognition, and symptoms) across people at risk for psychosis. Community participants (n = 39) exhibiting psychosis risk were recruited. Recorded ERPs include: N400 (semantic processing), ERN (error-monitoring), and P300 (attention). Neuropsychological assessments reflected cognitive function: working memory, language, executive function, and processing speed. Profiles of risk were computed across each ERP, cognitive domain, and symptom domain; n = 39. Symptom domain scores on Multidimensional Schizotypy Scale were elevated compared to general population (positive (M = 6.36, SD = 6.73), negative (M = 7.26 SD = 7.10), disorganized (M = 8.26, SD = 8.25)). Bivariate correlations across individual ERP and external variables yielded small to medium effect sizes (r's = −.01 to −.41). Profile analyses were run to compare ERP correlation patterns in order to determine the degree to which profiles of risk were similar: P3/ERN (r = −.82), ERN/N4 (r = −.62), and N4/P3 (r = .39). Additional analyses show potential mediating effects of cognition on ERPs and symptoms. Aberrations in ERP amplitude, coupled with fluctuations among cognitive function and symptoms, suggest preliminary and unique profiles of individuals at risk for psychosis.

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Poster 2-083

THE REWARD POSITIVITY IN A NOVEL, FOOD-BASED DOORS TASK RELATES TO DEPRESSIVE SYMPTOMS IN WOMEN WITH EATING DISORDERS

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Florida State University

Descriptors: Reward Positivity, Depression, Eating Disorders

Both depression and eating disorders have been linked to dysregulation of the reward system. The Reward Positivity (RewP) is a neural marker of reward sensitivity that has been evaluated in depression; however, little work has examined the association between RewP and depression in the context of eating disorders. The present study assessed RewP and depressive symptoms in women (n = 38) with current or partially remitted eating disorders based on a structured diagnostic interview. A novel variant of the Doors task eliciting RewP to a food reward was used; in this version, participants won and lost M&M candies instead of monetary incentives. We examined the average ERP activity 250–350 ms at the FCz electrode site following win and loss feedback. Results indicated that greater self-reported depressive symptoms were related to both a blunted neural response to rewards and a larger neural response to losses in the M&M Doors task. These findings extend the literature by demonstrating that the RewP is a relevant neural marker for depressive symptoms in individuals with eating disorders. Further, this study validated a novel M&M-version of the Doors task and indicates that this is a viable method to elicit the RewP in this population.

Poster 2-084

RESTING POSTERIOR ALPHA POWER IN ADOLESCENT MAJOR DEPRESSIVE DISORDER

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Descriptors: Resting State Posterior Alpha Power, Electroencephalography, Adolescent Major Depressive Disorder

Differential activity in posterior EEG alpha oscillations has been reported in major depressive disorder (MDD). Although prior research has generally focused on frontal alpha power and asymmetry, resting state alpha is generally maximal over posterior electrode sites. Thus, the current study used eyes closed 129-channel resting EEG data (average reference) from depressed (MDD = 31) and healthy (HC = 35) female adolescents ages 13–18 years to investigate the role of posterior alpha in MDD. Overall posterior alpha power (8–13 Hz) and asymmetry (right vs. left hemisphere) were quantified via Fast Fourier Transform. Results indicated that MDD adolescents had significantly reduced posterior alpha compared to HC (p = .046, η_p^2 = 0.06), which was associated with greater depression symptom severity and trait dependency (ps < .05). Further, a significant group by hemisphere interaction showed that MDD adolescents exhibited significantly larger posterior alpha over the right vs. left hemisphere (p = .01, d = .54), whereas HC showed no asymmetry (p = .79, d = .05). Relatively greater alpha over the right vs. left hemisphere correlated with depression symptoms, anhedonia symptoms, and rumination (ps < .05). Exploratory analyses found that reduced posterior alpha was associated with suicidal behaviors, but not suicidal thoughts, above and beyond depression severity. Overall, reduced posterior alpha, or greater cortical activity, may be a promising neurobiological index of adolescent MDD, and more broadly may relate to risk factors—dependency and rumination—characterized by enhanced perseveration.

Funding: K23 MH097786 and Tommy Fuss Fund.

Poster 2-085

OPTIMAL TRANSCRANIAL STIMULATION: IDENTIFICATION AND CONTROL OF LARGE SCALE BRAIN NETWORKS

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Descriptors: Stimulation, Control, Simulation

Local interventions in circumscribed brain regions, via deep brain stimulation or transcranial methods like TMS or TES, impact neural network activity across a broad spectrum of spatially distant, but topologically associated, brain areas. A systems-level model-based approach is used to predict the response to transcranial electrical stimulation. Furthermore, we propose an optimal stimulation policy that balances model performance and the aggressiveness of stimulation, to minimize dose for participants while still achieving the desired effect. This is achieved in a two step process: (a) a system identification algorithm is used to *simultaneously* estimate intrinsic connectivity parameters, remove stimulation artifacts, and source localize scalp EEG. The observability and controllability of the identified systems are mathematically quantified to help guide future transcranial stimulation experiments. (b) An optimal control strategy is proposed, to causally investigate the role of functional networks in cognition and behavior. For experiments examining event-related psychophysiological measures such as EEG, it is important that control is administered with respect to the timing of incoming stimuli. A finite horizon control strategy drives the system towards an *a priori* chosen target state at a critical time in the epoch. In this way, we can potentially prepare the brain in different configurations for upcoming experimental stimuli. To demonstrate the feasibility of the work, the system identification and optimal control algorithms are validated on simulated EEG data.

Poster 2-086

EXPLORING SENSORY PROCESSING IN TYPICAL DEVELOPMENT AND AUTISM SPECTRUM DEVELOPMENT USING FACTOR MIXTURE MODELLING AND EVENT-RELATED POTENTIALS

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Descriptors: Autism, Heterogeneity, Event-related Potentials

Sensory processing in autism is heterogeneous, and the relation between psychophysiological and questionnaire sensory measures in ASD remains unclear. The present study used factor mixture modelling at two longitudinal time points (2–4 and 4–9 years.) to describe subgroups of young ASD (n = 190) and TD children (n = 95) based on the caregiver-report Short Sensory Profile (SSP). Subgroups varied in the extent to which different subscales influenced overall SSP performance. Auditory ERPs were obtained from a majority of autistic participants at Time 1 (n = 115). 61-channel EEG was recorded while children listened to complex tones of 50, 60, 70, and 80 dB SPL via binaural headphones (~250 trials/condition); SOBI ICA was used to process data. P1 amplitudes were mean left and right hemisphere frontocentral voltages ±50 ms around the grand average peak in each condition across groups. Three subgroups were defined: (a) one with almost all of the TD (n = 92) and many ASD (n = 113) participants and a relatively typical sensory pattern, (b) a group of 53 ASD and 2 TD participants exhibiting extreme low energy/weakness, and (c) 24 ASD and 1 TD participants showing atypical SSP scores across many subscales. In ASD, P1 amplitudes significantly differed across subgroups, p = .02. Autistic participants in subgroup 3 exhibited larger P1 responses than those in other groups. Autistic children in subgroups 2 and 3 also had higher anxiety and more sleep disturbances than those in 1. This study furthers our understanding of the convergence between neural and questionnaire-report sensory measures in ASD.

Funding: This study was funded by the UC Davis MIND Institute, by the Robert Shoes Fund, by Scott & Jennifer Fearon, by the UC Davis Deans' Distinguished Graduate Fellowship, by the NIH (1R01 MH089626-01), the NIMH (U24MH081810), and by an Autism Center of Excellence grant awarded by the NICHD (P50 HD093079).

Poster 2-087

A BAD PLACE IN FEATURE SPACE: AVERSIVE ASSOCIATIVE LEARNING IN THE VISUAL FIELD

Wendel Friedl; Andreas Keil
University of Florida

Descriptors: Vision, Attention, Learning

Processing capabilities for many low-level visual features remain experientially malleable throughout the lifetime, aiding sighted organisms in adapting to dynamic environments. Visual field location is known to be a potent modulator of visuocortical activity, enhancing, for example, visual responses to stimuli appearing at cued spatial positions. However, it remains undetermined if a given retinotopic spatial position can attain prioritized cortical representation through experience. Employing a differential classical conditioning paradigm, this work examined visuocortical response changes as human observers learned to associate specific spatial locations with aversive outcomes. EEG was recorded while 51 healthy undergraduates viewed individually presented, high-contrast Gabor patches appearing at one of five different on-screen locations. Patches were flickered to produce steady-state visual evoked potentials (ssVEPs) at a temporal frequency of 15 Hz, with one spatial location (manipulated between-participants) paired with an aversive 90 dB white noise auditory stimulus for the final 200 (out of 350 total) trials. Both alpha band (9.6–13.2 Hz) and ssVEP signals showed marked changes in the noise-paired condition compared to baseline trials. Consistent with similar conditioning studies manipulating basic visual features such as orientation, parietal alpha-band activity showed a linear decrease leading up to the conditioned location, while the occipital ssVEP displayed a non-linear, difference-of-Gaussian signal change pattern consistent with lateral inhibition.

Funding: This work was supported by the National Institutes of Health, grants R01 MH112558 and R01 MH097320 to AK.

Poster 2-088

THE COGNITIVE PROCESS FOR THE DETECTION OF HUMANS IS PRIORITIZED EVEN UNDER HIGH ATTENTIONAL LOADS: AN ERP STUDY

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Descriptors: Event-related Potential, Anterior N2, Attentional Load

Human beings are able to quickly detect other people in visual scenes. In this study, we examined whether this ability occurred even under the high attentional loads or not. In the experiment, we presented images with and without human images as task-irrelevant stimuli and measured the anterior N2 as the indicator of the ability which can detect other humans. In addition, we manipulated the attentional loads (i.e., high or low) when viewing the images to examine the effects of attention. The results indicated that the anterior N2 elicited by images with humans was larger than that elicited by images without humans, even when the attentional load was high. This suggests that the cognitive processing for the detection of humans is prioritized even under the high attentional loads.

Poster 2-089

NEURAL RESPONSES TO ANTICIPATING VS. ENCODING MINIMAL INGROUP AND OUTGROUP FACES

Youngki Hong; Allison Auten; Anudhi Munasinghe; Kyle Ratner
University of California, Santa Barbara

Descriptors: Face Processing, Intergroup Bias

It is often the case that we know whether we will encounter an ingroup or outgroup member before such an interaction takes place. The current study examines the effects of a minimal group paradigm on cortical activity associated with both anticipating and structural encoding faces. We assigned participants into one of two groups using a minimal group paradigm and recorded their event-related potentials (ERPs) when participants were cued that they would see an ingroup or outgroup face (500 ms before the face appeared) and then when they categorized the actual face as belonging to their novel ingroup versus outgroup. The results of our analysis showed that the amplitude of the N170, which peaks around 170 ms following face onset and is typically interpreted as reflecting face structural encoding, did not differ between ingroup and outgroup faces. Interestingly, however, we found an ERP response similar to the N170 (i.e., a negative-going potential around 170 ms) in response to group membership cues, and that ingroup cues elicited larger responses (i.e., more negative-going) than outgroup cues. Our findings suggest that anticipating ingroup and outgroup faces may result in neural responses similar to actual encoding of the same faces, and that mere identification with a group may lead to different neural responses of anticipating but not encoding of ingroup and outgroup faces.

Poster 2-090

LARGER REWARD PREDICTION ERRORS ARE TRIGGERED BY UNEXPECTED OUTCOMES EVEN FOR OTHERS

Chikara Ishii; Jun'ichi Katayama
Kwansei Gakuin University, Department of Psychological Science

Descriptors: Feedback-related Negativity, Reward Prediction Error, Social Factor

The reward prediction error (RPE) is a requirement for behavioral adjustment and measured with the feedback-related negativity (FRN), an event-related brain potential. Previous studies have shown that unexpected negative outcomes elicit larger behavioral change and exhibit a larger FRN amplitude. We investigated whether unexpected outcomes also elicited larger FRN than expected outcomes for others. Pairs of participants alternated in a time-estimation task while their brain activities were recorded with EEG in a cooperative context. The task featured easy and hard blocks in a counterbalanced order. In the former, correct responses were expected while erroneous responses were unexpected. These expectations were reversed for the hard condition. Epochs were averaged over agency (self, other), expectancy (expected, unexpected), and outcome (correct, error) within subjects. The behavioral measures indicated a greater change in response time for incorrect trials than correct trials and the magnitude of this change was larger the outcome was unexpected. The ANOVA for the difference FRN (erroneous–correct trial) indicated significant main effects of agency and expectancy. Feedback related to oneself elicited larger FRN amplitudes than for others and outcomes that were unexpected elicited larger FRN amplitudes than expected ones. These results indicate that the RPE for others is relatively small, but is calculated in a similar way to oneself.

Funding: Part of this study was supported by Special Research Fund A of 2019–2020 funds from Kwansei Gakuin University awarded to Jun'ichi Katayama. The experiment was conducted as part of a project supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), JAPAN, for the Strategic Research Foundation at Private Universities (2015–2019; Project number S1511032) at the Center for Applied Psychological Science (CAPS), Kwansei Gakuin University.

Poster 2-091

LEXICAL ACCESS IN HIGHLY PROFICIENT EARLY AND LATE SPANISH-ENGLISH BILINGUALS: AN ERP STUDY

Lissete Gimenez; Yejin Bae; Susana Cruz Garcia; Esther Kim; Aliaifler Parra Ramos; Jill Grose-Fifer
John Jay College of Criminal Justice, City University of New York

Descriptors: Code-switching, ERP, Bilingualism
Research suggests that code-switching between two languages is possible because of the simultaneous activation of both languages via a shared lexicon. However, most research has compared monolinguals with bilinguals, or bilinguals with different proficiencies. In this study, we used two event-related brain potentials, the P200 and N400, to measure language access using interlingual homographs, in Spanish-English bilinguals. Twenty-nine Spanish-English bilinguals (who were highly proficient in both languages) read English sentences that contained Spanish-English homographs. Early, but not late, English learners showed interlingual priming when the Spanish meaning of the homograph fit the sentence, as evidenced by larger, more positive P200s and less negative activity in the early portion of the N400, relative to the unprimed condition. However, all participants showed greater early and late N400 priming for the English meaning than the Spanish meaning of the homographs, which is perhaps not surprising given the predominance of English words in the task. Our findings suggest that bilinguals who learn both languages at an early age, may either have easier access to both lexicons, or possibly less effective suppression of one language (in this case Spanish). In contrast, late learners have more effective early suppression of L1, possibly because they habitually strongly suppress L1 when engaging in L2 tasks. The strength of lexical connections increase with higher proficiency, thus we would expect that L1 or L2 access is dependent on the linguistic context in this population.

Poster 2-092

THE POWER OF "GOOD": ADJECTIVES RAPIDLY UPDATE MESSAGE LEVEL REPRESENTATIONS

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University of Illinois, Urbana-Champaign

Descriptors: Sentence Comprehension, Event-related Potentials, Representation Updating
Can a single adjective immediately influence message-building during sentence processing? We presented 32 participants with 168 short sentences such as "The other driver was so angry he threatened him with a LOADED/CIVIL gun/lawsuit." We asked if the unfolding message level representation can be rapidly updated by the adjective, changing the resulting pattern of facilitation at the noun. We were also interested in whether such updates unfold symmetrically—not only increasing, but also decreasing, the fit of particular nouns. We manipulated the pre-adjectival cloze probability of the noun and the amount of updating the adjective provided, and measured ERPs to the adjective and the noun. Patterns of N400 amplitude at the noun revealed that adjectives succeeded in updating the message, and did so symmetrically, both toward information that fit the adjective and away from information that did not. However, the updating was not as potent as the global context in determining N400 amplitude and the adjective could not fully override the initial semantic context. On the adjective, cluster-based permutations showed that updating itself was not associated with any discernible modulation. Overall, these results show that context-based representations can be rapidly strengthened and weakened when additional lexico-semantic information becomes available. However, local information does not always fully override the influence of prior context.

Funding: This work was supported by a Marie Skłodowska-Curie Individual Fellowship 800046 to J.M.S. and National Institute on Aging Grant R01-AG026308 to K.D.F.

Poster 2-093: Late-breaking Student Poster

SPONTANEOUS PRE-STIMULUS ALPHA ACTIVITY PREDICTS VISUAL, BUT NOT AUDITORY, DETECTION

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Descriptors: Alpha Oscillations, EEG
A substantial body of literature has linked cross-modal (visual to auditory) shifts in attention to increases in parieto-occipital alpha oscillatory activity (8–12 Hz). Because increases in parieto-occipital alpha activity have been linked to failures of visual detection, these changes are often interpreted in the context of suppressing the flow of task-irrelevant visual information. However, few studies have examined the relationship between spontaneous parieto-occipital alpha activity and auditory detection. In this study, we examined the relation between pre-stimulus oscillatory activity and performance across the visual and auditory modalities within the same set of participants. We hypothesized that increased pre-stimulus alpha power over parieto-occipital regions would not only be predictive of poor visual target detection (in accordance with previous findings), but also improved auditory detection. As expected, we found that increased alpha power 200–500 ms before visual target onset predicted errors in target detection. However, spontaneous increases in pre-stimulus alpha power did not predict improvements in auditory detection. Our findings suggest that while fluctuations in alpha power may affect visual detection, the relation between parieto-occipital alpha power and auditory detection is less clear.

Poster 2-094: Late-breaking Student Poster

DO BODY-BASED PRACTICES PROMOTE ADAPTIVE INTEROCEPTIVE AWARENESS AND SELF-REGULATION?

Brynn Tucker[1,2]; Lauren Qualls[1,2]; Colette Smart[1,2]
[1]University of Victoria, [2]SMART Lab

Descriptors: HRV, Interoception, Body-based Practice
Objectives: The current study investigates whether body-based practice predicts individual differences in interoceptive awareness as well as positive outcomes on variables associated with self-regulation (HRV, interoceptive awareness, and anxiety sensitivity). Methods: We collected multi-method data from psychology undergraduate students (N = 48, M_{age} = 21.81, 77% female sex, 75% Caucasian) at the University of Victoria. The sample was split into two groups: those with regular body-based practices and those without. Analyses. MANOVA, T-test and Mann-Whitney U tests were conducted to analyze if/how body-based practice predicts HRV, interoceptive awareness, and anxiety sensitivity. Results: Significant differences in interoceptive awareness were identified between the body-based practice and no-body-based practice groups, while no significant differences in anxiety sensitivity or HRV were identified between the two groups. Better understanding of the relationship between body-based practice and interoceptive awareness could provide insights into the "plasticity" of interoception. This could lead to potential therapeutic uses of body-based practices in individuals with low or maladaptive interoceptive awareness, given that impaired interoception is implicated in various forms of psychopathology.

Poster 2-095: Late-breaking Student Poster

HEART RATE VARIABILITY AND SELF-REPORTED EMOTION REACTIVITY IN A BIOLOGICAL SENSITIVITY TO CONTEXT MODEL OF EXECUTIVE FUNCTIONING IN EMERGING ADULTS

Jarvis Neglia; Mauricio Garcia-Barrera; Colette Smart
University of Victoria

Descriptors: Heart Rate Variability, Emotion Reactivity, Executive Functioning
Biological sensitivity to context theory (BSC) specifies that individual differences in emotion reactivity determine an individual's range of possible outcomes on a range of health and cognitive variables. BSC states that highly reactive individuals are more likely to show either very high or very low outcomes, while less reactive individuals are more likely to have average outcomes. Tonic heart rate variability (HRV) has been previously linked to emotion regulation, however disagreement persists regarding HRV's relationship with emotion reactivity. In the current study, self-reported emotion reactivity and resting tonic HRV were collected from a sample of emerging adults aged 18–25 (n = 49) in order to develop a BSC model for the outcome variable of executive functioning (EF). EF is particularly critical for emerging adults in the prevention of harm from risky behaviour, and has been found to follow a BSC model in early development. HRV was negatively correlated with self-reported emotion reactivity, and both measures showed distributions with EF consistent with BSC theory. Both measures significantly predicted participants' EF absolute value, indicating that participants with higher self-reported emotion reactivity or lower HRV had EF scores further from the mean. Hierarchical regression demonstrated that a model featuring both HRV and self-reported emotion reactivity best predicted EF absolute value. These results suggest that EF follows a BSC model in emerging adults, and that low heart rate variability may be an indicator of high emotion reactivity.

Poster 2-096: Late-breaking Student Poster

HEIGHTENED SELECTIVE ATTENTION TO FEAR-CONDITIONED STIMULI WITH IMAGINED US

Sarah Hopper; Erik Mueller; Christian Panitz
University of Marburg

Descriptors: Fear Learning, Emotion, Attention
In classical fear conditioning, neutral stimuli are paired with real aversive stimuli (US). These threat cues (CS+) elicit conditioned fear responses (CR) including selective attention. We lately showed that mental images of aversive stimuli suffice to induce subjective and cardiac fear CR, which helps to explain stable fears in the absence of aversive experiences. Here, we investigated whether imagery-based fear conditioning also causes heightened selective attention. Participants underwent either classical (n = 24) or imagery-based (n = 24) fear conditioning, using faces as CS. In the classical conditioning group, $CS+_{aversive}$ predicted an electric shock, $CS+_{neutral}$ predicted a neutral vibrotactile stimulus and CS- predicted no US. In the imagery group, participants learned to imagine a shock, a vibration, or no event in response to visual cues. Cues were then paired with CS during conditioning. Occipital EEG alpha desynchronization, indexing visuocortical attention processes, was used to assess selective attention to CS. Alpha desynchronization to $CS+_{aversive}$ was pronounced relative to $CS+_{neutral}$ in each group. In the imagery group, $CS+_{aversive}$ also evoked a stronger alpha power drop than CS−. Importantly, CR were comparable for imagery-based and classical fear conditioning, as there was no CS x group interaction. We showed for the first time that aversive imagery causes conditioned selective attention to threat cues. The results provide further evidence for a crucial role of imagery in the development and maintenance of fear, mediated via attentional threat biases.

Poster 2-097: Late-breaking Student Poster

SLEEP RESILIENCY: NORMAL VARIATION IN QUANTITY OF PRIOR NIGHT'S SLEEP AMONG COLLEGE STUDENTS DOES NOT IMPACT P3 AMPLITUDE OR TASK PERFORMANCE

Kira Bartnick[1]; Cindy Bukach[1]; Olivia Stibolt[1]; Catherine Reed[2]; Jane Couperus[3]
[1]University of Richmond, [2]Claremont McKenna College, [3]Mount Holyoke College

Descriptors: P3, Attention, Visual Oddball
Sleep is essential to maintaining proper cognitive functioning related to attention and working memory, and sleep loss has been associated with diminished academic performance, higher incidences of accidents, and worsened mood and temperament. Typically, sleep studies examine large periods of sleep deprivation (36–40 hr), or chronic sleep loss (14 consecutive days of <4 hr/night). Moreover, acute partial sleep loss (<4.15 hr the night before) among medical students the evening before an exam was enough to reduce the amplitude of the P3 waveform, a neural measure of attention allocation (Jain et al., 2010). Here, we examined individual differences in self-reports of prior night's sleep among a large sample of college students to determine how typical variations in sleep quantity impacts attention allocation as measured by P3 amplitude (target—standard). 262 participants completed 200 trials of a visual oddball task in which letters appeared on the screen for 200 ms followed by a blank screen for 1,200–1,400 ms. Targets appeared with 20% probability and were counterbalanced across blocks. Neither P3 amplitude nor task accuracy were correlated with sleep report, (p's > .2), indicating that college students are resilient in the face of normal fluctuations in sleep quantity from the previous night. We note that while our sample size is very large and the ecological validity of our study is high, our results are limited by the range of sleep reported (3–12 hr, with only 7.6% reporting less than 6 hr of sleep) and simplicity of the oddball task.

Funding: Funded by NSF (Bukach: IUSE 1625521; Couperus: IUSE 1625610; Reed: IUSE 1626554) and the James S. McDonnell Foundation (Bukach: Understanding Human Cognition Scholars Award).

POSTER SESSION 3

Poster 3-001

TESTING FOOD-RELATED INHIBITORY CONTROL PROCESSES IN OLDER ADULTS: A FOOD-RELATED GO/NO-GO ERP STUDY

Whitney Allen[1]; Colter Clayton[1]; Kaylie Carbine[1]; James LeCheminant[2]; Michael Larson[1,3]
[1]Department of Psychology, Brigham Young University, [2]Nutrition, Dietetics, & Food Science, Brigham Young University, [3]Neuroscience Center, Brigham Young University

Descriptors: Food-related Inhibitory Control, Events-Related Potential, N2 and P3
Over one-third of older adults (ages 65+) in the United States are obese. A factor that may relate to geriatric obesity is food-related inhibitory control; the ability to withhold a dominant response to palatable foods. We compared food-related inhibitory control in older and younger adults using the N2 and P3 components of the scalp-recorded event-related potential (ERP). 67 older adults (36 female, M_{age} = 64, SD_{age} = 7.9) and 67 younger adults (40 female, M_{age} = 21.7, SD_{age} = 3.5) completed two food-related go/no-go tasks where they withheld button press responses to high or low-calorie food stimuli. A 2-group (Older/Younger) × 2-task (High-Calorie/Low-Calorie) × 2-trial type (Go/No-go) ANOVA for both the N2 and P3 components showed a main effect for group (p < .001), with younger adults having larger overall ERP amplitudes, and a main effect of trial type with no-go trials eliciting a larger N2 and P3 component amplitudes than go trials (p < .001). The decomposition for the significant Group × Trial-type and Group × Task × Trial-type interactions showed that younger adults had a significantly larger N2 for no-go trials than go trials on the high calorie task (p = .04), while this difference didn't exist for the older adults (p = .13). The main effect of group for both ERPs and the difference between high and low-calorie inhibitory control for the N2 demonstrated that younger adults overall have increased neural processing to food-related go/no-go stimuli and older adults exhibit reduced high calorie related inhibitory control which may influence health related processes.

Funding: College of Family, Home and Social Sciences and Gerontology Center at Brigham Young University.

Poster 3-002

AGE, THETA/BETA RATIOS, AND INDIVIDUAL PEAK ALPHA FREQUENCY IN OLDER ADULTS

Anna Finley[1]; Douglas Angus[2]; Carien van Reekum[3]; Richard Davidson[1]; Stacey Schaefer[1]
[1]University of Wisconsin, Madison, [2]Bond University, [3]University of Reading

Descriptors: EEG, Theta/Beta Ratio, Peak Alpha
Prior research has found the ratio of fronto-central Theta (4–7 Hz) and Beta oscillations (13–30 Hz; Theta/Beta Ratio [TBR]) is negatively correlated with attentional control, reinforcement learning, executive function, and age. While TBRs have been found to decrease with age in adolescents and undergraduate samples, theta has been found to increase with age. Moreover, age-related decreases in individual peak Alpha frequency (IPAF) may be artifactually inflating the Theta component of TBRs. Collectively, these factors lead to an incomplete understanding of how TBRs predict a variety of constructs across the lifespan, particularly in older adults. Here, we present a preregistered analysis of data from the MIDUS 2 Neuroscience Project, reporting on cross-sectional associations between resting TBRs, age, and IPAF (n = 319; age 36–84, M = 55.28, SD = 11.10). We found that age was negatively correlated with TBRs and IPAF, such that older participants had lower TBRs and lower IPAF. Although we also observed a significant negative correlation between Theta and IPAF, there was limited evidence for a correlation between Theta and age. Notably, the correlation between TBR and age remained after controlling for IPAF. Our results replicate observations that TBR and IPAF are cross-sectionally associated with age, and show that the decreases observed in adolescents and young-adults are also seen across adulthood into older age. Our results also show that age-related decreases in TBR are not due to age-related decreases in IPAF.

Funding: The MIDUS Neuroscience Project was funded by the National Institute on Aging (P01- AG020166, U19-AG051426) and by the Waisman Intellectual and Developmental Disabilities Research Center (U54-HD090256) awarded by the National Institute of Child Health and Human Development.

Poster 3-003

A VOXEL-BASED MORPHOMETRIC ANALYSIS OF LONGITUDINAL GREY MATTER CHANGES IN THE HEALTHY AGING BRAIN

Nicole Neufeld; Ashleigh Parker; Jodie Gawryluk
University of Victoria

Descriptors: Voxel-based Morphometry, Healthy Aging, Longitudinal
Older adulthood is associated with normal age-related declines in cognitive functioning. However, there are some inconsistencies in the literature regarding associated changes in grey matter, with some reporting atrophy across the whole brain and others reporting more focal atrophy. The current study took a longitudinal approach to investigate changes in grey matter over four years in healthy aging. 3T T1 anatomical magnetic resonance images (MRI) were obtained from 16 healthy older adults (7 male, 9 female; mean age 74.38 ± 4.52 years at baseline) from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database at two time points, four years apart. Voxel-based morphometry (VBM) analyses were carried out using FMRIB's Software Library to examine within-subject changes in grey matter over time. VBM results indicated grey matter atrophy in distributed areas including bilateral frontal and temporal regions as well as in the hippocampi, bilaterally. However, there were no significant changes in cognitive performance over these four years. The current findings reveal atrophy in multiple regions despite normal cognitive performance over the course of four years in healthy aging. Similar regions are known to be affected in neurodegenerative disorders and associated with cognitive decline. Follow up work will aim to replicate the current findings in a larger sample and to examine the relationship between cognitive performance and grey matter volume.

Funding: The project was supported by an NSERC Discovery Grant awarded to Dr. Jodie Gawryluk.

Poster 3-004

EFFECTS OF COVERT ATTENTION ON ORIENTATION DETECTION AND PERCEPTION: AN EEG STUDY

Sarah Sheldon; Kyle Mathewson
University of Alberta

Descriptors: EEG, Covert Attention, Visual Perception
Twenty-six participants performed a cued orientation detection task while EEG was recorded simultaneously. The task consisted of an informative cue (indicating right or left side) or uninformative cue (pointing towards both the left and right), then an oriented target on the left or right. Next is a response screen where participants used the mouse to rotate the stimuli so that it matches the orientation of the target. Errors were quantified as the difference between the target orientation and the orientation of the response stimulus. The errors on each trial were fit to standard mixed model with a bias parameter to get the parameter values guess rate, precision, and bias. From the model, we estimated precision, guess rate, and bias as a function of informative versus uninformative cue and left target versus right target. Analysis yielded a difference in performance between informative and uninformative cue when the target was on the left side, but no difference between cue types when the target was on the right side. Also, no significant differences were found in participants' precision suggesting that attention has an effect akin to all-or-nothing gating. We found a significant difference in bias when the target was on the left and right sides. Furthermore, EEG power between informative and uninformative cued trials was significantly different prior to target onset within alpha and beta frequency bands. However, power only differed between left and right targets when the cue was uninformative which suggest better attention allocation to the right side regardless of trial type.

Poster 3-005

OSCILLATORY ENGAGEMENT FOLLOWING AUDITORY STIMULI VARIES FOR OPEN AND CLOSED EYES

Grace Clements; Kathy Low; Diane Beck; Monica Fabiani; Gabriele Gratton
University of Illinois, Urbana-Champaign

Descriptors: Sensory Processing, Attention, Oscillations
Visual and auditory processing compete during cross-modal tasks. Such competition may even occur during auditory-only tasks when the eyes are open and visual input occurs in the absence of an explicit task. To facilitate auditory processing with open eyes, visual processing may need to be suppressed. Theta activity enables such attentional restructuring. Because less visual processing is occurring with closed eyes, less theta activity may be needed to redirect the attentional system towards auditory stimuli. We tested this hypothesis in two EEG studies (N_1 = 23, N_2 = 23) in which subjects were presented with irrelevant/unattended auditory pips every 5–10 s, with eyes open and closed. Given the high similarity between time-frequency analyses of Study 1 and 2, we combined the data. At posterior electrodes, theta suppression occurred ~0–300 ms after the pip to a lesser extent with eyes closed than open, suggesting that with less visual engagement, less attentional system restructuring occurs following an auditory stimulus. Unexpectedly, we also observed a broad, persistent enhancement strongest in the alpha band 550–850 ms after the pip that was greater for closed-eyes. This closed-eyes enhancement may reflect the recruitment of multimodal regions normally involved in visual processing. An oddball task (2-pips) replicated this basic effect in Study 2. Theta suppression appeared to be stronger for rare than frequent pips. Such results suggest that visual processing during an auditory task varies as a function of open/closed eyes and attentional engagement.

Funding: NIA grant RF1AG062666 (G. Gratton & M. Fabiani, PIs).

Poster 3-006

EFFECTS OF ATTENTION BIAS MODIFICATION TRAINING ON ELECTROCORTICAL MEASURES OF ERROR MONITORING IN ANXIETY

Hayley Gilbertson[1]; Lin Fang[1]; Rourke Sylvain[2]; Jeremy Andrzejewski[3]; Josh Carlson[1]
[1]Northern Michigan University, [2]Michigan Technological University, [3]Florida State University

Descriptors: Anxiety, EEG, Error-related Negativity

Anxiety disorders are one of the most predominant mental health conditions worldwide. The Error-Related Negativity (ERN)—an Event-Related Potential (ERP) associated with error monitoring—has been shown to be enhanced in anxious individuals. Moreover, Beck's cognitive theory asserts that negatively biased attention has an important role in the maintenance of anxiety disorders. That is, anxious individuals selectively attend to and have difficulty disengaging from negative stimuli/information. Attention Bias Modification (ABM), as a relatively new treatment for anxiety, consists of training attention away from negative information to reduce anxiety. However, whether the ABM training, especially, an intensive multi-session training, have impact on the error monitoring system remains unknown. This experiment investigated the effects of ABM training on the error-related negativity (ERN) in high trait-anxious individuals. Here, a local sample of (N = 100) community members and university students were recruited to participate in a 6-week ABM training protocol. Pre and post EEG data were conducted while participants engaged in a Flanker task. ABM training was implemented through a cell phone app, downloaded onto the participant's phone. The results provide evidence that ABM (and control) training decreased attentional bias, but did not modulate the ERN. Thus, it appears the multi-session ABM can lead to reduced behavioral measures of attentional bias, but does not appear to generalize to an electrocortical measure of error monitoring.

Funding: Data from this poster was collected through the NIMH grant awarded to Dr. Josh M. Carlson (R15MH1109051).

Poster 3-008

MEASURING NEURAL AND PHYSIOLOGICAL CORRELATES OF ATTENTION RESTORATION AND STRESS RECOVERY IN NATURAL ENVIRONMENTS

Emily Scott; Amy McDonnell; Sara LoTemplio; Bert Uchino; David Strayer; Kevin Greenberg; David McNay
University of Utah

Descriptors: Electroencephalography, Electrocardiography, Environmental Psychology

Attention restoration theory and stress recovery theory suggest that time spent in nature restores attention and reduces stress. However, there are few studies in the field that measure both theories. This study (N = 67) used electroencephalography (EEG) and electrocardiography (ECG) to examine within-subject changes in neurophysiology and peripheral physiology before, during, and after immersion in nature. We used a 3-stimulus oddball task to elicit changes in P3a and P3b amplitude as a neural correlate of attention restoration, and we examined changes in resting heart-rate variability (as measured through respiratory sinus arrhythmia, or RSA) as an indicator of stress recovery. We hypothesized increases in P3a/P3b amplitude, suggesting increased attentional resources allocated to working memory, and increases in RSA, suggesting increased parasympathetic nervous system activity, after nature exposure. Results found a significant increase in P3a/P3b amplitude after a 5-day nature trip compared to before the trip, and a significant decrease in RSA during the trip compared to before or after the trip. P3a, but not P3b amplitude, was positively correlated with RSA. The increase in P3a/Pb amplitude supports our hypothesis and suggests greater attentional capacity after nature exposure. The decrease in RSA is contrary to our hypothesis and suggests increased sympathetic activity during nature exposure. This shift could be due to greater arousal from a novel and vast desert environment. This study was the first to measure EEG and ECG concurrently in the nature literature.

Poster 3-009

THE CONTINGENT NEGATIVE VARIATION TO TONES IS AFFECTED BY MODALITY OF ATTENTION, BUT NOT BY AROUSAL FROM VISUAL STIMULI

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Descriptors: CNV, Attention, Arousal

The contingent negative variation (CNV) is a sustained, negative event-related brain potential (ERP) that reflects anticipation and is affected directly by attention and inversely by arousal. In previous studies, researchers found that arousing stimuli in the focus of attention affect the CNV, but less is known when the arousing stimuli are not the ones eliciting the CNV. We examined the effect of arousing images on the CNV to tones presented with orthogonal timing. In separate blocks, we showed arousing and neutral images from the International Affective Picture System (IAPS) while 2-s tones (not time-locked to the images) were presented through headphones. Participants were instructed to attend either to the images or to the tones and to count the number of times a rare stimulus occurred (but no response was given during the tasks). We hypothesized that CNV amplitudes would be larger when participants paid attention to tones than to images, that the high-arousal blocks of images would elicit larger CNV amplitudes than the low-arousal blocks, and that the effect of arousal would be larger when participants attended to images than to tones. However, only direction of attention had a significant (and large) effect, and its direction was opposite what we predicted: CNV amplitudes were larger when participants attended to the images than when they attended to the tones. We speculate that the tones were distracting to participants while they attended to the images, resulting in a relatively large CNV. This distraction may have confounded any effect of image content.

Poster 3-010

THE IMPACT OF ALCOHOL SENSITIVITY ON ALCOHOL CUE PROCESSING IN UNDERAGE DRINKERS

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Descriptors: Alcohol, Incentive Salience, Event-related Potentials
Low alcohol sensitivity (LS), i.e., requiring more drinks to feel the subjective effects of alcohol, is associated with an increased risk of developing alcohol use disorder (AUD). Compared to their high sensitivity (HS) peers, LS individuals drink more, endorse more symptoms of AUD, and experience more negative consequences from alcohol use. Moreover, numerous studies suggest that alcohol cues have greater incentive motivational value for individuals with the LS phenotype. The current study determined the strength of the association between alcohol sensitivity and incentive salience of alcohol cues using event-related potentials (ERPs) in a large sample of underage drinkers. One hundred and twenty-seven participants (18–20 years) varying in levels of alcohol sensitivity viewed images of non-alcoholic and alcoholic beverages in a picture-viewing oddball paradigm while ERPs were recorded. Results revealed a significant negative association between alcohol sensitivity and mean amplitude of the P3 elicited by alcoholic beverages, $F(1, 122) = 4.54$, $B(SE) = -.55$ (.26), $p = .03$. This association holds after controlling for sex, typical drinks per drinking day, and P3 mean amplitude elicited by non-alcoholic beverages. The current results replicate previous studies using extreme groups designs and extended existing findings associating LS with incentive salience attribution to alcohol cues in a large sample of underage drinkers, suggesting that greater motivational value of alcohol cues among LS individuals is robust and detectable phenotype at early stages of the drinking career.

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Poster 3-011

DOES SLOW BREATHING INDUCE RELAXATION? COMPARING PACED SLOW BREATHING AND SLOW BREATHING BIOFEEDBACK

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Descriptors: Slow Breathing, Relaxation
Because slow breathing increases vagal tone, it is generally assumed that slow breathing increases relaxation. Accordingly, a variety of popular stress management and relaxation techniques involve slow breathing instructions. Yet, empirical research studying the effects of slow breathing on self-reported relaxation is scarce. The current study aimed to compare relaxation effects of slow paced breathing vs. slow breathing biofeedback. Following a 10-min baseline and a 11-min worry induction, participants ($N = 36$) performed a 10-min slow breathing exercise: paced breathing or breathing biofeedback. Respiration and ECG were recorded continuously. Self-reported relaxation was assessed immediately after baseline and after the breathing exercise. Results showed that slow breathing was successfully induced by paced breathing and biofeedback, but respiration rate was significantly lower during biofeedback than during paced breathing. Heart rate was significantly lower during the slow breathing exercise compared to baseline, and during slow breathing biofeedback heart rate was significantly lower than during paced slow breathing. No significant differences in self-reported relaxation were found between baseline and breathing exercise, nor between paced breathing and breathing biofeedback. These findings suggest that slow breathing-induced reductions in heart rate do not coincide with changes in self-reported relaxation, which is consistent with the idea that different mechanisms underlie physiological and subjective relaxation.

Poster 3-012

MOVEMENT-RELATED CORTICAL POTENTIALS REVEAL STRATEGY SELECTION IN YOUNGER AND OLDER ADULTS

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Descriptors: Cognitive Control, LRP, Aging
It is well-established that individuals selectively prioritize information accrued during different stages of the stimulus evaluation process ("early" versus "late") in a cue-dependent manner to enhance performance. The extent to which older adults flexibly adjust their processing strategies in response to cues, however, has gone unexplored. Here, we report findings from 48 participants (24 young, 24 old) who performed a cued Flanker task in which one of three symbolic cues, indicating the probability that a congruent array would subsequently appear (75%, 50%, or 25%), was presented on each trial. The lateralized readiness potential (LRP), an electrical measure of response preparation, allowed us to infer cue-driven changes in strategy selection, or the relative weight granted to information accumulated during early, incomplete versus late, complete stages of stimulus evaluation. For stimulus-locked LRPs, we computed congruency effect difference waveforms (incongruent minus congruent). Supporting behavioral results, peak amplitude measures (200–500 ms post-flanker onset) revealed that 75% cues elicited greater initial activation of the incorrect response than 50% or 25% cues for both younger and older adults. This suggests that when participants expected a congruent array, they adopted a "parallel" processing strategy, resulting in a heightened susceptibility to the performance-impairing effect of distractors. These and other results extend the conclusions of Gratton and colleagues (1992) to older adults, suggesting that strategic control may remain intact during aging.

Funding: This work was supported by NIA grant RF1AG062666 to G. Gratton and M. Fabiani.

Poster 3-013

RELATIONSHIP BETWEEN MINDFULNESS INTERVENTION AND NEURAL INDICES OF ERROR MONITORING: RANDOMIZED GROUP-BASED STUDY

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Descriptors: Mindfulness, Electroencephalography, Error Monitoring
Mindfulness meditation is thought to improve several cognitive processes, including error-related performance monitoring, yet the mechanisms are poorly understood and results inconsistent. We tested pre- to post-intervention neurophysiological reflections of error processing using the error-related negativity (ERN) and error positivity (Pe) components of the event-related potential (ERP) collected during a modified flanker task. Participants included healthy young adults randomly assigned to a six-week group-based mindfulness intervention ($n = 38$) or weekly TED talks ($n = 44$). Behaviorally, accuracy increased from pre-session to post-session with no other significant effects. There was a significant difference between error and correct ERP amplitudes for both groups. Subsequent 2-Group (Mindfulness, Control) × 2-Time (Pre, Post) repeated measures ANOVAs on ERN and Pe residualized difference amplitudes showed no significant main effects or interactions. However, participants' ratings of engagement, stress, and mood were better in the TED talk than mindfulness participants. Results suggest similarity in neurophysiological measures of error processing between mindfulness and TED talk interventions with questions regarding the mindfulness group efficacy in healthy young adults.

Funding: Funded by Brigham Young University Counseling and Psychological Services. Correspondence address: michael_larson@byu.edu.

Poster 3-014

INFREQUENT BUT EXPECTED STIMULI ELICIT AUTOMATIC, NON-SELECTIVE INHIBITION

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Descriptors: Motor inhibition, Cortico-motor Excitability, Infrequency
Unexpected perceptual events are known to induce motor slowing and global, non-selective inhibition through recruitment of a fronto-basal ganglia (FBg) mechanism. This is thought to occur because of the perceptual surprise induced by the presence of an unexpected stimulus, but it is unknown whether events that are expected but infrequent may also produce inhibition through recruitment of the same mechanism. Waller, Hazeltine, and Wessel (2019) recently found that infrequent stimuli elicit the same scalp signature as instructed motor stopping, the frontocentral P3, and that these stimuli also produced uninstructed motor slowing. Furthermore, a source-separation analyses was unable to separate the two types of P3's, suggesting they stem from a non-independent neural generator. Here, we used single-pulse transcranial magnetic stimulation to test whether such infrequent events produce another signature of the FBg mechanism, non-selective reduction of cortico-spinal excitability (CSE). We found that, during movement, infrequent but expected events indeed elicit CSE reduction, but at a different time point than unexpected events. CSE suppression compared to baseline was significant at 150ms following unexpected perceptual events ($T(20) = 3.40$, $p = .003$) but was only significant at 175 ms following expected but infrequent events ($T(20) = -2.53$, $p = .02$). This suggests that infrequency alone is sufficient to recruit the FBg mechanism for inhibition, but that the time frame for its recruitment following expected events is qualitatively different than for unexpected events.

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Poster 3-015

USING MACHINE LEARNING TO PREDICT SUCCESSFUL RESPONSE INHIBITION BASED ON BETA BURST CHARACTERISTICS COMPARED TO BETA POWER

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Descriptors: Response Inhibition, Beta Bursts, Machine Learning
Introduction: The ability to inhibit unwanted behaviours relies on effective response inhibition in the brain. The Stop Signal Task (SST) measures this process and movement cancellation speed (SSRT). Brain oscillations in the Beta (13–28 Hz) frequency band are mechanistically involved in response inhibition, showing right frontal Beta power increases at the moment of stopping. However, recent findings suggest that Beta-band activity is dominated by short burst-like events (Beta bursts). We are investigating whether characteristics of Beta bursts (quantity, volume) could predict successful response inhibition and stopping speed (SSRT) compared to a traditional power averaging based approach. *Methods:* EEG (64 channel) was recorded from 217 healthy human participants while performing the SST. Beta bursts and power were extracted for each trial. Machine learning was used to classify successful versus failed stop trials and to predict SSRT on the basis of the number and volume of Beta bursts as well as averaged Beta power. The models were trained on an internal dataset ($n = 130$) and tested on holdover ($n = 87$) and separate external data ($n = 203$). *Results:* Beta burst volume was most predictive of stopping behaviour (AUC = 0.58; $r = .38$). Beta burst features combined (AUC = 0.57; $r = .38$) were more predictive than Beta power (AUC = 0.55; $r = .28$). *Discussion:* Beta burst features, volume notably, were more influential than Beta power in predicting successful response inhibition and SSRT, supporting the idea that Beta burst characteristics contain information that is directly instrumental to behaviour.

Funding: Nadja Enz is supported by the Irish Research Council postgraduate scholarship GOIPG/2018/537.

Poster 3-016

DEVELOPMENT AND VALIDATION OF AN EYES OPEN ONE-SESSION CUE-FOCUSED MEDITATION TASK

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Descriptors: Emotion Regulation, Cognitive Control, Functional Connectivity
Most mindfulness research focuses on eyes-closed approaches, with few empirical studies using eyes-open meditation practices. This study used a novel cue-focused meditation (CFM), involving 31 participants maintaining focused attention on a video of a candle flame, while emotionally salient images from the International Affective Picture Set briefly interrupted the video at regular intervals. The aim was to validate whether a single session eyes-open CFM selectively affects cue reactivity by presenting pleasant and unpleasant pictorial cues while collecting concurrent EEG data. Time- and time-frequency domain measures including the LPP ERP component, evoked theta power, and bilateral and medial-lateral frontal inter-channel phase synchrony were used to observe changes in functional connectivity, and regulatory emotional and control processing using a 2×2 factorial design. This study found a pre-to-post early frontal theta power interaction effect, as theta power increased during incongruent stimuli and decreased during congruent stimuli. A similar LPP interaction effect showed amplitude reductions to affective pictures that were congruent with pictures viewed during the CFM task and amplitude increases to incongruent stimuli. Medial-lateral frontal functional connectivity during the CFM partially mediated these effects, suggesting greater regulatory engagement during the CFM had salutary emotion regulation effects. The eyes-open CFM holds promise as a brief mechanistic probe because hypothesized ERP effects were detected after only one session of mindfulness practice.

Poster 3-017

INDUCED MIDFRONTAL THETA OSCILLATIONS IN A SHOOTING TASK WITHIN (VIRTUAL) REALITY UTILIZING MOBILE EEG

Leon Lange; Roman Osinsky
University of Osnabrueck

Descriptors: Performance Monitoring, Mobile EEG, Virtual Reality
While the human brain has to continuously deal with vast amounts of highly dynamical input in everyday life, laboratory EEG studies traditionally try to control and exclude varying and disturbing influences. In this study, we have taken a different approach and examined neuronal correlates of performance monitoring in a dynamical, little restricted shooting task. Participants shot at a target by either using a toy gun or they shot within an immersive virtual environment using a head-mounted VR system. Either way, wearing a mobile EEG-system allowed them to move and look around freely during the experiment. Findings will be presented showing that in both conditions missing shots evoked stronger non-phase-locked midfrontal theta activity than shots that hit the target. There was no difference in phase-locked theta activity nor in the FRN. The results raise the question whether the absence of the FRN could be due to methodological reasons or to partially different neuronal processing in ecologically valid tasks than in the laboratory. Overall, our results show that we can derive feedback-related EEG components utilizing an ecologically valid task within a little restricted experimental setting.

Poster 3-018

BUPRENORPHINE DAMPENS MOTIVATIONAL SIGNIFICANCE OF ERRORS

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Descriptors: Error Processing, Buprenorphine, EEG

Despite pandemic proportions of opioid addiction, long-term outcomes of individuals undergoing substitution therapies are not well described. One important cognitive function, which might be affected by opioid substitution, is error processing, as it is a prerequisite for successful behavioural adaptation and learning in daily life. Errors are thought to induce aversive negative arousal, while opioids have been suggested to reduce aversive arousal of unpleasant stimuli. Thus, the question arises whether the acute administration of an opioid dampens error processing. In this between-subject double-blind study, 42 male participants received either 0.2 mg buprenorphine (BUP; often used in substitution therapy) or a placebo pill (CON) before completing an error processing task, during which we recorded EEG. Behavioural error measures as well as affective state ratings did not differ between BUP and CON participants. On the neural level, however, we observed less pronounced error processing, reflected in decreased Pe (Error Positivity) amplitudes in BUP compared to CONT participants. Moreover, response-locked frontal delta oscillations were generally decreased in BUP participants, irrespective of correct or erroneous responses. Our physiological results suggest that opioids have indeed the potential to dampen the motivational significance of errors. This is evident during more elaborate error processing stages of conscious error processing and evidence accumulation, while automatic error detection seemed less affected by the administration of BUP.

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Poster 3-019

SEDENTARY TIME IS RELATED TO BEHAVIORAL INDICES OF RESPONSE INHIBITION AND NEUROELECTRIC INDICES OF ATTENTIONAL CONTROL AMONG ADULTS WITH OVERWEIGHT AND OBESITY

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Descriptors: Response Inhibition, Sedentary Time, Obesity

Excessive sedentariness has been related to poorer cognitive control in adults. Sedentariness may compound obesity-related impairments in cognitive control and its relationship to response inhibition in adults with overweight and obesity (OW/OB) remains poorly understood. This study investigated the relationship between accelerometer-measured sedentary time (ST; min/d), performance on the Go/NoGo task and N2 and P3-ERP indices of response inhibition and attentional control in 80 adults with OW/OB (55 females, $M_{age} = 35.2 \pm 5.8$ years, BMI = 32.8 ± 5.3 kg * m^{-2}). ST was not related to performance on the Go condition nor to its ERP-indices. In contrast, higher ST was related to increased attentional resource allocation during NoGo target and non-target trials as indicated by higher P3 amplitude across centro-parietal sites (C1, Cz, C2, CP1, CPz, CP2; $ps \leq .03$). Higher ST was *negatively* related to *target accuracy* on NoGo trials and this relationship was fully mediated by shorter non-target reaction times on NoGo trials (95% BC bootstrap CI: −0.182, −0.014). ST was not related to frontal nor fronto-central N2 amplitude on Go and NoGo target trials nor the N2 amplitude difference waves. Adjustment for daily moderate-to-vigorous physical activity (all models), age (P3 amplitude) and % fat mass (target NoGo accuracy) did not modulate these findings except for NoGo non-target P3 amplitude ($p = .07$). Our results suggest suboptimal response inhibition due to more impulsive responding despite the up-regulation of attentional resources among more sedentary adults with OW/OB.

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Poster 3-020

USING TIME-FREQUENCY EEG POWER TO DISENTANGLE DUAL MECHANISMS OF CONTROL AND ANXIETY RISK

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Descriptors: EEG, Cognitive Control, Anxiety

Dual-mechanisms of control (DMC) theory differentiates two temporally distinct, complementary aspects of cognitive control: proactive and reactive. According to DMC theory, these components have differentiable associations with anxiety. However, existing behavioral measures of proactive and reactive control rely on difference scores; thus, it remains unclear whether the association between cognitive control and anxiety is driven primarily by proactive control, reactive control, or both. To address this question, the present study aimed to disentangle proactive and reactive control using EEG. Participants included 144 adolescents (55.9% female; $M_{age} = 15.4$ years) who completed an AX Continuous Performance Test during an EEG laboratory assessment. Within-subject, trial-by-trial correlations between EEG activity and reaction times (RT) revealed that whereas cue-locked frontal delta and theta activity was associated with *faster* probe RT (likely indicating proactive control; $p < .001$), probe-locked frontal delta and theta activity was associated with *slower* probe RT (likely indicating reactive control; $p < .001$). With regard to between-subjects associations with total anxiety, there was a significant proactive X reactive control interaction, such that adolescent anxiety was elevated when both proactive and reactive control were high and when they were both low ($ps < .05$), but not when only one was high. In addition to identifying candidate neural markers of proactive and reactive control, results highlight the complementary, adaptive nature of both types of control.

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Poster 3-021

DOES MY ABILITY TO REGULATE MY EMOTIONS IMPACT HOW I FEEL WHEN OFFERING CONTACT COMFORT TO MY PARTNER DURING STRESS?

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Descriptors: Couples, Emotion, Caregiving

Romantic partners are a source of support, particularly for individuals living with chronic pain. However, optimal caregiving requires effective emotion regulation (ER; Shaver et al., 2010), yet little is known about how ER is associated with the physiological experience of offering support to a partner in a stressful situation. The aim of this study was to use a measure of heart rate variability to expand findings from a previous study that found that partners who report more difficulties with ER had lower skin conductance levels when offering contact comfort versus no contact comfort during a stressful chronic pain video (Clement, Lonergan, & Lafontaine, 2020). We predicted that greater difficulties with ER would result in longer (i.e., lower heart rate) inter-beat-intervals (IBIs) when offering contact comfort (compared to no contact comfort) during a stressful chronic pain video. First, six caregivers completed the Difficulties in Emotion Regulation Scale (DERS). Next, IBI was recorded during a 10-min stressful condition while they alternated between holding and not holding their partners' hand. The association between IBI while holding and not holding the partner's hand and the DERS-Total score was examined via descriptive analysis for each caregiver. Participants reported varying levels of difficulties with ER abilities, and different patterns of IBI emerged when participants offered contact comfort versus no contact comfort during the stressful video. Findings are discussed in light of literature on psychophysiological reactivity, ER, and attachment theory.

Poster 3-022

EXAMINING THE WITHIN-INDIVIDUAL AND WITHIN-FAMILY ASSOCIATIONS OF RESPIRATORY SINUS ARRHYTHMIA AND FRONTAL ALPHA ASYMMETRY

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Descriptors: Respiratory Sinus Arrhythmia, Frontal Alpha Asymmetry, Mother-infant

Respiratory sinus arrhythmia (RSA) and frontal alpha asymmetry (FAA) are psychophysiological indices of flexibility and approach motivation via autonomic and neural processes, respectively. Specifically, RSA is a measure of high frequency beat-to-beat changes in heart rate captured by electrocardiography and FAA is a measure of asymmetry in the alpha band captured by electroencephalography. Notably, both RSA and FAA have been suggested as endophenotype candidates for Major Depressive Disorder (MDD), such that these indices are decreased in adults with MDD and their offspring. However, research assessing the associations of these indices within individuals and across generations (i.e., in mother-infant dyads) are current gaps in the literature. The aim of the current study was to assess the associations of RSA and FAA in mothers, in infants, and in mother-infant dyads. Resting-state RSA and FAA were separately collected from mothers and their 12-month old infants (N = 35). Among mothers, RSA and FAA shared a significant, medium-sized correlation (r = .40, p = .018). Across dyads, mothers and their infants shared a significant, medium-sized correlation for both FAA (r = .30, p = .040) and RSA (r = .31, p = .037). Among infants, however, RSA and FAA shared a non-significant negative association (r = −.25, p = .113). Current results call for a developmental model for understanding within individual associations across autonomic and neural measures and support the heritability criterion for these indices as candidate endophenotypes for MDD.

Funding: This project was supported by internal funding provided by Purdue University.

Poster 3-023

ERP CORRELATES OF HEURISTIC DECISION MAKING STRATEGY AND RISK ATTITUDES DURING RISKY DECISION MAKING

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Descriptors: Risky Decision, ERP, Heuristic Strategy

A quick assessment of risks is often crucial for human decision making. Economic decision research suggests that the choice between two monetary options, where one has an uncertain outcome, depends on the options' expected value and a subjective evaluation of risks. The differences in subjects' attitude towards risk, i.e., a differentiation between risk-averse and risk-seeking individuals, has been shown to modulate the neural response to risk in the dorsolateral Prefrontal Cortex. However, it is not clear how the classification of risk attitudes relates to neurocognitive processes. This study proposes a measure that reflects individuals' heuristic decision-making strategy behind the choice between a safe and a risky option and evaluates its neural correlates during risky decision-making, as well as its relationship with risk attitudes. Event-related potentials (ERP) from a 64-channel EEG system were recorded in order to measure the neurophysiological mechanisms underlying risky decision-making. Our measure of heuristic strategy correlates with subjects' attitude towards risk and with late parietal ERP components associated with reward prediction and regulation of emotions. These findings suggest that individuals' attitude towards risk and its underlying neurocognitive processes might be partly explained by differences in decision making strategy.

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Poster 3-024

AGE-RELATED DIFFERENCES IN COGNITIVE CONTROL STRATEGIES: AN ERP STUDY

Stephanie Long; Morgan Middlebrooks; Connie Lamm
University of Arkansas

Descriptors: Cognitive Control, Aging, P3

Cognitive change, as a normal function of aging, has been well reported in the extant literature. In the context of cognitive control, ERP (event-related potentials) researchers have found that as aging occurs older adults have more inefficient neural processing than their younger counterparts. For example, this has been shown as a reduction in ERP component amplitudes in the context of a Go/Nogo task (Cheng et al., 2019). This inefficiency has also been described as a decrease in amplitude of components localized in the posterior areas, while component amplitudes localized in the prefrontal cortical areas increased with age (Kropotov et al., 2016). Kopp and colleagues (2014) used ERPs to show differential recruitment of frontal cortex for proactive and reactive control in aging adults. Here, we explored age-related changes in neural activation using ERPs during the execution of four cognitive control strategies: proactive control, reactive control, inhibitory control, and response conflict. While EEG was recorded, older (50+ years) and younger adults (<25 years) completed three tasks to engage cognitive control: a Go/Nogo task (inhibitory control), the AX-CPT (proactive and reactive control), and a hybrid Flanker/Navon letter task (response conflict). Preliminary findings indicated that older adults showed decreased P3 component amplitude during engagement of proactive and reactive control compared to younger adults, suggesting inadequacy of resources rather than neural inefficiency.

Poster 3-025

THE INVESTIGATION OF THE IMPACTS OF EMOTIONS ON DECISION-MAKING BY MEANS OF EVENT-RELATED LOW BETA OSCILLATIONS

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Descriptors: EEG, Decision-making, Emotion

The understanding emotions' impacts on decision making is a rising need for many different fields such as brain-computer interface researches, neuromarketing, and neuromodulation researches. In this study, it is aimed to investigate the effect of emotion on the decision-making process by means of Electroencephalography (EEG) Event-Related Oscillations approach. There are 2 distinct EEG sessions, demonstrating negative and positive stimuli, at the beginning of each part, subjects are instructed to decide their most disliked/liked picture from 4 different pictures and after each session, to rank from most disliked/liked to the less picture. For the analyses, Repeated Measures ANOVA was used to measure the response to low beta (15–20 Hz) in 0–200 ms time windows for 19 subjects. The responses to the most disliked pictures had higher left temporal-parietal power; responses to the rest of the negative pictures had higher right temporal-parietal power (p = .028). The beta phase-locking in response to the pictures that are chosen as the most liked was higher at the right hemisphere, meanwhile, phase-locking values for the rest of the positive pictures there is no hemispheric difference. While the previous studies were stated that beta response is activated by negative emotional stimuli, the results of this study indicate that the people's decision about what they like or dislike the most could be differentiated topologically via the low beta oscillations.

Poster 3-026

THE ROLE OF PREFERENCE ON SUBJECTIVE AND PERIPHERAL CORRELATES OF EMOTION INDUCTION THROUGH MUSIC

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Universitat Jaume I

Descriptors: Music, Emotion, Preference

Previous studies focused on music-related pleasure responses have mainly used positive or music stimuli chosen by participants, exploring basically arousal but not hedonic valence correlates. Moreover, only a few studies have considered individual differences factors, such as music preference. Our study aims to investigate preference effects on subjective ratings (valence, energy arousal, tension arousal) and psychophysiological responses (EDA, corrugator, zygomatic) induced during a passive listening task with pleasant, neutral and unpleasant standardized film music excerpts. A total of 50 volunteers listened to 42 excerpts presented during 8 s while peripheral measures were continuously recorded. After music offset, subjective ratings were collected (preference, valence, energy and tension arousal). Results showed that preference had an influence on both physiological and subjective correlates. Particularly, those excerpts rated as more preferred prompted greater EDA and zygomatic activity whereas reduced corrugator responses. Regarding subjective ratings, preference positively predicted hedonic valence but not energy and tension arousal. Instead, both pleasant and neutral excerpts were also evaluated as most preferred but differed in terms of energy and tension arousal. Taken together, our findings provide empirical evidences regarding the role of preference on physiological and subjective responses to music, opening a question regarding its relevance in future studies that seek to investigate music-related reward and emotion.

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Poster 3-027

EMOTION INDUCTION THROUGH MUSIC: TIME COURSE OF PERIPHERAL CORRELATES OF HEDONIC VALENCE AND AROUSAL

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Universitat Jaume I

Descriptors: Emotion, Music, Peripheral Correlates

There has been a growing interest in the research community regarding the use of music as emotional stimuli. However previous studies have mainly focused on self-reports and central measures, with a few works exploring peripheral correlates. Moreover, only one study has explored the time course of the physiological measures considering happy and sad excerpts, leaving aside the dimensional approach to emotions. This study aimed to investigate the time course of several peripheral correlates of hedonic valence (corrugator, zygomatic, heart rate) and arousal (Electrodermal Activity: EDA) during a passive listening task with positive, negative and neutral film musical excerpts. A sample of 50 healthy volunteers (25 women) took part in this experiment by listening to 42 musical excerpts (14 positive, 14 negative, 14 neutral) presented during 8 s, while peripheral measures were continuously recorded. Results showed that peripheral measures varied according to the affective valence prompted by music excerpts, from 2 s of stimulus onset until the end of the stimulus duration. Specifically, both EDA, HR and zygomatic activity was larger for positive vs. negative and neutral stimuli, whereas corrugator showed enhanced activity to negative music, during all time that the excerpts were presented. Taken together, our results provide additional evidences regarding the potential of music to induce emotions in laboratory settings, thus opening a path to explore interventions based on music in pathologies with underlying emotion deregulatory processes.

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Poster 3-028

DEPRESSIVE SYMPTOMOLOGY AND RESTING PARASYMPATHETIC FUNCTIONING ARE ASSOCIATED WITH POSITIVE EVALUATION OF EMOTIONAL PICTURES

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Descriptors: Depression, Parasympathetic Nervous System

A wide range of individual differences in perceptual and biological factors are involved in evaluative processes of emotional stimuli, including the parasympathetic nervous system and depressive symptomology. The present work examined how resting parasympathetic activity and depressive symptomology are associated with patterns of emotional reactivity as measured by ratings of positivity, negativity, and emotional arousal of pleasant, neutral, and unpleasant pictures in a typical population of young adults. Results show that lower parasympathetic activity at rest was associated with increased positivity ratings of pleasant and neutral pictures, and increased emotional arousal ratings of pleasant pictures. Higher depressive symptomology predicted increased positivity ratings and increased emotional arousal ratings across all picture categories. These variables interacted such that individuals with higher depressive symptomology and lower resting parasympathetic activity rated pictures more positively, across categories. This work emphasizes the complexity involved in evaluative processes and the autonomic substrates underlying them, and may shed light on the role of positivity evaluations in emotional processing.

Poster 3-029

PREDICTORS OF URGE TO SMOKE UNDER STRESSFUL CONDITIONS UTILIZING THE PASAT-C TASK: MEASURING THE HEART RATE VARIABILITY IN SMOKERS AND ITS RELATIONSHIP WITH DEPRESSION AND ANXIETY SYMPTOMS

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Descriptors: HRV, Anxiety, PASAT-C

Previous studies have examined the relationship between smoking and emotion regulation, as well as the relationship between smoking and Heart Rate Variability (HRV). In particular, the inability to manage negative mood and negative affectivity, increases the desire for smoking. So smoking works as a kind of negative reinforcement. In addition, it seems that smoking also has a negative effect on heart function, so smokers have reduced heart rate variability. A connection has been observed between the desire for smoking and the symptoms of depression and anxiety. The present study will first examine how laboratory stress induced by PASAT-C affects the desire and urge of individuals [$N = 30$] to smoke as well as emotional and psychophysiological reaction to stress. Secondly, individual differences in stress intolerance were examined as predictors of tolerance to discomfort. Finally, this study focuses on the analysis of the heart rate variability of smokers in order to examine how is affected from the level of stress, negative emotionality, depressive symptoms and the desire for smoking. The results showed that there was no difference in heart rate variability between the levels, but the desire for smoking during baseline seems to affect the heart rate variability indicators.

Poster 3-031

THE COMPLEX INTERPLAY BETWEEN AFFECT AND ATTENTION IN DYSPHORIA: A STARTLE REFLEX MODULATION AND CARDIAC DECELERATION STUDY

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Descriptors: Dysphoria, Affect, Attention

Depression is characterized by dysregulated affective disposition and by biased attentional processing of emotional information. However, very little is known about the relation between these processes. The present study used attentional and affective startle modulation and cardiac deceleration to investigate the interplay between affective disposition and attention during the viewing of emotional pictures in individuals with dysphoria (n = 38) and in controls (n = 52). The attentional and affective modulation of the startle reflex were investigated through the presentation of a startle probe at 300, 1,500, 3,500, and 4,500 ms after picture onset. To analyze later stages of attention processing, heart rate deceleration was also assessed during 6 s of picture viewing. Whereas controls showed the expected startle potentiation to unpleasant stimuli as compared to neutral and pleasant ones, individuals with dysphoria did not show any startle potentiation in response to unpleasant stimuli. Of note, individuals with dysphoria showed blunted startle potentiation to unpleasant stimuli as compared to controls. Moreover, the two groups did not differ with respect to attentional startle modulation. However, individuals with dysphoria showed a prolonged cardiac deceleration when viewing unpleasant compared to neutral stimuli, whereas the same effect was observed in controls only in the initial stage of picture processing. This study suggests that dysphoria is characterized by underactivation of the defensive motivational system and by prolonged attentional allocation to unpleasant stimuli.

Funding: The study was supported by a grant from MIUR (Dipartimenti di Eccellenza DM 11/05/2017 n. 262) to the Department of General Psychology, University of Padua.

Poster 3-032

THE INFLUENCE OF ADAPTIVE COGNITIVE STRATEGIES ON DEFENSIVE ACTIVATION DURING ANTICIPATION OF PAIN

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Descriptors: Cardiac Defense Response, Startle Reflex, Electrodermal Activity

This study aimed to explore whether Cardiac Defense Response (CDR) could be a potential biomarker of defensive activation in pain anticipation. A total of 120 participants performed an anticipatory task in which a colour frame (blue or yellow) presented during 12 s signalled whether they could receive a heat-painful stimulus (threat) or not (safety). After cue onset, digitized probes (105 dB, 50 ms) were delivered either at 6 or 10 s to prompt startle reflex responses. CDR pattern was obtained in an independent physiological test prior to the pain anticipation task by recording HR changes (80 s) after an unpredictable aversive noise (110 dB, 500 ms). Participants were classified into two clusters as accelerators (N = 66) or decelerators (N = 54) based on the CDR second accelerative component (20–45 s). Participants also completed different self-report questionnaires upon arrival to the laboratory. Our results showed that decelerators scored higher than accelerators in different self-reported measures of cognitive control, positive reappraisal and refocus on planning when facing aversive events. In addition, accelerators were more reactive when anticipating the upcoming pain stimulus, with enhanced eyeblink amplitude and greater electrodermal activity for threatening trials, as compared to decelerators. Our findings suggest that tendency to use adaptive cognitive reappraisal in everyday life might be associated with a lower activation of the defensive motivational system during anticipation of pain. Further clinical implications would be discussed.

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Poster 3-033

EMOJIS AS AFFECTIVE SYMBOLS: DO THEY REPRESENT WHAT THEY SHOULD? AFFECTIVE JUDGMENTS OF EMOJIS, EMOTICONS AND HUMAN FACES VARYING IN EMOTIONAL CONTENT

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Descriptors: Emoji, Emotion, Affect

An important function of emojis as communicative symbols is to convey emotional content from sender to receiver in computer-mediated communication, e.g., WhatsApp. However, compared with real faces, pictures or words, many emojis are ambiguous, because they do not symbolize a discrete emotion or feeling state. Thus, their meaning relies on the context of the message in which they are embedded. Previous studies investigated affective judgments of pictures, faces, and words suggesting that these stimuli show a typical distribution along the big two emotion dimensions of valence and arousal. Also, emojis and emoticons have been investigated recently for their affective significance. The present study extends previous research by investigating affective ratings of emojis, emoticons and human faces and by direct comparison between them. In total, 60 stimuli have been rated by 83 participants (8 males, age: 18–49 years), using the non-verbal Self-Assessment Manikin Scales for valence and arousal. The discrete emotion of the stimuli was measured on a 9-point Likert scale. Preliminary results show significant main effects of the factors 'stimulus category' and 'emotional dimension' including emotionality, valence and arousal. Also, the interaction between these two main factors was significant. Emojis elicited highest arousal, whereas stimuli related to happiness were rated highest in valence across stimulus categories. Angry emojis were rated highest in emotionality. Also, the discrete emotion was best recognized in emojis, followed by human face stimuli and lastly emoticons.

Poster 3-034

PERIPHERAL PHYSIOLOGICAL REACTIVITY TO MULTIMODAL EMOTIONAL VIDEO CLIPS

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Descriptors: Skin Conductance, Heart, Video

Human emotion states involve the integration of multiple dynamic sensory cues. Here we assembled a set of multimodal video clips to evoke emotion that are suited to psychophysiological recording and analysis. All clips were: (a) 10 s long, (b) taken from a single lens, landscape perspective that places the viewer in a reasonable position, (c) free from music, narration, watermarks, or special effects, and (d) free from production value elements associated with professional film (e.g. ,expert lighting, celebrities) that may lead the viewer to consider the action to be 'staged' and thus suppress emotional reactivity. After pilot ratings collection in 45 video clips, 37 pleasant, neutral, and unpleasant clips were chosen that were balanced in average sound intensity, luminance, and entropy (as an index of perceptual complexity). Heart rate, skin conductance, and corrugator EMG were recorded in 49 participants as they viewed the clip series in mixed order on a monitor and speaker in a shielded room. After the series, ratings of pleasantness and arousal were collected, which strongly differentiated all contents. Skin conductance was significantly enhanced by emotional, compared to neutral clips. Heart rate decelerated significantly during clip presentations, but did not differ by clip content. Corrugator EMG did not differ by clip content. These results encourage the further development of multimodal video clips for the study of emotion, and demonstrate the large impact of stimulus narrative and variability on the patterns of peripheral physiological reactivity.

Poster 3-035

PREFRONTAL ASYMMETRY PREDICTS AFFECTIVE RECOVERY AND COGNITIVE PERFORMANCE

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Descriptors: Frontal Asymmetry, Affect Regulation, Cognition
Individuals differ in how they deal with their emotions after failure. While some stay in a negative mood for hours, others recover quickly. Prefrontal alpha asymmetry (PFA) describes the relative activity of the left prefrontal cortex (PFC) compared to the right PFC. Higher relative left-sided PFA has been associated with reduced sensitivity to negative events, adaptive dealing with challenges and faster recovery from negative affect. When processing of negative stimuli takes up executive resources of the PFC, subsequent cognitive performance can be impaired. The present study investigates whether PFA influences affective recovery and cognitive performance following failure and hypothesizes that a higher right-hemispheric activity is associated with less recovery from negative affect and poor performance in a cognitive task. To test these assumptions, forty-seven participants completed two mental rotation tasks separated by a short break and received negative feedback on their performance in the task. Baseline EEG data was collected before the first task and affective and cognitive changes were tracked using visual analogue scales throughout the experiment. In participants that felt upset after the initial failure, higher right-hemispheric PFA was associated with a persistence of negative affect. These participants also showed poor performance on the second task. The findings suggest that PFA is a vulnerability factor that prevents individuals from regaining their initial affective state and impairs their cognitive performance.

Poster 3-036

THE EFFECT OF MOVIE AND MUSIC ON DENTAL ANXIETY

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Descriptors: Anxiety, Dental Anxiety, Music Therapy
The aim of this study was to determine methods that alleviate physiological symptoms of dental anxiety. Past studies have shown that visual presentations of dental stimuli lead to increases in the sweat gland response as measured by skin conductance. Physiological palm sweating is said to be a phenomenon that occurs with changes in emotions such as anxiety, fear and anxiety. Research conducted in the past focused on the behavioral impact of a movie or music on dental anxiety. However, the physiological effects have yet to be examined. For this study we presented participants with visual images of dental tools while recording their skin conductance responses (SCR). Participants were placed into one of three groups; the movie group had a movie playing while they performed the task, the music group had music playing while they performed the task, and the control group had nothing in the background. The data indicated that music listening was more effective than movie watching while being exposed to dental tools. Surprisingly, this was even more evident for those who were exposed to images of tools and less so for those presented with the actual dental tools. Less surprisingly, this pattern was strongest for those participants who scored high on the Dental Anxiety Scale.

Funding: Funded by Salisbury University Psychology Department.

Poster 3-037

AVOIDANCE AND ESCAPE: AFFECTIVE REACTIVITY AND ATTENTION DURING PREPARATION OF DEFENSIVE COPING RESPONSES

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Descriptors: Affective Reactivity, Defensive Coping Responses
Affective engagement varies during avoidance vs. escape preparation—thus, reflexive blink reactions to startle probes presented during coping response preparation are inhibited when coping avoids (i.e., prevents) aversive stimuli whereas they are somewhat enhanced if coping merely escapes (i.e., shortens) such stimuli. Here we examine event-related potential (ERP) for startle probes presented during coping preparation to determine if cortical processing of and reflexive reaction to such probes are modulated differently, as has been shown in other (e.g., picture viewing) contexts. Cues signaled that a button press would terminate (escape), completely prevent (avoid), or have no effect on (uncontrollable) subsequent presentation of an aversive scene. Brief acoustic probes were presented throughout the cue interval, and startle blink magnitude and ERP amplitude for each probe were measured in 30 healthy adults. During coping preparation, blinks were potentiated during uncontrollable anticipation, somewhat reduced during escape preparation, and further reduced during avoidance preparation, $F(2, 28) = 5.1$, $p = .01$. A different pattern was found for probe ERP, $F(2, 25) = 12.9$, $p < .001$, with modulation apparent in a window from 175 to 225 ms post-probe onset, such that amplitude was similarly reduced during escape and avoidance preparation relative to aversive anticipation. These data suggest that startle and ERP are modulated by different processing dimensions during coping preparation, such that startle reflects certainty of aversive exposure whereas probe ERP is modulated by action.

Funding: MUSC Internal Pilot Project Award.

Poster 3-038

UNIQUE PSYCHOPHYSIOLOGICAL FEATURES ASSOCIATED WITH ALEXITHYMIA

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Descriptors: Alexithymia, Emotional Faces, Autonomic Reactivity
Alexithymia is a personality trait characterized by a marked difficulty in recognizing and describing emotions, and an externally oriented thinking style. Findings regarding autonomic reactivity in alexithymia are mixed with some studies supporting hyporeactivity and others hyperreactivity toward emotional stimuli. Thus, we attempted to examine potential disturbances in the generation of autonomic responses toward emotional stimuli in alexithymia. One hundred-twenty young adults participated in a face-viewing task, while skin conductance responses (SCR) and heart rate (HR) were measured during the presentation of neutral, fearful, joyful, angry, excited and sad facial stimuli. Resting heart rate variability (HRV) was also measured. The Toronto Alexithymia Scale (TAS-20) assessed participants' levels of alexithymia. TAS-20 was associated with decreased HR and increased SCR in response to angry stimuli, indicating increased parasympathetic activation and sympathetic activation respectively. TAS-20 was also positively associated with resting RMSSD and negatively with resting SDNN, suggesting increased resting parasympathetic activity and decreased overall HRV, respectively. Such disturbances in parasympathetic and sympathetic activity might explain to some extent why alexithymic individuals experience confusion about their affective states and have difficulties in communicating them. Findings are discussed in relation to the physiological mechanisms that contribute to the maintenance of alexithymic emotional difficulties and link alexithymia with internalizing symptomatology.

Funding: The current study has received funding from the internal grants of the University of Cyprus and the Youth Board of Cyprus, to study attentional processes, emotion generation and regulation in alexithymia, through objective measures and biological markers along with self-report.

Poster 3-039

MODULATION OF NOISE-PROBE P3 RESPONSE UNDER CONDITIONS OF SUSTAINED THREAT

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Descriptors: P300, Sustained Threat, Noise-probe

Noise-probe stimuli within visual affective-cueing tasks evoke responses of various types, including startle blinks and brain-ERPs. The most-studied ERP response, P3, shows reduced amplitude during viewing of phasic affective stimuli compared to neutral. This has been shown both for pictures (pleasant/unpleasant < neutral; Schupp et al., 1997) and for shock/no-shock cues (shock < no-shock; MacNamara & Barley, 2018; Nelson & Hajcak, 2017). The implication is that phasic affective stimuli draw attention away from noise probes, resulting in diminished brain processing of the probes. Given the important distinction between acute and sustained threat (e.g., within the NIMH RDoC framework), the current study examined—for the first time—probe-P3 response under sustained threat conditions. Participants completed a visual performance task under two blocked conditions: sustained threat-cueing (i.e., shocks could occur at any time between task-trials within a block) and sustained safe-cueing (e.g., no shocks occurred during the task block). In contrast to findings from phasic-threat studies, probe-P3 was *potentiated* during threat blocks relative to safe, indicating a different focus of attention during sustained threat cueing—i.e., generalized (multi-modal) attention to the external environment, as opposed to specific (visual-modality oriented) attention during phasic threat cueing. These findings suggest that noise-probe P3 can be useful for indexing attentional sets associated with these two types of threat and examining individual differences in sensitivity to each.

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Poster 3-040

NOT INCONGRUITY DETECTION BUT ITS RESOLUTION DETERMINES SUBJECTIVE HUMOR: AN ERP STUDY USING JAPANESE PUNS

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Descriptors: Humor Comprehension, Event Related Potential

Humor comprehension is believed to consist out of two cognitive stages: incongruity detection and its resolution (Suls, 1972). Incongruency refers to the sense of strangeness or unease created by the punch line and the resolution is the moment the joke is understood. Two ERPs are associated with these processes; the N400 for incongruity detection and the P600 for the resolution (Feng et al., 2014). However, the empirical evidence does not clearly dissociate the cognitive stages and corresponding ERPs, because most studies use humorous stimuli in which the punch line induces incongruity and the resolution simultaneously. Therefore, this study used Japanese puns called "nazokake". In nazokake, incongruity always occurs before the resolution. This structure enabled us to clearly dissociate these two stages and determine which ERP is evoked. The purpose of this study was to determine which cognitive stage contributes most to subjective assessment of humor. We separated the puns for each participant into two groups based on whether it was perceived as funny or not and examined the ERPs elicited at the incongruity detection and solution phases. As expected, we observed the N400 in the incongruity detection phase and the P600 in the solution phase. The N400 amplitude did not differ between funny and unfunny puns, but the P600 was larger for funny puns than unfunny ones. These results suggest that the resolution stage, but not the incongruity detection stage, determines subjective humor.

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Poster 3-041

EARLY PROCESSING OF GENDER AGREEMENT VIOLATIONS IN EMOTIONAL AND NEUTRAL NOUN PHRASES

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Descriptors: Emotion, Language, Early Posterior Negativity (EPN)

Neuroscientific research suggests significant interactions between emotion and language with respect to where and when emotional information conveyed by verbal content is processed in the brain. Most of these studies focused on visual processing of isolated emotional words. However, in everyday life, we primarily encounter words embedded in a sentence structure. Contemporary neurocognitive models postulate that syntactic information is processed early in sentence comprehension. Electroencephalographic studies (EEG) investigating the modulation of event-related brain potentials (ERPs) by morphosyntactic and semantic processing have shown that number and gender agreement violations compared to grammatically correct sentences or phrases interact with the emotional valence of the sentence or phrase. In this study, we investigated how gender agreement violations in self-referential pronouns affect emotional modulation of pronoun-noun phrases. Specific focus is laid on the Early Posterior Negativity (EPN), a brain potential peaking at about 200–300 ms post stimulus onset at occipito-parietal EEG sensors and indicating early facilitated processing of emotional compared to neutral content. A total of 33 participants (N = 10 males) participated in the EEG study and were asked to silently read the pronoun-noun phrases presented for 600 ms on a computer screen in white font on black background. Preliminary results corroborate emotion effects in the time window of the EPN and strongly suggest joined rather than encapsulated emotion and morphosyntactic processes in this time window.

Poster 3-042

INDIVIDUAL NEUROAFFECTIVE PROFILES IN COCAINE USE DISORDER

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Descriptors: Cocaine, Late Positive Potential, Reward

Previous studies showed that individuals with stronger neuroaffective responses to drug-related than non-drug-related rewards are more vulnerable to compulsive smoking than individuals with the opposite brain reactivity profile. Here we aimed to test if the same neuroaffective profiles exist in individuals with cocaine use disorder (CUD). Participants with CUD (n = 43) completed a Picture Viewing Task where we recorded EEG while they viewed pleasant (erotic, romantic, and sweet foods), unpleasant (mutilations, violence, and accidents), cocaine, and neutral images. For each picture category, we computed the amplitude of the late positive potential (LPP) over centro-parietal sensors from 400 to 800 ms post picture onset. The amplitude of the LPP increased as a function of motivational arousal (quadratic trend, $p < .001$). Cocaine cues prompted higher LPPs than neutral images ($p < .05$), but lower LPPs than high arousing images (Cocaine vs. Erotic $p < .001$, Cocaine vs. Mutilations $p = .001$). In line with what we observed in other populations characterized by cue-induced compulsive behaviors, clustering participants using LPP responses revealed the presence of two groups: one with larger LPPs to pleasant compared to drug images ($p < .001$) and one with larger LPPs to drug compared to pleasant images ($p = .01$). The two groups have similar LPPs to neutral and unpleasant images. This is the first study to report the presence of these neuroaffective profiles in individuals with CUD. Future directions include assessing the extent to which cluster membership predicts success in treatment for CUD.

Funding: This work was supported by NIDA 1F32DA 048542-01A1 and NIDA R01 DA039125.

Poster 3-043

EFFECTS OF MOOD ON COGNITIVE PROCESSING IN EMOTIONAL-JUDGMENT TASKS: AN EVENT-RELATED POTENTIAL STUDY

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Descriptors: ERP (N2), Mood, Cognitive Process
Congruent judgments have the same emotional value as a person's mood. It is known that the mood influences judgment at an unconscious processing stage (Gushiken, 2004). In this study, we used an event-related potential (N2) during an emotional-judgment task to examine the effect of mood on cognitive processing. N2 is known to reflect the early, unconscious stage of cognitive processing. Twenty-three university students (10 females, mean age 21.3 ± 1.45 years) participated in this study. Taste stimuli for mood induction consisted of a sucrose solution (1 M) for pleasant, a quinine sulfate solution (0.5 mM) for unpleasant, and distilled water for neutral taste. The 162 stimuli in the judgment task consisted of 54 pleasant, 54 neutral, and 54 unpleasant pictures selected from the IAPS. We recorded EEG from 22 sites on the scalp. We conducted a judgment (pleasant, unpleasant) × taste (sweetness, neutral, bitterness) × picture (pleasant, neutral, unpleasant) repeated measures ANOVA for the number of judgments, which indicated a significant interaction judgment × taste, and a significant increase in pleasant judgments (19.9 ± 0.81) compared to unpleasant judgments (15.4 ± 0.83) for sweetness ($p < .05$). We also conducted a taste × judgment × site (Fz, Cz, Pz, Oz) repeated measures ANOVA for the N2 amplitude. Results indicated a significant interaction taste × judgment, and a significant increase in N2 amplitude for sweetness compared to bitterness for unpleasant judgment ($p < .05$). These results suggest that mood congruent judgments are related to early cognitive processing.

Poster 3-044

SEX DIFFERENCES IN THE ASSOCIATION BETWEEN CARDIAC AUTONOMIC ACTIVITY AND MALADAPTIVE EMOTION REGULATION

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Descriptors: Emotion Regulation, Heart Rate Variability, Rumination
Cardiac autonomic balance (CAB) is defined as the relative balance between cardiac sympathetic (SNS) and parasympathetic (PNS) activity, while cardiac autonomic regulation (CAR) is defined as the total activity of both nervous systems. It is theorized that greater difficulties in emotion regulation (DER) and maladaptive emotion regulation strategies are associated with poorer health via poorer resting cardiac activity. However, few studies have linked resting CAB and CAR with self-report measures of DER and associated maladaptive regulation strategies, such as rumination. Therefore, the current study examined associations between both CAB and CAR and DER and rumination. Resting cardiac data was collected from 173 participants (120 females, mean age = 19.15), who completed the DER and Ruminative Responses scales. Time-domain measures of heart rate variability were used to derive indices of CAB and CAR. Correlation results revealed poorer (lower) CAB was associated with greater DER ($r = -.165$, $p = .036$) and rumination ($r = -.154$, $p = .05$), while lower CAR was also related to greater DER ($r = -.279$, $p < .001$) and rumination ($r = -.158$, $p = .044$). These associations were strongest in females (CAB: $r = -.204$, $p = .032$; CAR: $r = -.316$, $p = .001$). These data support theories that maladaptive ER is associated with poorer cardiovascular function. Furthermore, novel evidence revealed a potential stronger association with CAR compared to CAB; suggesting co-inhibition of the ANS branches may be particularly linked with maladaptive ER, especially in females.

Poster 3-045

DYNAMICS OF FACIAL EXPRESSIONS IN RESPONSE TO EMOTIONAL SOUNDS: COMPARISON OF BLIND AND SIGHTED INDIVIDUALS IN THE EMG STUDY

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Descriptors: EMG, Facial Expressions, the Blind
Facial reactions constitute one of the crucial components of emotion. These reactions are frequently studied in the context of facial perception, but they are understudied regarding the processing of sounds. There is a long-standing debate on the innateness and universality of facial expressions. Here, we aimed to contribute to this debate investigating possible differences between sighted and blind populations in the dynamics of facial expressions associated with the perception of emotional sounds. We hypothesized that if emotional facial expressions are innate, they should be similar in both blind individuals and control. 20 blind (age 34,2; 7F) and 33 sighted individuals (age 31,2; 18F) participated in the experiment. The procedure consisted of the presentation of 80 sounds belonging to one of four categories: 3 emotional (sadness, fear, happiness) and the neutral, each sound lasting up to 3 s. The sounds included, e.g., crying, laughing, shouting. Participants' task was to freely listen to the presented sounds while the activity of corrugator supercilii and zygomaticus major muscles were measured. A series of analyses of variance showed differences in the dynamics of facial emotional responses between the two groups. The main difference concerns the activity of the zygomaticus major, especially in response to the sounds expressing happiness. While in sighted individuals, the reaction rapidly increases and decreases, in the blind, the reaction tends to rise slowly and persists longer. Thus, our findings challenge the innateness approach to emotional facial expressions.

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Poster 3-046

MUSE HEADBAND DESIGN AND ITS IMPACT ON THE QUALITY OF EEG RECORDING

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Descriptors: EEG, Muse, Human Resources Management
The purpose of this study was to identify correlates of burnout among employees of the organization with the Muse Headband and "Methods of diagnosing the level of emotional burnout" by Boiko. EEG measures of burnout could be useful for the improvement of employees' mental health. Ten employees from the HR and sales departments aged 23–44 years old participated in the study. EEG was recorded with Muse, electrodes of which were covered with the conductive cream. After resting-state EEG with closed and opened eyes was recorded, participants were asked to watch three series of pictures of people with positive and negative emotions and under the stress. A bandpass filter between 0.5 and 49 Hz was applied to TP9, Fp1, Fp2, and TP10 channels. Eye-moving artifacts were rejected manually with the EEGlab. Only 5 recordings of Fp1 and Fp2 electrodes were considered eligible for further analysis due to the poor fit of the Muse device's shape for most participants' heads, especially in the area of TP9 and TP10 electrodes. The Wilcoxon test for paired samples revealed no difference in alpha power between eye-closed and eye-opened resting-state EEG. Similarly, no differences in alpha asymmetry were found in reaction to pictures of negative emotions and stressful events. Since recordings of one half of the subject were of poor quality and the second half showed no difference in alpha power between resting state with opened and closed eyes and reaction on emotional stimuli, it can be concluded that Muse device cannot be used for psychophysiological measures in organizations due to design of the Headband.

Poster 3-047

VIRTUAL REALITY SPATIAL TASK PERFORMANCE ESTIMATION THROUGH COGNITIVE LOAD: EEG AND EYE TRACKING STUDY

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Descriptors: Spatial Abilities, Cognitive Load, Virtual Reality
Spatial abilities (SA) are essential for many cognitive activities. Insufficiency of SA can provoke additional cognitive load (CL) while solving spatial task. However, most research are made on the material of 2D objects. Still SA are essential in 3D environments, e.g., in VR. This study was aimed to find out the relationship between the level of SA and the emerging of CL when solving a spatial tasks with 3D objects in VR. The hypothesis: the higher the SA level, the more effective the subjects will be in performing the 3D task. Effectiveness was composed of task score and an indicator of the induced CL. 17 participants (9M; 8F) performed a spatial task of geometric shapes rotation with timing in a virtual environment presented in HTC Vive Pro Eye. Before the experiment participants passed the "King's Challenge" (Rimfeld et al., 2017) SA test. The level of CL was estimated by beta band spectral power. Also the scan-path complexity (real-to–perfect path length ratio while finding the object) was used for CL level estimating. A positive correlation (r = .67) was found between the level of SA and the beta-activity in the central and parietal areas. The group with low SA showed complicated scan-paths. It was found that people with different levels of SA demonstrated close task scores, which is in consistent with the ability-as-compensator hypothesis (Lee et al., 2014). However, participants significantly varied in required cognitive resources (p < .05). Thus, measures of SA combined with eye tracking and EEG provide to estimate the effectiveness of VR spatial task performance.

Funding: This work was supported by a grant from the Russian Science Foundation №19-78-10148.

Poster 3-048

COMPARING ADULTS TO CHILDREN IN A MODEL ACCOUNTING FOR TRAIT- AND STATE-BASED VARIANCE IN SEQUENTIAL LATENT MEASURES OF EVENT-RELATED POTENTIAL (ERP) COMPONENTS

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Descriptors: Structural Equation Modeling, Human Development, Contingent Negative Variation (CNV)
Connectionist theory posits that cascades of neural activity activate in specific patterns to produce explicit behavioral responses. Using structural equation modeling to account for individual differences, we recently demonstrated the importance of understanding unique sources of variance which contribute to averaged ERP measurements in typical children; including stable traits (e.g., sex), contextually-fluid states (e.g., anxiety), and measurement error. Here, we compare neural processing of typical adults and children using a multigroup latent path model to determine if ERP components predict one another in chronological order while accounting for session-specific latent state variance and individual traits. All participants (154 children, 8–12 years, and 74 adults, 18–30 years) performed the same visual Go/No-Go task in 2 lab visits, 1 to 2 weeks apart. Our model yielded acceptable fit indices: RMSEA = .06, CFI = .96, and SRMR = .077. The coefficients in the latent path of processing from N1 through P3 were significant for adults but not for children. The coefficients of N1→P2 and P2→N2 for adults were significantly larger than those of children. The latent N1 for children had significantly larger negative amplitudes than adults suggesting differential effects of attentional control. In adults, State effects (i.e., latent session 1 predicting latent session 2) were not significant. In contrast, State effects were significant in children which may represent underlying neural plasticity reflecting changes in neurocognitive strategies across the two sessions in children.

Funding: Funded in part by NICHD (5R03HD046512), Colorado State University (CSU), College of Health and Human Sciences to PLD & WJG, and CSU Department of Occupational Therapy to PLD, BKT, MHL, and WJG.

Poster 3-049

APPEARANCE CONCERNS ARE ASSOCIATED WITH NEURAL RESPONSE TO SELF-RELEVANT STIMULI

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The Florida State University

Descriptors: LPP, Appearance, Psychopathology
Studies show individuals with body dysmorphic disorder (BDD) and appearance anxiety often exhibit cognitive and perceptual biases, simultaneously *overestimating* the importance of attractiveness. Self-idiographic eye-tracking studies demonstrate this can lead to harmful attentional bias which alters the perception of the self and of others, often overemphasizing the self —the neural mechanisms that might relate to these biases are largely unknown. In the present study, we examined individual differences in self-reported appearance anxiety and symptoms of body dysmorphic disorder (BDD) in relation to the late positive potential (LPP)—an index of stimulus significance—in response to pictures of oneself, strangers, and objects. Eighty-three female college students participated in a novel passive viewing task and were presented with pictures of Objects, a Stranger, and the Self, with each picture presented at a variety of angles in a random fashion. Results indicated that the LPP was potentiated in the Self category, such that Self > Stranger > Object. Further, the Yale Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS) and Appearance Anxiety Inventory (AAI) scales significantly positively correlated with LPP amplitude to Self, but was unrelated to the LPP elicited by Other and Object pictures. Results provide evidence for the LPP as a neural indicator of attentional biases to self that is related to appearance anxiety and appearance concerns.

Poster 3-050

ASSOCIATIONS BETWEEN CONCURRENT CARDIAC AND NEURAL MEASURES OF INFANT ATTENTION OVER SHORT AND LONG TIMESCALES

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Descriptors: Infant Attention, Timescale, ECG and EEG
Attentional processes operate across short (i.e., sub-second) and long (i.e., a few seconds) timescales, reflecting the continuum of phasic to tonic physiological responses. Clarifying how infant attention is similar and distinct across these timescales may inform temporal dynamics of attention in early development. However, multimodal event-related studies of infant attention have focused on short timescales. Thus, we examined the associations among three cardiac and EEG measures of infant attention over short and long timescales of 1 and 10 s epochs, with predictions that lower heart rate, reduced alpha power, and greater theta power would index enhanced attention. Based on 34 one-year-old infants' concurrent cardiac and neural responses during passive viewing of face/toy images, we used within-subject correlations and t-tests to quantify and assess associations among these psychophysiological measures. For both short and long timescales, alpha and theta power were strongly related across frontal, central, parietal, and occipital sites (.14 < r_s < .48; ts > 4.60, ps < .001); heart rate was positively related to alpha power at occipital sites and theta power at frontal, central, and parietal sites (.06 < r_s < .13; ts > 2.12, ps < .05). Notably, effect sizes were larger for long than short timescales (t = 10.84, p < .001), suggesting enhanced robustness of multimodal measures of infant attention over long timescales. Broadly, our findings highlight similar physiological responses across both timescales and contribute to temporal, biobehavioral accounts of infant attention.

Poster 3-051

EMOTIONAL PROCESSING DEFICITS IN CHILDREN EXPOSED TO DOMESTIC VIOLENCE: CONVERGING EVIDENCE FROM RESTING EEG ASYMMETRY AND THE LPP

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Descriptors: Resting EEG, Late Positive Potential, Domestic Violence

Childhood maltreatment has been linked to emotion processing deficits in children; however, domestic violence (DV) exposure, specifically, is less studied. The current study examined associations between physical DV exposure and emotional processing in 4–6 year-old children (N = 61) undergoing two EEG paradigms measuring resting frontal alpha asymmetry (FA) and the late positive potential (LPP). Children completed 1–2 min of resting EEG to assess FA. Next, children completed an affective oddball task with instructions to discriminate between animal (targets) and non-animal pictures (distractors). Distractor pictures included angry, happy, and neutral human faces (NimStim). Physical DV was significantly associated with FA, such that DV exposed children had lower left than right frontal asymmetry (Cohen's d = .97; p < .01). This pattern has been associated with behavioral avoidance. There was a trend effect for the interaction between oddball task condition and DV exposure on the LPP (η^2 = .06; p = .068) such that non-exposed children exhibited larger LPP amplitudes to target stimuli (animals) and affective faces (happy, angry) relative to neutral faces. In contrast, DV exposed children had comparable LPP amplitudes across stimuli types. This pattern may suggest deficits in motivated attention (no target effect) and affective face discrimination in DV exposed relative to non-exposed children. Together, these results provide converging evidence of atypical emotion related psychophysiology in children with DV exposure.

Funding: This project is funded by a grant from the National Institutes of Mental Health U01 MH113390 (Grasso and Briggs-Gowan).

Poster 3-052

FOLLOW-UP STUDY OF GAZE FOLLOWING DEVELOPMENT FROM 10 TO 14 MONTHS

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Descriptors: Gaze Following, Eye-tracking, Joint Attention

Gaze following is the one of the basic social-cognitive skill that makes available triadic interaction. The aim of the study was to investigate the development of this ability from 10 to 14 months. Fifteen participants (6 boys) were observed by using eye-tracker SMI Red500 at two time points. First time point was 10 months, average age of participants was 10.75 (SD = 0.51), range 9.34–1.44 months. Second time point was 14 months, average age of participants was 14.74 (SD = 0.88), range 13.51–16.80 months. Procedure and task were similar to those used by Senju group (Senju et al., 2008). Gaze records were processed by GraFIX software (de Urbain et al. 2014). Fixation duration on face in direct gaze phase and shift phase (FD2, FD3), fixation duration on congruent and incongruent objects in shift phase (CD, ID) were measured. Different scores DS = (CD−ID)/(CD+ID) were calculated. Only marginally significant difference in cd at different ages was found (Z = −1.761, p = .078, d = 0.45). Correlation analysis revealed significant correlation between CD at 10 and CD at 14 months (ρ = 0.554, p = .032) and between CD at 10 months and DS at 14 months (ρ = 0.575, p = .025). Neither correlation between FD2 and DS nor CD were found. Gaze following skill at 14 months could be predicted by gaze following measurements at 10 months.

Funding: The reported study was funded by RFBR, project number 19-313-90066.

Poster 3-053

DEVELOPMENTAL CHANGES IN ERP MEASURES OF EXTERNAL AND INTERNAL PERFORMANCE MONITORING ACROSS MIDDLE CHILDHOOD

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Descriptors: Performance Monitoring, EEG, Development

Performance monitoring processes rely on both internal and external information sources to enable learning and behavioural adaptation. Across childhood, research suggests that utilisation of external processes is reduced in favour of internal processes. However, little research has examined neurophysiological indices (the feedback-related negativity, FRN; and error-related negativity, ERN) of these changes. Data from 339 children assessed annually from kindergarten to 2nd grade (aged 5–9 years) were examined to determine (a) how FRN and ERN amplitudes change over time, and (b) whether associations between these components change over time. EEG data were recorded during an incentivised Go/No-go task, and ERP component amplitudes were extracted at Fz as peak measures. Linear growth models indicated that over the 3-year period, ERN amplitude became significantly more negative (b = −0.63, p < .01), whereas there was no linear trend in the FRN. Multi-level regression analyses indicated a positive association at Kindergarten, such that a more negative ERN predicted a more negative FRN (b = 0.30; p < .01), which inverted over time such that in 2nd Grade a more negative ERN was associated with a less negative FRN (b = −0.39; p < .01). These results suggest that children may initially incorporate both external and internal feedback in monitoring behaviour, but shift to a stronger reliance on internal monitoring with age. It is also likely that there are individual differences in the timing and extent of this transition that may have meaningful implication for children's cognitive development.

Funding: Funding for this project was provided by The Pennsylvania Department of Health, and the National Institute of Health UH3OD023 332-01.

Poster 3-054

RECURRENT ABDOMINAL PAIN IN ADOLESCENTS IS ASSOCIATED WITH LOW OXYTOCIN PLASMA CONCENTRATION

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Descriptors: Recurrent Abdominal Pain, Oxytocin, Adolescents

The neuropeptide, oxytocin (OT), is a crucial modulator of diverse aspects of affiliation, including maternal behaviour, affiliation in mammals, including maternal behaviour, sexual reproduction, pair bonding, social communication, and social memory. The objective of this study was to examine whether plasma levels of OT in adolescents with RAP, differ from those who have no recurrent pain. Methods: The concentration of oxytocin in plasma was measured by ELISA kit in 27 adolescents (aged 12–18) with RAP according to J. Apley and N. Naish criteria and in 20 age-matched adolescents without RAP. Data are shown as the Median (25–75 quartiles). Mann–Whitney and Kruskal-Wallis tests were used. Results: Plasma OT concentration was significantly higher in girls than in boys (0.046 (0.029–0.100) ng/ml vs. 0.018 (0.009–0.055) ng/ml, p = .008). RAP adolescent group exhibited lower plasma OT level compared to controls (0.029 (0.009–0.051) ng/ml vs. 0.056 (0.021–0.091) ng/ml, p = .043). Additionally, we revealed the tendency to the progressive lowering of OT levels with increasing RAP frequency per month and low RAP with improvement after stool. Conclusion: We suppose that low plasma OT level in RAP adolescents may reflect the presence of chronic stress and/or detachment, considering the important role of OT as anti-stressor and social communication regulator. Also, the revealed association the low OT levels with RAP pattern "with improvement after stool" may reflect the possible role of OT in the individual perception of intestinal discomfort/pain and obsessions/compulsions forming.

Poster 3-055

SHIELDING CHIPS REDUCE EFFCTS OF ELECTROMAGNETIC RADIATION EMITTED BY HEADSETS ON EEG BRAIN ACTIVITY DURING AEROBIC EXERCISE AND IN THE RECOVERY PHASE

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Descriptors: EEG, Electromagnetic Fields, Shielding Chips

Current research shows alterations in EEG brain activity induced by electromagnetic fields (EMFs). More specifically, increases in EEG alpha, beta, and gamma activity have been observed. In this study, we investigated the effects of EMFs emitted when wearing a headset during endurance training, and in the recovery phase, and application of a shielding chip on the headset. Subjects performed a running training on a treadmill at 80 % of maximum performance. We tested the following experimental conditions when wearing a headset during exercise and in the recovery phase: (a) headset switched on, (b) headset switched on plus music app without sound, (c) headset switched on with application of a shielding chip, (d) headset switched on plus music app and application of a shielding chip, and (e) headset switched off (control condition). High-density EEG was recorded from 128 electrodes applied according to the international 10–20 system before, during, and after each experimental condition. EEG beta and gamma activity increased in frontal, central, and temporal areas when subjects were exposed to headset-emitted EMFs compared to the control condition. When running the music app, increases in brain activity were significantly higher than headset use without music app. Additionally, these increases in EEG activity decreased significantly slower during the recovery phase when previously exposed to EMFs than in the control condition. Applying a shielding chip to the headset reduced the observed increases in brain activity during aerobic exercise and in the recovery phase.

Poster 3-056

MOTOR SEQUENCING TRAINING HAS A POSITIVE EFFECT ON SENSORIMOTOR FUNCTIONS IN PRESCHOOL CHILDREN

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Descriptors: Sensorimotor Development, Motor Sequencing Training, Neuropsychological Assessment

It is known that during preschool age there is high rate of sensorimotor development. It is important to establish the effective ways for developing this abilities in preschool children. The goal of this study was to reveal the effect of motor sequencing training on sensorimotor functions in 5–6 years age children. We compared the efficacy of two methods of training (motor sequencing training for children vs. conventional motor exercises) in a randomized controlled pilot study. The participants were 20 typically developing children aged 5–6 years. Children were randomly assigned to the intervention and comparison group. Children from intervention group participated in 12 weeks of motor sequencing training. This training trains the child to plan, sequence and process information more effectively through repetition of goal-directed movements. We used 3 subtests from Luria's child neuropsychological assessment battery to assess the sensorimotor functions (Kinetic praxis, Design coping, Imitating Finger Positions). The ANOVA has revealed ($p < .05$) that for all 3 subtests on sensorimotor functions the motor sequencing training was superior to the conventional motor training, with effect sizes in the medium-to-high range (0.53–0.90). The findings from this pilot study suggest that motor sequencing training can be used as an effective approach for development of the sensorimotor functions in preschool children. However, it is necessary to do further research for revealing the impact of motor sequencing training on neurocognitive development children.

Poster 3-057

SYMPATHETIC ACTIVATION AFTER FEMALE PERSPECTIVE TAKING INCREASES SUPPORT FOR DIVERSITY INITIATIVES AMONG MALE STEM ACADEMICS

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Queen's University Belfast

Descriptors: Perspective Taking, Electrodermal Activity, Gender

Women are underrepresented in science, technology, engineering, and mathematics (STEM) and experience heightened activation of the sympathetic nervous system in threatening environments, such as in male-dominated STEM classrooms. Despite growing implementation of initiatives in academia to reduce the consequences of these gender gaps, diversity initiatives may be met with negative or indifferent attitudes among faculty. Using a dual-process framework of persuasion, we used virtual reality to manipulate exposure to information about the causes and consequences of gender bias in STEM and to facilitate taking the perspective of a female scientist. Male STEM academics (faculty, postdocs, PhD students; $N = 70$) took part in a virtual reality experience while electrodermal activity (EDA) assessed sympathetic activation. Participants watched a neutral or gender bias presentation, took the perspective of either a female or male scientist by viewing their virtual avatar in a mirror, and interacted with predominately male attendees during a virtual research conference. Male academics exposed to gender bias information reported more positive diversity attitudes compared to neutral information, particularly when taking the perspective of a female academic. Perspective taking as a female also led to greater EDA compared to male avatars, suggesting male academics exhibited heightened activation of the sympathetic nervous system, similar to women in male-dominated contexts. Lastly, sympathetic activation significantly predicted and indirectly accounted for positive diversity attitudes.

Funding: Research funded by the EPSRC (EP/S011919/1).

Poster 3-058

HEART RATE VARIABILITY CHANGE IN RESPONSE TO KETAMINE IN ADOLESCENTS WITH TREATMENT-RESISTANT DEPRESSION AND ASSOCIATIONS WITH NEURAL ENTROPY

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Descriptors: Ketamine, Heart Rate Variability, Treatment Resistant Depression

Investigation of the neurobiological mechanisms of novel interventions is needed to target poor treatment response in adolescent depression. Neurobiological inflexibility may maintain depression by interfering with adaptive responses. Heartrate variability (HRV) and neural entropy may indicate inflexibility in depression and relate to treatment response. Before and after 6 ketamine infusions, 13 adolescents with treatment resistant depression completed clinical assessments and resting-state fMRI, during which photoplethysmography was used to record pulse-to-pulse intervals at a sampling rate of 50 Hz. Root Mean Square of the Successive Differences (RMSSD) and high frequency (HF)-HRV (absolute power from autoregressive models and a frequency band of .20 to 1 Hz) were calculated. Shannon entropy was calculated from rs-fMRI timeseries from subcortical regions from the Harvard-Oxford atlas. Post-ketamine, HF-HRV significantly increased, $t(11) = 2.10$, $p = .03$. While increase in HRV did not relate to change in depression, change in entropy in the subcallosal cingulate positively correlated with HF-HRV, $r(9) = .79$, $p = .006$. Results show ketamine effects neural and physiological changes, possibly representing increased autonomic flexibility as a mechanism of ketamine treatment response. Increased HRV may interact with neural entropy to target depressive symptoms. Neurobiological flexibility may be critical for treatment changes. Randomized control trials with larger samples are needed to more thoroughly probe the relationship between HRV, entropy, and clinical improvement.

Funding: This research was supported by the National Institutes of Health's National Center for Advancing Translational Sciences (UL1TR002494, 1UL1RR033183, UL1TR000114), Biotechnology Research Center (P41 EB015894), the NINDS Institutional Center Core Grants to Support Neuroscience Research (P30 NS076408), the High Performance Connectome Upgrade for Human 3T MR Scanner (1S10OD017974-01), the NIDA T32 Postdoctoral Training Program (5T32DA037183-05), the University Foundation, Amplatz Scholarship, and the Society for Psychophysiological Research (SPR) Research Training Award.

Poster 3-059

THE INFLUENCE OF THE HEAD MODEL CONDUCTOR ON THE SOURCE LOCALIZATION OF AUDITORY EVOKED POTENTIALS

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Descriptors: Auditory Tetanizing Effect, Source Reconstruction, Realistic Head Models

The accuracy of EEG source analysis reconstruction improves when a realistic head volume conductor is modeled. We investigated how the progressively more complex head representations influence the spatial localization of auditory-evoked potentials (AEPs). Fourteen young-adult participants with normal hearing performed the AEP task. Individualized head models were obtained from structural MRI and diffusion-weighted imaging (DWI) scans. AEPs were elicited by 1 kHz and 4 kHz tone bursts during a passive-listening tetanizing paradigm. We compared the amplitude of the N1 and P2 components before and after a tetanic-stimulation with 1 kHz sounds. Current density reconstruction (CDR) values of both components were investigated in the primary auditory cortex and adjacent areas. We compared the source reconstruction obtained with 10 different head models on the EEG forward solution. Starting from the simplest model (skill, skull, brain), we investigated the influence of modeling or not the CSF, distinguishing between GM and WM conductors, and including anisotropy WM values. Topographic error (RDM) and magnitude (lnMAG) from the most complex solution were used to quantify the model comparisons. Results showed a change in the neural response within the primary auditory cortex, but not in adjacent areas. The inclusion of the CSF compartment had the strongest influence on the source reconstruction, while the WM anisotropy led to a smaller improvement. We conclude that individualized realistic head models provide the best solution for the forward solution when modeling the CSF conductor.

Poster 3-060

ELECTROPHYSIOLOGICAL EXPLORATIONS OF PASSIVE AND ACTIVE MODES IN MOTIVATED BEHAVIOR

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Descriptors: Approach-Avoidance, Oscillations, EEG

Flexibly shifting between passive and active defensive responses is critical for healthy stress-coping. While well studied in animals, the neural mechanisms behind this threat-response remains poorly understood in humans. In this study, participants (n = 15, aged 18–26) engaged in a virtual-reality version of the rodent Risk-Reward Interaction (RRI) task while EEG was recorded. Across 5 blocks (600 trials), participants had to learn by trial-and-error to associate a cue with an aversive tone to avoid or to a monetary reward to approach. Depending on their start position on each trial, participants could actively (move) or passively (not move) respond to the cue within 1,050 ms. Four conditions were investigated: active/passive avoidance, and active/passive approach. Preliminary analysis: Both cues elicited a strong theta burst (4–8 Hz) over posterior channels, with the largest increase in active-avoidance. For all conditions, theta power decreased across the blocks. By contrast, theta power increased in approach conditions across blocks but later, towards the onset of the reward, likely reflecting an anticipatory response. Lastly, cue onset for passive-avoidance induced a large gamma burst (30–50 Hz), likely reflecting a movement suppression threat response. By highlighting dynamic oscillatory responses to different actions, these results hold promise for integrating EEG measures of adaptive threat-responses with extensive animal research. This may advance insights into human stress-related psychopathologies, particularly those characterized by rigidity in behavioral reactions.

Funding: Galit Karpov received funding from the Behavioral and Neural Sciences Graduate Program at Rutgers—Newark.

Poster 3-061

ELECTRODERMAL RESPONSES INDICATE FEAR LEARNING, BUT NOT NON-LEARNING

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Descriptors: Fear Conditioning, Skin Conductance

Contemporary studies of human fear conditioning focus frequently on extinction or relapse which, arguably, requires that fear conditioning, often indexed by differential electrodermal responding, has been acquired during acquisition training. Data from participants who fail such a learning criterion are frequently disregarded. The current analysis is based on 351 participants who completed a standard differential fear conditioning paradigm comprising four presentations of two CSs (CS+/CS-) during habituation and eight presentations of each CS during acquisition and extinction (6 s CSs; shapes or neutral faces; ITI 15, 17 or 19 s). CS+ was followed by an electrotactile US on each trial of acquisition. Electrodermal first and second interval responses (FIR, SIR), continuous stimulus evaluations, and post experimental contingency reports were assessed. Adopting a learning criterion of "larger FIR to CS+ than to CS− across the last two acquisition trials", 104 participants were identified as non-learners. These non-learners displayed differential conditioning on blocks 1–3 of acquisition in electrodermal FIR and on blocks 2–4 in SIR and CS evaluations. 90 non-learners could report the stimulus contingencies. Similar results emerged for a learning criterion of "larger FIR to CS+ than to CS− in the second half of acquisition" (74 non-learners). A lack of differential electrodermal responding late during acquisition does not indicate a failure to learn the stimulus contingencies and exclusion of participants based on such criteria leads to unnecessary data loss.

Funding: This work was supported by Grant APP1156490 from the Australian National Health and Medical Research Council.

Poster 3-062

ELECTROPHYSIOLOGICAL CORRELATES OF CONTINGENCY AWARENESS IN A SEMANTIC CONDITIONING PARADIGM

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Descriptors: EEG, Conditioning, Contingency Awareness

The recognition of the conditioned-unconditioned stimulus (CS-US) association in classical conditioning is referred to as contingency awareness. The neural underpinnings of contingency awareness in human fear conditioning are poorly understood. Here, we recorded electroencephalography (EEG) from a sample of 48 participants in a semantic conditioning experiment. In the acquisition phase the participants were presented with sequences of words from two semantic categories paired with tactile stimulation followed by presentation of a neutral sound (US−) (e.g., animals -> left hand vibration -> US−, clothes -> right hand vibration -> US−). In the test phase the association violated in 50% of trials which followed by a presentation of a loud noise (US+). The participants were only instructed to listen carefully. On the basis of self-reported contingency awareness, twenty participants were divided in aware (N = 28) and unaware (N = 20) group. The aware group expressed a non-lateralized effect of alpha-beta (12–23 Hz) suppression along with a more negative CNV at central channels preceding presentation of the vibration (main effect of Group). Also, CNV was more negative in expectation of US+ comparing with expectation of US− in the aware group but not in the unaware group. The results indicate that contingency awareness is accompanied by neural patterns reflecting expectation as can be seen in the suppression of somatosensory alpha-beta activity before expected presentation of the vibration as well as in CNV in expectation of an aversive event.

Funding: The study was supported by the German Research Society (Deutsche Forschungsgemeinschaft), Grant KO-1753/13.

Poster 3-063

EFFECTS OF ACUTE STRESS ON MEMORY FOR OBJECTS ENCODED IN EMOTIONAL AND NEUTRAL CONTEXTS: AN FMRI STUDY

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Descriptors: fMRI, Emotion, Long-term

It has frequently been observed that stress around the time of encoding enhances long-term memory for emotionally arousing items. It is unclear, however, whether and how acute stress effects memory for associated information. In the present study, we therefore used functional brain imaging to investigate long-term recognition memory for neutral objects that has been encoded with either pleasant, unpleasant or neutral background scenes. Shortly before object/scene encoding, participants (n = 77) were exposed either to a stress (social evaluator cold pressure test; SECPT) or a control protocol. We found that memory performance was enhanced for objects from emotional compared to neutral contexts, and related to stronger activation in posterior parietal, temporal and prefrontal brain regions during retrieval. Interestingly, although no effect of stress was observed at the behavioural level, pre-encoding stress exposure specifically increased activation in all of these retrieval regions. In line with prior findings testing single item-memory, our results may suggest that stress also facilitates memory binding of emotional context information.

Poster 3-064

NO EVIDENCE FOR INTEGRATION OF AFFECTIVE STATES IN REACTIVATED EPISODIC MEMORIES

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Descriptors: Associative Memory, Integration, Emotion

Humans are thought to encode new experiences that involve previously encountered percepts as integrated representations, holding information from both the pre-existing memory and the novel event. Whether emotional responses are similarly integrated is however unknown. Using a novel associative inference paradigm that incorporates Pavlovian fear conditioning, we tested the hypothesis that initially neutral material can come to evoke signatures of emotional expression following partial reactivation and new association with negative stimuli. Participants visited the lab on three consecutive days. First, to encode 40 associations between pairs of neutral items (A–B) which were presented sequentially. Then, on day two, each "B" item was similarly paired to a new item "C" that was either neutral or emotionally negative. Finally, on day three, each "A" item from day one was presented followed by its implicitly paired "C" item from day two. Pupil dilation was measured on day two and three. Multilevel regression analysis revealed that the negative "C" items elicited strong pupil responses that carried over to their associated "B" item on day two. However, we found no increased pupil dilation for "A" items that were later implicitly paired to negative "C" items as compared to neutral ones. We conclude that the present experiment provides no evidence that emotional states transfer via episodic memory associations. Such lack of "affective integration" may protect against maladaptive generalization of emotional responses to stimuli that are only remotely associated with threat.

Poster 3-065

EFFECTS OF SELF-RELEVANCE AND VALENCE ON THE ERP SUBSEQUENT MEMORY EFFECT

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Descriptors: Subsequent Memory, Emotion, Self-relevance

The subsequent memory effect (SME) refers to neural activations that predict later memory for a stimulus: that is, the difference in neural activity between items later remembered and not remembered. In the event-related potential (ERP) literature, the SME is often seen as an increased positivity in later time windows at anterior and/or parietal electrodes. Both self-relevance and the emotional properties of stimuli can have a large impact on memory performance, and in the ERP literature these factors are associated with effects that are similar to SME effects, especially a late positive potential (LPP). However, few studies have examined the impact of self-relevance and emotion on the ERP SME. In the present work, ERPs were recorded while participants read two sentence social vignettes in second person (self-relevant) or third person (other-relevant) with a neutral, positive, or negative critical word in the second sentence. Later, memory was tested for the critical word with cued recall and recognition tasks. Both self-relevance and valence affected behavioral memory performance and the LPP. Consistent with previous research, a positivity evident at both frontal and posterior sites was larger for subsequently remembered stimuli from around 300 to 1,000 ms. This effect was larger for emotional stimuli, especially at posterior sites and especially for negative stimuli. Although we observed the expected main effects of self-relevance on memory performance and ERPs, there was limited evidence that self-relevance modulated the SME or the effect of valence on the SME.

Funding: R21-AG051853 from the National Institute on Aging to Elizabeth Kensinger and Angela Gutchess.

Poster 3-066

EFFECTS OF TRANSCUTANEOUS VAGUS NERVE STIMULATION (TVNS) ON EMOTIONAL WORD PROCESSING AND RECOGNITION MEMORY

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University of Potsdam

Descriptors: Transcutaneous Vagus Nerve Stimulation

Previous clinical research found that invasive vagus nerve stimulation (VNS) enhanced word recognition memory in humans (Clark et al., 1999, Nat. Neurosci.), an effect assumed to be related to the activation of the locus coeruleus arousal systems. In the present study, we applied non-invasive transcutaneous auricular VNS (tVNS) to replicate and extend this study. Using a single-blind, randomized between-subject design, 60 healthy volunteers received active or sham stimulation during a lexical decision task, in which emotional and neutral stimuli were classified as words or non-words. One day after stimulation, participants' recognition memory performance and subjective memory confidence for these words were tested. Salivary alpha-amylase (sAA) levels were also measured before and after stimulation to check for changes in central noradrenergic activation. As in previous studies, emotion modulated word processing and memory. Pleasant words were better identified and remembered than neutral and unpleasant ones. tVNS showed no effects on task performance or on overall sAA level changes. However, when high and low confidence ratings were considered, tVNS, compared to sham stimulation, increased hit rates for words that were remembered with high confidence, irrespective of emotional content, indicating an effect of tVNS on hippocampus-mediated consolidation processes. Overall, this study provides new insights into the modulatory effect of tVNS, which likely improves hippocampus-mediated, recollection-based memory.

Poster 3-067

ACOUSTIC SHORT-TERM MEMORY RETRIEVAL: ERP AND ICA EVIDENCES FOR TWO SUBSYSTEMS

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University of Montreal

Descriptors: Acoustic Short-term Memory, Electrophysiology, Independent Component Analysis

The aim of our study was to understand better the cognitive processes involved in pure acoustic memory retrieval with the use of ERPs and independent component analysis (ICA). The task was a modified Sternberg task, with non-musical pure tones as memory items, with three memory set size conditions (2, 4, or 6 tones). In a control condition, no task-relevant tone was presented in the memory set. Participants reported the presence or absence of a probe tone in the memory set. The probe elicited a large P3 component when tones were encoded, but not in the control condition. With an increase in memory load, P3 amplitude decreased, accuracy was lower, and response time (RT) longer. P3 was larger when the probe matched the last tone encoded than when it matched any other tone or was absent from the memory set. This larger P3 was accompanied by shorter RT and near perfect accuracy. This difference between the retrieval of the last tone encoded and that of any other was further examined by using an ICA on ERPs, which allowed us to separate brain activity that had different time-courses and different scalp distributions. We found a parieto-occipital ICA component with larger activations for probes that matched the last serial position than for earlier ones, and an anterior component that had little activation for the last serial position and large activations for all earlier ones. The results suggest that acoustic memory for pure tones is mediated by two subsystems: one encoding the last item with high probability, and another for all other serial positions.

Funding: The research was supported by grants from the Natural Sciences and Engineering Research Council of Canada, the Canada Research Chairs program, and the Canada Foundation for Innovation awarded to PJ.

Poster 3-068

AUTONOMIC CORRELATES RELATING MENTAL AND PHYSICAL FATIGUE

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University of Chicago

Descriptors: Fatigue, Autonomic Nervous System

While mental fatigue (MF) and physical fatigue (PF) have historically been described in separate literatures, there is virtue in examining the psychological and physiological similarities of these constructs. As both MF and PF relate to the motivation to stop during effortful tasks, activation of MF and PF may involve overlapping physiological processes. An underexplored question remains: Are the autonomic signatures of MF and PF related and does autonomic activation during MF induction impact autonomic activity during subsequent PF induction? The current study aimed to examine the temporal nature of the psychological and physiological relationship between MF and PF. 85 participants completed a 90-min MF induction task, followed by a submaximal exercise task. MF ratings were collected throughout the MF task and PF ratings were collected during the exercise task. Measures of Parasympathetic (PNS), Respiratory Sinus Arrhythmia, and Sympathetic Nervous System (SNS), Pre-Ejection Period, were collected continuously throughout both tasks. SNS activity significantly dropped and PNS activity significantly rose throughout the MF task. SNS activity significantly rose and PNS activity significantly dropped throughout the PF task. PNS activity at max MF predicted PF task PNS activity; Subjects with higher PNS activity at max MF dropped in PNS activity more rapidly during the PF task. These data show that while MF and PF ANS activation trajectories are reciprocally related, a connection between MF and PF physiological activation is elucidated through within-subject analysis.

Funding: This research was supported by a grant from The National Science Foundation (BCS-1632445).

Poster 3-069

CENTROPARIETAL BETA ACTIVITY DURING THE EEFRT: THE ROLE OF MOTOR PREPARATION IN READINESS AND EFFORT EXPENDITURE

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Descriptors: Beta, Motor Function, Difficulty

Beta activation over the motor cortex has been identified as a neural correlate of both motivation and motor functioning. However, there is limited research combining these two constructs. That is, little past work has examined beta activity in preparation for and during execution of motivated movement. The present study investigated beta activation (13–30 Hz) over the motor cortex while participants (N = 47) completed the Effort-Expenditure for Rewards Task (EEfRT), a motor functioning task in which participants choose between easy and hard trials. Beta activity was reduced for hard trials relative to easy trials, indicating greater motor preparation for hard trials. In contrast, task beta activity was elevated for hard trials relative to easy trials, and beta activity increased throughout the course of hard trials. Task beta activation was generally unrelated to task performance, but reduced beta activation during hard trials predicted choosing to engage in more hard trials. These data reveal that task difficulty alters beta activity because people are motivated to complete difficult tasks. As participants get ever closer to achieving their goal, motor preparation declines and beta activity increases. Such insights aid in our understanding of why individuals choose to take on difficult tasks.

Poster 3-070

EVALUATION OF EMOTIONAL FACIAL EXPRESSION PROCESSING IN DEMENTIA BY MEANS OF EVENT-RELATED THETA OSCILLATION

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Descriptors: EEG, Theta, Facial Expression

There is clear evidence that normal aging and dementia can influence emotional abilities. Patients with different types of dementia could have various types of emotional dysfunctions. The study aimed to find out how the event-related theta response changes with aging and dementia during an emotional paradigm. Six groups of participants were included in the study: 20 patients with amnestic-Mild Cognitive Impairment (aMCI), 20 Alzheimer's Disease patients (AD), 14 Parkinson's Disease patients with mild cognitive impairment (PDMCI), 14 Parkinson's Disease patients with dementia (PDD), matched in age, education, and gender with 20 healthy elderly (HE), and 20 healthy young (HY). Pictures of happy, neutral, and angry facial expressions (FE) were presented. Seven locations (frontal, central, parietal-1, parietal-2, temporal, temporoparietal, occipital) were chosen for EEG analysis. Event-related theta (4–7 Hz) power and phase were analyzed by the wavelet transformation using the Brain Vision Analyzer program. Between-subjects effects were significant for theta power and phase ($p < .01$). The theta power and phase of the PD groups (PDD<PDMCI) was lower compared to the other groups, especially in the posterior areas ($p < .05$). There was an increment both in theta power and phase-locking in the aMCI and HE compared to other dementia groups ($p < .05$). Due to the strong link between emotional and memory processes, dementia patients could have severe impairments in the recognition of emotional FEs, and this impairment could be differentiated with event-related theta oscillations.

Funding: This study was funded by The Scientific and Technological Research Council of Turkey (TÜBİTAK) (Grant No. 218S314).

Poster 3-071

MEDIATION TRAINING HAS POSITIVE EFFECT ON EXECUTIVE ABILITIES IN SCHOOL-AGE CHILDREN WITH ADHD

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Descriptors: ADHD, Executive Abilities, Meditation Training

It is known that children with ADHD have deficit in executive abilities. It is necessary to search for the ways to help children with ADHD to overcome the deficit in executive abilities. In our previous research we have found that body-oriented therapy can effectively influence the executive abilities in children with ADHD (Kiselev et al., 2018). The goal of this study was to reveal the effect of the meditation training on executive abilities in school-age children with ADHD. We compared the efficacy of two methods of training (meditation training vs. conventional motor exercises) in a randomized controlled pilot study 14 children with ADHD between 7 and 8 years of age were included and randomly assigned to treatment conditions according to a 2×2 cross-over design. The meditation training was adapted for primary school-age children. Children participated in training for 4 months. We used 4 subtests from NEPSY (Tower, Auditory Attention and Response Set, Visual Attention, Statue) to assess the executive functions and attention in children. Effects of treatment were analyzed by means of an ANOVA for repeated measurements. The ANOVA has revealed ($p < .05$) that for all 4 subtests on executive functions and attention the mediation training was superior to the conventional motor training, with effect sizes in the medium-to-high range (0.63–0.87). The findings from this study suggest that mediation training has positive effect on executive abilities in school-age children with ADHD. We are going to investigate the effect of this training 1 year after the completion of this training.

Poster 3-072

CHANGES IN AND CORRELATES OF AUTONOMIC NERVOUS SYSTEM FUNCTION AFTER MILD TRAUMATIC BRAIN INJURY

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Descriptors: Mild Traumatic Brain Injury, Concussion, Autonomic Nervous System

Autonomic nervous system (ANS) dysfunction may occur after mild traumatic brain injury (mTBI), but the mechanisms, time course, and clinical significance of ANS changes are unclear. In 20 prospectively-recruited mTBI patients and 4 age- and gender-matched healthy controls (HC), we aimed to clarify how ANS functions are associated with mTBI. Participants were assessed twice 3 weeks apart (1 week and 1 month post-injury). Electrocardiogram, impedance cardiograph, and electrodermal reactivity were collected at baseline, during, and after a mental arithmetic task. ANS response to cognitive stress was investigated given clinical interests in understanding the impact of routine activities (e.g., mental activities) on mTBI recovery. Outcomes were heart rate (HR), high-frequency heart-rate variability (HF-HRV), pre-ejection period (PEP), and skin conductance level/reactivity (SCL/SCR). Outcomes were evaluated using general linear mixed models with Group (mTBI, HC), Visit (V1, V2), and Event (baseline, easy practice, easy task, hard practice, hard task, recovery) factors. Sympathetic nervous system (SNS) indices, PEP and SCR, were most associated with mTBI: the mTBI group showed significant SCR to cognitive stress at Visit 1 ($p = .001$; nonsignificant in HCs) and a trend for more baseline SNS activity (lower PEP) than HCs ($p = .086$). Contrary to expectation, PEP (V1) was positively associated with anxiety (V1, V2) and mTBI symptom burden (V2; $r = .58-.76$). Findings warrant a larger sample (currently precluded by the COVID-19 pandemic) to explicate the role of the SNS in mTBI.

Funding: Medical College of Wisconsin Advancing a Healthier Wisconsin Endowment.

Poster 3-073

EXPLORING THE IMPACT OF 1/F NOISE AND BASELINE CORRECTION ON THE INTERPRETATION OF TIME-FREQUENCY ANALYSES OF EEG/MEG DATA

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Descriptors: Time-frequency Analysis, Baseline Correction, Decibel

In time-frequency analysis (TFA) of electrophysiological data, signal changes are commonly estimated by dividing power at each time-frequency point by the mean power during a baseline period (e.g., in decibel [dB] conversion). This procedure assumes that, for each frequency, sources of power (i.e., the oscillatory signal and 1/*f* noise) scale by the same factor relative to the baseline. This assumption may be incorrect, especially if signal and noise are independent contributors to the power spectrum—a biologically plausible scenario. To assess the effects of violations of this assumption, we simulated a mixed design study with one between-subject (noise level) and one within-subject (signal amplitude) factor. Noise level refers to the steepness of the 1/*f* slope in each group, and signal refers to a burst of activity at a given frequency during an epoch added onto the background noise. After TFA, permutation methods were used to identify time-frequency points where the within-subject contrast differed significantly between groups. Findings suggest that even when the difference in this contrast (i.e., between signal amplitude in conditions 1 and 2) is kept constant across groups, spurious interactions can emerge after dB conversion if the two groups differ in level of background noise. Hence, we recommend testing whether 1/*f* slope differs across groups or conditions and using multiple baseline correction strategies to validate results if it does. Such a situation may be particularly common in aging, developmental, or clinical studies.

Funding: This work was supported by NIA grant RF1AG062666 to G. Gratton and M. Fabiani.

Poster 3-074

WHICH ERP PREPROCESSING ROUTINE IS THE MOST ROBUST? A REANALYSIS OF A MULTI-LAB STUDY INVOLVING THE MEASUREMENT OF THE CLASSIC RELATIONSHIP BETWEEN N400 AND CLOZE PROBABILITY

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Descriptors: ERP Preprocessing, Signal-to-Noise Ratio

ERP preprocessing is an often under-appreciated aspect of the replicability of ERP research. ERP preprocessing involves committing to many analytical choices, all of which may have consequences for the statistical power of analyses. To test which preprocessing routine provides the most power, we reanalyzed the data from a nine-lab study by Nieuwland et al. (2017). We treated the labs as a sample of EEG recording environments providing a good representation of varying signal quality across ERP laboratories in the world. We focused on the well-established effect of the relationship between cloze probability and N400 amplitude and asked which preprocessing routine recovers the relationship to the largest extent. Our analyses indicate which preprocessing parameters are crucial for recovering adequate statistical power of an ERP experiment, especially when the signal quality is suboptimal. We also compared different indices of quality of raw EEG recordings (based on the measurement error and estimates of signal noise) and show how well they predict labs' ability to reveal true effects under different preprocessing regimes.

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Poster 3-075

THE EFFECTS OF EMOTIONAL STIMULI ON P300 IN THE CONCEALED INFORMATION TEST

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Descriptors: P300, CIT, Arousal

Studies of Klein and colleagues (2017) demonstrated that emotional arousal evoked by stimuli influences concealed information detection with the usage of electrodermal activity. The study conducted by Osugi and Ohira (2018) showed that arousal level during the encoding phase impacts P300 amplitude to probe during CIT. However, it is still not clear whether an arousal level of a stimulus itself can influence a P300 to probe during CIT. The current study explored this issue. Seventy participants were randomly assigned to one of three groups: innocent, guilty with low arousal stimulus, guilty with high arousal stimulus. All participants from guilty groups took an envelope with a photo presenting the same object, but with different arousal level of the picture. One week after acquiring knowledge, the P300 CIT with three stimulus protocol was conducted. The results showed significant P300 CIT effect in each guilty group, and a significant difference in arousal level induced by the presented picture but there were no significant differences between P300 amplitude to probe stimulus between guilty groups.

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Poster 3-076

COMPARING APPLES AND ORANGES OR DIFFERENT TYPES OF CITRUS FRUITS? USING WEARABLE VERSUS STATIONARY DEVICES TO ANALYZE PSYCHOPHYSIOLOGICAL DATA

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[1]University of Cyprus, [2]University of Basel

Descriptors: Heart Rate Variability, Wearable Device, Stationary Equipment

Wearable devices capable of capturing psychophysiological signals are popular. However, such devices have, yet, to be established in research. This study compared psychophysiological data (skin conductance level (SCL), heart rate (HR), heart rate variability (HRV)) captured with a wearable device (Microsoft band 2) to those of a stationary device (Biopac MP150), in an experimental pain induction paradigm. Additionally, the present study compared two analytical techniques of HRV psychophysiological data: traditional (i.e., peaks are detected and manually checked) versus automated analysis using Python programs. Forty-three university students (86% female; M_{age} = 21.37) participated in the cold pressor task. Results showed that most correlations between the two devices for the mean HR were significant and strong ($rs > .80$) both during baseline and experimental phases. For the time-domain measure of mean RR (function of autonomic influences) of HRV, the correlations at baseline were almost perfect ($rs = .99$), whereas at the experimental phase were significantly strong ($rs > .74$). However, no significant correlations were found for mean SCL ($p > .05$). Additionally, automated analysis led to similar features for HRV stationary data as the traditional analysis. Implications for data collection include the establishment of a methodology to compare stationary to mobile devices and a new, more cost-efficient way of collecting psychophysiological data. Implications for data analysis include analyzing the data faster, with less effort and allowing for large amounts of data to be recorded.

Poster 3-077

THE INFLUENCE OF REINFORCEMENT SENSITIVITY ON CARDIOVASCULAR FUNCTIONING DURING A FRUSTRATION TASK

James Loveless[1]; Ansley Loveless[2]; Andrea Davis[1]; Katherine Hitchcock[1]; Erik Everhart[2]; Matthew Whited[2]
[1]Middle Tennessee State University, [2]East Carolina University

Descriptors: Gray's Reinforcement Sensitivity Theory, Cardiovascular Reactivity and Recovery

Gray's reinforcement sensitivity theory is a neurobehavioral model of personality that posits that individual differences are in part determined by the degree to which an individual is motivated by approach to appetitive stimuli or avoidance of punishing stimuli. Recent research has demonstrated that individuals more motivated by approach demonstrate different patterns of cardiovascular reactivity during an anger induction than those more motivated by avoidance. The present study sought to replicate those findings through the secondary analysis of existing data (n = 80) from a larger study in which participants underwent a frustration task where they were asked to solve unsolvable anagrams. Cardiovascular reactivity and recovery were measured through the use of high frequency heart rate variability (HF HRV) data, and motivational disposition was measured via the BIS/BAS scales. Results revealed that higher resting HF HRV was associated with greater reactivity, r = .31, n = 80, p = .006, 95% CI [.10, .50], and slower recovery, r = .34, n = 80, p = .002, 95% CI [.13, .52]. High BAS Drive scores were related to lower resting HF HRV, r = −.28, n = 80, p = .013, 95% CI [−.47, −.06], and a quicker recovery, r = −.22, n = 80, p = .04, 95% CI [−.422, −.004]. High BIS scores were associated with a slower recovery, r = .25, n = 80, p = .03, 95% CI [.03, .44]. These results demonstrate the complicated relationship between personality and autonomic functioning. Implications and directions for future research are discussed.

Poster 3-078

DISPOSITIONAL FACTORS ACCOUNTING FOR THE RELATIONSHIP BETWEEN LOW RESTING HEART RATE IN CHILDHOOD AND LATER ANTISOCIAL BEHAVIOR: A TRIARCHIC MODEL ANALYSIS USING LONGITUDINAL-STUDY DATA

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[1]Florida State University, [2]Örebro University, [3]University of Pennsylvania, [4]University of Southern California

Descriptors: Heart Rate, Antisocial, Triarchic

There has been a longstanding interest in autonomic activity in relation to criminal deviancy, antisocial behavior (ASB), and psychopathy. Among the autonomic measures studied to date, considerable evidence supports low resting heart rate (HR) early in life as one of the most robust predictors of later ASB (Farrington, 1997). Some studies have examined stimulation seeking and fearlessness as possible trait factors accounting for the low HR/ASB relationship (Hammerton et al., 2017; Portnoy et al., 2014; Sijstema et al., 2010), but the individual-difference basis of this relationship remains unclear. The current study tested for associations of resting HR at ages 9–10 with triarchic psychopathy traits of boldness, meanness, and disinhibition along with ASB later in life (ages 19–20) among participants (N = 687) from a longitudinal investigation, the Risk Factors for Antisocial Behavior (RFAB; Baker et al., 2013) project. Resting HR was negatively associated with both violent and nonviolent behavior, and with externalizing problems more broadly. It was also related negatively to triarchic traits of boldness and disinhibition, with the relationship somewhat stronger for boldness. Importantly, boldness and disinhibition each accounted for significant variance in associations of low resting HR with particular types of ASB. Implications of these findings for our understanding of the nature and bases of the low HR–antisocial behavior relationship will be discussed.

Poster 3-079

NEUROPHYSIOLOGICAL PREDICTORS OF GAZE-CONTINGENT MUSIC REWARD THERAPY AMONG ADULTS WITH SOCIAL ANXIETY DISORDER

Sally Cole; Grace Allison; Sarah Dolan; Amit Lazarov; Randy Auerbach; Akina Umemoto; Franklin Schneier
Columbia University

Descriptors: Social Anxiety Disorder, Error Related Negativity, Treatment Response

Social anxiety is associated with heightened performance monitoring (Kujawa et al., 2016), and the current study sought to: (a) clarify neurophysiological correlates related to performance monitoring and (b) determine whether these indices predicted treatment response to gaze-contingent music reward therapy. At baseline, healthy (HC = 20) and social anxiety disorder (SAD = 27) adults ages 19–43 years were administered clinical interviews and self-report symptom measures. Participants completed the Flanker Task while EEG data were recorded, and analyses focused on the error-related negativity (ERN), frontal midline theta (FMT), and delta power. SAD participants then received up to 12 sessions over 8 weeks of a novel music-reinforced attention-bias modification treatment (ABMT) designed to train participants' attention toward neutral and away from threatening faces. Clinical follow-up assessments were completed 9 and 20 weeks after initiating ABMT. Baseline results indicated that compared to HC, SAD performed the task more accurately (p = .01, η_p^2 = .13) and exhibited increased ERN and delta power to error commission (ps ≤ .03, η_p^2 s ≥ .10). Finally, after controlling for age and baseline symptoms, increased ERN predicted reduced social anxiety symptoms at post-treatment (week 9) (β = .56, p = .01) and week 20 (β = .58, p = .01). Overall, hypervigilance to error is characteristic of SAD, and interestingly, a predictor of treatment response following gaze-contingent music reward therapy.

Funding: NIMH 1 R61 MH116089-01 (PI Schneier) and NY State Psychiatric Institute EEG Core Pilot Grant (PI Schneier).

Poster 3-080

GLOBAL BRAIN VOLUME IS ASSOCIATED WITH GENERAL PSYCHOPATHOLOGY IN CHILDREN

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Descriptors: Psychopathology, Neuroanatomy, Development

Childhood is important for the onset of psychopathology and for brain development. Psychopathology is characterized by considerable comorbidity, which is mirrored in its underlying neural correlates. Both common and dissociable variations in brain volume have been found across multiple mental disorders in adult and youth samples. However, the majority of related research has used samples with broad age ranges, which may obscure developmental differences. The present study examined associations between regional gray matter volumes (GMV) and dimensional psychopathology in a large sample (N = 9,672) of children (9–10 years) collected as part of the Adolescent Brain and Cognitive Development (ABCD) Study. A bifactor model identified four dimensions of psychopathology: a general factor, which reflects common variance across disorders, as well as three subfactors measuring specific internalizing, conduct, and ADHD symptoms. Brain volume was acquired using 3T MRI. Results from SEM analyses demonstrate nearly global inverse associations between regional GMVs and the general psychopathology and conduct factors, with significant associations for the ADHD factor as well (p values ≤ .048, FDR-corrected). Sensitivity analyses including total GMV and intracranial volume as covariates further support this global effect, as region-specific results became non-significant, with the exception of the bilateral hippocampus. These results suggest that smaller brain volume is a common risk factor for psychopathology across disorders, and possibly for conduct and ADHD symptoms in particular.

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Poster 3-081

MATERNAL DEPRESSION STATUS AND PUBERTAL DEVELOPMENT INTERACT TO PREDICT NEURAL RESPONSE TO REWARD: EVIDENCE FROM TIME-FREQUENCY ANALYSIS OF THE REWARD POSITIVITY

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McGill University

Descriptors: Reward Positivity, Depression, Time-frequency Decomposition

One of the most powerful risk factors for depression is a maternal history of the disorder. Evidence suggests that inherited abnormalities in neural reward circuitry may play a role in this intergenerational transmission of risk. However, we know that heritability of depression is not stable across development, nor is neural response to reward. In fact, increases in heritability of depression and in neural response to reward coincide with a developmental period characterized by dramatic increases in the incidence of depression: adolescence. In order to better understand risk trajectories across adolescence, the present work tested whether pubertal development was differentially associated with neural response to reward based on maternal depression history. Sixty-seven mothers (30 with a history of depression; ages 32–59) and their never-depressed daughters (ages 10–19) completed diagnostic interviews; daughters also completed the Pubertal Development Scale as well as the Doors task while EEG was recorded. Results indicated that the association between daughters' pubertal status and delta frequency power in the time-window of the reward positivity was significantly moderated by mothers' depression status. Specifically, girls at more advanced pubertal stages without a maternal depression history demonstrated an *increased* neural response to rewards, while girls in later puberty with a maternal depression history demonstrated a *reduced* neural response to rewards. These findings have important implications for understanding depression risk across development.

Poster 3-082

THE LATE POSITIVE POTENTIAL TO NEUTRAL IMAGES (BUT NOT POSITIVE OR NEGATIVE IMAGES) MODERATES THE RELATIONSHIP BETWEEN TRAUMA-EXPOSURE AND DEPRESSIVE SYMPTOMS

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Rutgers University

Descriptors: Depression, Attention, EEG

Trauma-exposure is associated with maladaptive attentional processes and risk of depression, but much about the role of dysregulated attention in psychopathology remains unknown. This study tested whether attention to emotional stimuli moderates the relationship between trauma-exposure and depressive symptoms. Subjects were 75 trauma-exposed undergraduates who viewed a series of positive, negative, and neutral images, presented for 2,000 ms each, while EEG data were recorded. The late positive potential (LPP) was measured at Pz between 500 and 2,000 ms after stimulus onset. Greater LPP amplitude indicates greater attention allocation. Trauma history and psychopathology were assessed via self-report. We tested the LPP to each stimulus type as moderators of the relationship between the number of traumatic events and depressive symptoms. Covariates were LPPs to other image types, gender, PTSD and anxiety symptoms. Anxiety, β = 0.469, p < .001, and PTSD, β = 0.285, p < .001, symptoms predicted depressive symptoms. The LPP to neutral images, β = −1.437, p = .015, but not to positive or negative images, predicted depressive symptoms. Only the LPP to neutral images was a moderator, β = −0.584, p = .029. Among subjects who experienced more traumatic events, allocating less attention to neutral (i.e., not motivationally salient) images was associated with more depressive symptoms. This might help explain the maintenance of depressive symptoms such as low motivation and difficulty with concentration. Future studies should focus on neutral stimuli, not only positive or negative stimuli.

Poster 3-083: Late-breaking Student Abstract

BLINDED BY MAGIC: ELECTROPHYSIOLOGICAL CORRELATES OF CHANGE BLINDNESS

Monique Yuan; Sarah Sheldon; Kyle Mathewson
University of Alberta

Descriptors: Change Blindness, EEG, ERP

Magicians can often hide their method for a trick in plain sight by effecting change blindness. The purpose of this study is to find out why an individual is induced with this phenomenon. Alpha oscillations are known to impair detection of visual stimuli, but it is unclear if this is due to increased guess rate or decreased fidelity of the mental representation. Here we estimated fidelity and guess rate as a function of pre-stimulus alpha oscillations using a change blindness task. In this study, each trial began with an array of 6 Gabor patches with a fixated dot that subjects were instructed to keep their eyes on. As the array travelled to the centre of the screen, it either changed direction vertically at 90° or continued horizontally. When the array switched direction, one of the patches rotated 30° simultaneously. Subjects were then asked to identify which patch rotated. EEG (electroencephalography) and eye-tracking data from participants were recorded during the task. There were two different types of trials: flexion, in which the array changed direction, and control, in which the array did not change direction. Reaction time tended to be slower in flexion trials, and we found that the change in direction affected the subject's ability to see the Gabor patch rotation. Based on the ERP (event-related potential) results, we could see that the P300 differed between correct flexion, incorrect flexion, and control trials. This difference demonstrates that the subject's attention is automatically drawn to a larger change in stimuli.

Funding: NSERC (Natural Sciences and Engineering Research Council) WISEST (Women in Scholarship, Engineering, Science, and Technology).

Poster 3-084

THE P300 TO TARGET STIMULI IN PREGNANCY IS ASSOCIATED WITH CHANGE IN DEPRESSION SYMPTOMS IN THE POSTNATAL PERIOD

Magen Lowe; Elizabeth Mulligan; Nicholas Santopetro; Heather Flynn; Greg Hajcak
The Florida State University

Descriptors: P300, Postnatal, Depression

The P300 is a stimulus locked event-related potential (ERP) that indexes attention allocation and motivational salience. Many studies have found a reduced P300 amplitude in depressed individuals. Less work has examined the association between the P300 and depression in the perinatal (i.e., around birth) period, or the utility of the P300 as a predictor of change in depressive symptoms over time. The current study utilized a longitudinal design to examine P300 amplitude to the target stimuli in relation to prospective changes in depression within peripartum women. EEG was recorded during an emotional interrupt task in 191 pregnant women. The P300 was quantified as the average neural activity between 300 and 500 ms at site Pz following correct responses to the imperative stimulus. The Edinburgh Postnatal Depression Scale (EPDS) was administered at the initial EEG visit and re-administered at approximately 7 weeks postpartum (n = 191) and again at approximately 59 weeks postpartum (n = 65). A reduced P300 in pregnancy was associated with an increase in EPDS scores at each follow-up assessment when controlling for EPDS scores in pregnancy. The present study aligns with previous work that has found a reduced P300 in depressed individuals and further suggests that a reduced P300 in pregnancy may present as a risk factor for worsening depression over the perinatal period.

Funding: NIMH R21 MH116481.

Poster 3-085

STANDARDIZED MEASUREMENT ERROR: A UNIVERSAL MEASURE OF DATA QUALITY FOR AVERAGED EVENT-RELATED POTENTIALS

Steven Luck; Andrew Stewart; Aaron Simmons; Mijke Rhemtulla
University of California, Davis

Descriptors: Reliability, Replicability, Signal-to-Noise Ratio

Event-related potentials (ERPs) can be very noisy, and yet there is no widely accepted metric of ERP data quality. Here we present a universal measure of data quality for ERP research: the standardized measurement error (SME). Whereas some potential measures of data quality provide a generic quantification of the noise level, the SME quantifies the expected error in the specific amplitude or latency value being measured in a given study (e.g., the peak latency of the P3 wave). It can be applied to virtually any value that is derived from averaged ERP waveforms, making it a universal measure of data quality. In addition, the SME quantifies the data quality for each individual participant, making it possible to identify participants with low-quality data and "bad" channels. When appropriately aggregated across individuals, SME values can be used to quantify the impact of the single-trial EEG variability and the number of trials being averaged together on the effect size and statistical power in a given experiment. If SME values were regularly included in published papers, researchers could identify the recording and analysis procedures that produce the highest data quality, which could ultimately lead to increased effect sizes and greater replicability across the field. The SME can be easily calculated using the latest version of ERPLAB Toolbox (v8.0).

Funding: The work described in this poster was made possible by grant R01MH087450 from the National Institute of Mental Health.

Poster 3-086

LATERALIZATION OF THE ACOUSTIC STARTLE RESPONSE IS SENSITIVE TO SUBTLE VARIATION IN SPATIALLY INDICATIVE SOUND FEATURES

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Descriptors: Startle, Perception

Several studies have shown lateralization of the acoustic startle response. The present study aimed at replicating and extending a previous report of stronger ipsilateral startle responses to different types of spatially indicative sounds. Auditory processing based on inter-aural level differences (ILD) likely involves the lateral superior olive as first site of analysis, whereas inter-aural time differences (ITD) are processed in the medial superior olive. Differences in these neurophysiological underpinnings could influence the magnitude of startle reactions, as indexed by bilateral EMG assessed at the orbicularis oculi muscle. 58 healthy participants (49 women), audiometrically checked for normal hearing, were presented (via headphones) with noise bursts (105 dB(A), 50 ms) varying in spatial location and type: unilateral, ILD (5 or 10 dB), ITD (0.5 or 0.7 ms) and combined ILD/ITD. Participants were instructed to promptly indicate the perceived location of the sound source (left vs. right) by button press. Results showed adequate discrimination performance, with reaction times and accuracy reflecting effects of both ILD and ITD, as well as lateralization of EMG responses, characterized by stronger activation at the ipsilateral side for all three types of spatial sounds. However, ILD and unilateral sounds showed stronger lateralization effects than ITD. This is further evidence for lateralization of sensorimotor processes involved in the startle response, suggesting differential effects of spatial sound perception based on ILD vs. ITD.

Poster 3-087

MONAURAL DETERMINANTS OF INDIVIDUAL DIFFERENCES IN THE HUMAN ABR BINAURAL INTERACTION COMPONENT

Kazunari Ikeda[1]; Tom Campbell[2]
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Descriptors: Auditory Brainstem Response, Binaural Interaction Component, Selective Attention

The auditory brainstem response binaural interaction component (ABR-BIC) is a difference waveform. Subtraction isolates this component of the binaural response from the artificial sum of monaural responses to left and right stimulation. The DN1 peak negativity of the ABR-BIC (binaural < summed monaural) occurs during or after the ABR's positive wave V peak. Unknown was if the apparent attentional modulation of human DN1 (Ikeda, 2015, *Hearing Research, 325*, 27–34), rather, had bilateral monaural origins. Participants heard either tone-pips or clicks via monaural left, right, or binaural presentation (Ikeda, 2015). These participants selectively attended to sounds or to concurrently presented visual stimuli. DN1s for tone-pips were unequivocally present, i.e., differing significantly from zero, only with auditory selective attention. DN1s with clicks proved significantly present, regardless of attended modality. Beyond DN1's presence, auditory selective attention significantly increased only monaural and binaural tone-pip Wave-V peak amplitudes, yet not tone-pip DN1s. Attentional influences on tone-pip DN1 presence thus have bilateral monaural origins. Further, DN1 amplitudes correlated more strongly with the monaural than the binaural wave V, particularly with right monaural presentation. A multiple parallel mediator model characterized a monaural determinant of individual differences in DN1. This pre-attentive determinant of DN1 relied on how, with right-ear presentation, Wave V increased for clicks over tone-pips.

Poster 3-088

HIGHER FRIENDSHIP QUALITY IS ASSOCIATED WITH LOWER P300 ACTIVITY WHEN RECEIVING SUPPORT

Sara Medina-DeVilliers; Allison Belkowitz; James Coan
University of Virginia

Descriptors: ERP, Friendship Quality, Social Support

Relationships support health and well-being by buffering the effects of stress-related physiological activity. Prior fMRI research indicates that higher relationship quality is associated with less threat-related neural activation in the dACC during partner, but not stranger, handholding. Neural measurements, such as EEG and ERP, provide higher temporal resolution when measuring responses to a threat. Specifically, P300 likely reflects dACC activity and signals the need for top-down control of attention. We investigated self-reported friendship quality and neural threat response in 53 friend dyads using EEG. Participants viewed threat and safe cues under each of the four conditions: alone, receiving supportive handholding, giving supportive handholding, and handholding while facing threats simultaneously. Friendship quality was measured using the Friendship Quality Questionnaire. We extracted the mean amplitude of P300 from frontal and central parietal electrodes following threat cues. Linear mixed effects models indicated no main effect for condition but main effects for friendship quality, such that higher friendship quality is associated with lower P300 amplitude in frontal and central parietal brain regions. There was also significant interaction between friendship quality and condition, such that higher friendship quality within a dyad indicated decreased P300 activity when participants received supportive handholding. Results indicated that friendship quality may be a moderator of threat response and reflect similar results previously found in neuroimaging research.

Funding: This project is funded by the Mind and Life Institute PEACE grant.

Poster 3-089

EVENT-RELATED CORRELATES OF EVOLVING TRUST EVALUATIONS

Ariel Snowden; Allison Hancock; Catalin Buhusi; Christopher Warren
Utah State University

Descriptors: Trustworthiness, Event-related Potentials, Face Perception

We used event-related potentials (ERPs) to investigate the neural correlates of social decisions related to trust. Participants made decisions concerning companies based on how trustworthy the company representatives appeared. Participants viewed sequential pictures of novel faces in sets of 8–12, with each face appearing for 1 s. The decision was to withdraw an initial investment or double the investment at any time during presentation of the set. Companies were formed using participant trust ratings from a preliminary session, such that decisions could be predicted by the apparent trustworthiness of the faces. Participants made faster, more accurate decisions for companies consisting of stronger evidence (e.g., faces rated more extremely) relative to companies containing weak evidence (e.g., less extreme ratings). For companies with more extreme ratings, participants made faster decisions for untrustworthy than trustworthy companies. This finding aligns with studies showing facilitated processing of untrustworthy faces. In addition, female faces were perceived as more trustworthy than male faces, suggesting a sex bias in trust perception. ERP data time-locked to face stimuli revealed that the P3 component, linked to motivational salience, was larger for female than male faces. In addition, the P3, P1 (linked to attention), and LPP (linked to sustained attention) were enhanced to the first face in a company than subsequent faces. Our data suggest that when making social decisions about groups of people, the first person one meets draws the most attentional resources.

Funding: This project was supported by a student research grant (College of Education and Human Services and the Department of Psychology, Utah State University) awarded to Ariel Snowden.

Poster 3-090

THE FATE OF THE UNEXPECTED: CONSEQUENCES OF MISPREDICTIONS FOR ERP REPETITION PATTERNS

Melinh Lai[1]; Joost Rommers[2]; Kara Federmeier[1]
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Descriptors: Prediction, Language, Memory

Amid increasing interest in the nature and role of prediction in language comprehension, there remains a gap in our understanding of what happens when predictions are disconfirmed. Are unexpected words harder to process and encode because of interference from the original prediction? Or do expectation violations strengthen the representations of unexpected words? We used event-related potentials (ERPs) to probe the downstream consequences of prediction violations. Critical words were unexpected but plausible completions of either strongly constraining sentences, wherein they constituted a prediction violation, or weakly constraining sentences that did not afford a clear prediction. Three sentences later the critical word was repeated at the end of a different, weakly constraining sentence. In Exp. 1 repeated words elicited a reduced N400 and an enhanced late positive complex (LPC) compared to control sentences in which the word was seen for the first time. Critically there was no effect of initial sentence constraint on the size of the repetition effect in either time window. These results replicated in Exp. 2 which used the same critical items and added strongly constraining filler sentences with expected endings to further promote prediction. Thus, prediction violations did not accrue costs or benefits for later processing, suggesting that the impact of prediction may be "local" to the predicted representations. This would allow prediction to reduce encoding efforts while still affording the system the flexibility to efficiently process less predictable information.

Funding: NIH grant AG026308 to K.D.F.

Poster 3-091

PROBING PREDICTION COSTS & BENEFITS: WHAT RESPONSE TIMES AND ERPS REVEAL ABOUT THE ROLE OF VOLITIONAL CONTROL IN CONTEXT PROCESSING

Clara Lopes; Jack Silcox; Brennan Payne
University of Utah

Descriptors: Prediction, Psycholinguistics

Readers use context to rapidly generate predictions about features of likely upcoming words. There is electrophysiological evidence that semantic prediction violations elicit a late anterior positivity that reflects the costs of revising a strongly-held prediction. At the same time, there is little evidence that prediction costs yield changes in reading behavior (e.g., increased word reading time, RT). To address this discrepancy, we evaluated neural and behavioral measures of context use by simultaneously recording event-related potentials (ERPs) and RTs in a word-by-word self-paced category prediction paradigm. Participants (N = 32) read category contexts (e.g., "A type of tree") followed by a target word that was predictable (high typicality: "oak"), a prediction violation (low typicality: "ash") or incongruent (outside of the category: "tin"). Participants subsequently decided whether the target word matched the category. We replicated prior work from experimenter-paced ERPs showing contextually graded N400 responses at the target word, as well as an anterior positivity unique to prediction violations. Ex-Gaussian distributional analyses of RTs showed that prediction violations elicited a greater proportion of extreme RTs, skewing the distribution. By allowing readers volitional control over reading time, we show that prediction violations that elicit the frontal positivity are also associated with a behavioral cost—an increase in the slow tail of the RT distribution, which has been argued to reflect increased recruitment of cognitive control mechanisms during reading.

Poster 3-092

CHANGES IN LISTENING EFFORT, THE BENEFITS AND COSTS TO CONTEXT PROCESSING: A STUDY UTILIZING BEHAVIORAL, ELECTROPHYSIOLOGICAL AND PUPILLOMETRIC MEASURES

Jack Silcox; Brennan Payne
University of Utah

Descriptors: Linguistic Context, Listening Effort

Participants (N = 42) listened to sentences that were highly constraining and completed with expected or unexpected sentence-final words ("The prisoners were planning their escape/party") or were low-constraint sentences with unexpected sentence-final words ("All day she thought about the party"). Sentences were presented either in quiet or with +3 dB SNR background noise. Pupillometry and EEG were simultaneously recorded. Participants also completed a subsequent sentence recognition and cued word recall task. We found that the mean pupillary response was larger (i.e., more dilated) when listening to sentences in noise compared to quiet, reflecting increased listening effort. On average, the N400 expectancy effect at the sentence-final word was both reduced in amplitude and delayed in onset latency when listening in noise. We also observed a reduction in subsequent memory performance in noise. However, analyses of trial-to-trial coupling between pupil dilation and N400 amplitude showed that on trials where participants' showed increased listening effort (i.e., greater pupil dilation), there was a subsequent recovery of the N400 effect both in amplitude and latency. At the same time, these trials were related to *poorer* subsequent memory. Overall, we conclude that while background noise impairs the rapid use of context to facilitate semantic processing in general, this effect is attenuated when listeners increase effort in response to noise. However, this effort-induced reliance on context for word processing comes at the cost of poorer subsequent memory.

Poster 3-093

SENSITIVITY OF THE CONTRALATERAL DELAY ACTIVITY (CDA) TO UNCONSCIOUSLY PERCEIVED VISUAL INFORMATION

Amy Barton[1]; Steven Hackley[2]; Fernando Valle-Inclán[3]; Nelson Cowan[2]
[1]Northwest Missouri State University, [2]University of Missouri, Columbia, [3]University of La Coruña

Descriptors: Contralateral Delay Activity (CDA), Memory, Unconscious Processes

Conventionally, the contents of working memory are equated with consciousness. However, there is some behavioral evidence that visual stimuli outside of awareness are registered in visual working memory (VWM; Bergström & Eriksson, 2015; Soto, Mantyla, & Silvanto, 2011). We approached this issue using a cortical slow potential, CDA (contralateral delay activity), whose amplitude is known to reflect the number of items held in VWM (Luria, Balaban, Awh, & Vogel, 2016). We used continuous flash suppression via a mirrored stereoscope to block awareness of certain to-be-remembered items. On each trial, we presented 3 unmasked items and either 0 or 3 masked items. Participants rated their awareness of masked items trial-by-trial. Only trials in which they declared that they had not seen even a glimpse of the masked items were introduced into the ERP analysis. We found a negative deflection 100–200 ms after onset of masked items that was completely absent on trials without masked items. Amplitude of the CDA then decreased for the remainder of these trials with 3 masked items. In agreement with ERP signs that masked items were processed, the recall of unmasked items decreased on trials containing masked items. Although the unconsciously registered masked items were not themselves remembered, they displaced consciously perceived unmasked items from VWM.

Poster 3-094: Late-breaking Student Poster

ADVERSE EXPERIENCE AND ELECTROCORTICAL RESPONSE TO EROTIC AND EMOTIONAL VISUAL STIMULI

Allison Miller; Keanan Joyner; Christopher Patrick
Florida State University

Descriptors: Event-related Potentials, Adverse Experience, Valence

Trauma and adverse childhood experiences (ACEs) are known to have lasting effects on a host of psychological processes for victims (Mumford, Taylor, Berg, Liu, Miesfeld, 2019; Tinney & Gerlock, 2017; Trickett & McBride-Chang, 1995). This study sought to understand the relationship between physical, emotional, and sexual trauma and physiological reactivity to visual stimuli depicting pleasant, unpleasant, neutral, and specifically erotic scenes. Community and college participants (N = 198) had electroencephalogram recorded during a passive viewing paradigm using IAPS pictures (Lang, Bradley, & Cuthbert, 1999), and filled out self-report measures of lifetime traumatic experiences. Event-related potentials (P300 and LPP) were quantified to understand the attentional and emotional engagement processes with the visual stimuli. Differences in amplitude between groups endorsing physical, emotional, and/or sexual adverse experiences were examined. It was hypothesized that those with a history of sexual trauma would have greater augmented LPP and P300 responses to erotic and pleasant stimuli, more so than other histories of trauma (physical or emotional). However, the data did not support this primary hypothesis. While erotic pictures evoked a larger P3 and LPP response than other pleasant pictures, the difference between erotic and pleasant brain reactivity did not differ by history of trauma type. Exploratory analyses examining the impact of individual differences and symptoms of psychopathology on trauma and these ERPs will also be presented.

Poster 3-095: Late-breaking Student Poster

BRAIN RESPONSES TO VERBAL SUGGESTIONS OF PAIN MODULATION

Carolane Desmarteaux[1,2]; Anouk Streff[1]; Jeni Chen[1,2]; Bérengère Houzé[1]; Mathieu Piché[3]; Pierre Rainville[1,2]
[1]University Institute of Geriatrics of Montréal, [2]University of Montréal, [3]University of Québec in Trois-Rivières

Descriptors: Hypnosis, fMRI

Introduction: The effectiveness of hypnosis in reducing pain is well supported by the scientific literature, yet brain networks involved in the transformation of verbal suggestions into pain modulatory effects remain to be determined. Method: Brain activity was measured in 24 healthy participants using BOLD-fMRI during verbal suggestions of hypoalgesia, hyperalgesia, or normal sensation (i.e., control), and in response to the following painful electrical stimulation. Results: Pain ratings confirmed that suggestions of hyperalgesia and hypoalgesia produced the expected changes in pain perception (p's < .01). Verbal suggestions of both hypo and hyperalgesia (vs. control) produced BOLD increases in the left parahippocampal gyrus (PHG) and decreases in the right parietal operculum (PO) and the anterior cingulate cortex (ACC) (FDR-corrected $q < 0.05$ Individual responses to suggestions in these regions (PHG, PO and ACC) predicted changes in brain responses to the electrical stimulation in several pain-related areas (ant/post insula, ACC, thalamus), consistent with pain modulation. Discussion: The link between brain responses to hypnotic suggestions and effects on brain processing of noxious sensation is at the heart of hypnotic analgesia. The cingulo-parietal network is associated with self-agency and perceived automaticity and may be involved in self-regulation during hypnosis while the activation of the left PHG may reflect a contextualization induced by the verbal suggestions.

Poster 3-096: Late-breaking Student Poster

THE EFFECT OF BOUNDARY UNPREDICTABILITY ON EVENTS IN TEMPORAL COMMUNITY STRUCTURE

Abby Clements; Youssef Ezzyat
Swarthmore College

Descriptors: Event Boundary, Event Segmentation, Statistical Learning

The question of what causes the automatic, unconscious formation of boundaries that segment the unbroken stream of perceptual information that people experience into discrete events is important to our understanding of event segmentation and of memory itself. Previous research has demonstrated that prediction error plays a key role in forming event boundaries, but recent studies have indicated that event representations with corresponding boundaries can also be created via statistical learning of the temporal associations of nodes in a community structure graph. To examine the interaction of these two methods of boundary formation, we had participants incrementally learn a community structure graph, then parse the sequence into events while recording scalp EEG; we manipulated some of the event transitions to be unpredictable. Results showed that subjects were more likely to indicate a boundary had occurred after a transition between two different communities, supporting previous results, and that between-community and within-community transitions are represented by different patterns of activity as measured by EEG. However, subjects were no more likely to indicate the existence of a boundary after a manipulated transition, despite the fact that prediction errors were generated at those points, and behavioral parsing performance correlated with differences in the neural representations of manipulated and nonmanipulated trials. This suggests that prediction error does interact with temporal community structure, but it does so in a complex fashion that is not merely additive.

Poster 3-097: Late-breaking Student Poster

EFFECTS AND MODERATORS OF COMPUTER-BASED TRAINING ON CHILDREN'S EXECUTIVE FUNCTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Yifei Cao; Ting Huang; Jipeng Huang; Yuan Wang
Northeast Normal University

Descriptors: Computer-based Training, Executive Functions, Children

Computer-based (CB) training has attracted increasing attention from researchers. Numerous studies found CB training improved executive functions (EFs) of adults. However, it remains controversial if children can benefit from CB training, and what moderator could influence the training effects. The present meta-analysis examined the effects of CB training on children's EFs: working memory, cognitive flexibility, and inhibitory control. A thorough literature search yielded a sample of 38 studies with 219 effect sizes. Results indicated that CB training showed moderate training effects on improving children's EFs ($g = 0.39$, $k = 38$, $p < .05$) and training effects of working memory ($g = 0.4$, $k = 30$, $p < .001$) were significantly higher. Furthermore, we found near-transfer effects ($g = 0.38$, $k = 35$, $p < .001$) were significantly higher than far-transfer effects ($g = 0.21$, $k = 16$, $p < .001$). Standard computerized training was significantly more effective than training with game-elements. Typically developing children gain significantly more training effects than atypically developing children in CB training. In addition, number of training sessions, age, modulated the training effects. Results were discussed detailedly in the full paper. These meta-analytic findings provide evidence that CB training (especially standard computerized training) may serve as an efficient way to improve EFs of children (especially typically developing individuals). We also discussed some directions for future CB training studies.

Funding: This work was supported by "the Fundamental Research Funds for the Central Universities, NENU", undergraduate research program. This work was also supported by Undergraduate Research Program Award, School of Psychology at Northeast Normal University.

Poster 3-098: Late-breaking Student Poster

MASTERY IMAGERY ABILITY MODERATES THE RELATIONSHIP BETWEEN HEART RATE REACTIVITY TO STRESS AND PERCEPTIONS OF STRESS AND PHYSIOLOGICAL AROUSAL

Henry Beevor[1]; Annie Ginty[2]; Jet Veldhuijzen van Zanten[1]; Sarah Williams[1]
[1]University of Birmingham, [2]Baylor University

Descriptors: Imagery Ability, Heart Rate Reactivity, Stress

Imagery has been proposed to reduce stress, however the mechanisms of this relationship are not fully understood. The present study examined if the ability to imagine mastering challenging or difficult situations moderated the relationship between heart rate reactivity (HRre) and perceptions of stress and physiological arousal experienced during acute stress. 458 participants (M_{age} = 19.48, SD = 1.26, 62% female) completed a standardised stress task. HRre was calculated as HR during stress—HR at baseline. Following the task, participants rated how stressed and physiologically aroused they felt (i.e., intensity) and whether they perceived the stress and physiological arousal as being helpful/unhelpful to performance (i.e., interpretation). Mastery imagery ability was also assessed. Moderation analyses controlling for sex showed that imagery ability moderated the relationship between HRre and interpretation of stress ($\beta = .015$, $p = .003$) and physiological arousal ($\beta = .013$, $p = .004$). Simple slopes analysis showed that in those with higher imagery ability, HRre was associated with stress and arousal being perceived as more positive towards performance. Imagery ability did not moderate the relationship between HRre and intensity of stress or physiological arousal (p's > .05) but did predict lower stress intensity ($\beta = -.217$, $p < .001$) and physiological arousal intensity ($\beta = -.172$, $p < .001$). Results suggest higher mastery imagery ability could help individuals perceive responses to stress as more beneficial for performance and thus be an effective coping technique.

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