

Welcome to Miami!

It is our pleasure to welcome you to beautiful Miami Beach! The next few days will be packed with opportunities to enjoy cutting-edge social neuroscience in a stunning environment. While you're in town, we hope you will have the opportunity to visit some of South Florida's famous sites, which you will find illustrated throughout the program. Enjoy!

SANS 2019 Organizers



Aaron Heller & Lucina Uddin

With special thanks to Program Committee co-chairs: Johanna Jarcho and Dominic Fareri

and

Program Committee members: Dylan Gee, Brent Hughes, Amy Krosch, Maital Neta, Candance Raio, Kyle Ratner, Robb Rutledge, Greg Samanez-Larkin, Ajay Satpute, Diana Tamir and Dylan Wagner

and

Courtney Rogers and Bryce Dirks



The New World Center is a concert hall in South Beach designed by Frank Gehry.

new center

Thursday May 2, Afternoon

3:00pm Welcome and Introductory Remarks Aaron Heller & Lucina Uddin

3:15pm Early Career Award Winner Jamil Zaki



abstract

3:30pm Distinguished Scholar Address Nancy Kanwisher

The Cortical Organization of Social Cognition

Social perception and cognition have witnessed enormous progress over the last 20 years. We now know that that social cognition engages cortical regions quite distinct from those engaged in nonsocial aspects of cognition. Further, many cortical regions have been identified that conduct highly specific aspects of social cognition, from face perception, to language understanding, to theory of mind. This highly systematic cortical machinery is strikingly similar from one individual to the next, resulting in a richly detailed new map of social cognition in the brain. But while these discoveries constitute major progress, they are also the barest beginning, and reveal a vast landscape of new questions. What exactly is represented in each of these cortical regions, and how do the computations that produce those representations unfold over time? How are these regions structurally connected to each other and to the rest of the brain, and how do they interact with each other to produce real-world social cognition? And finally, how does the cortical organization of social cognition arise, both developmentally and evolutionarily? These questions will be harder to answer with current methods, but are well worth the effort.





Vizcaya Museum is a villa and estate featuring extensive Italian Renaissance gardens.

Thursday May 2, Afternoon

4:30pm Presidential Address Michael Tomasello



Becoming Human: A Theory of Ontogeny

Over the past two decades, my colleagues and I have documented many differences in the cognitive and social abilities of human children and their nearest great ape relatives. In this talk, I attempt to bring these studies together into a coherent theory of the ontogeny of uniquely human psychology. For each of eight uniquely human developmental pathways - four cognitive and four sociomoral – there are two key transitions: one at 9 months and one at 3 years. The hypothesis is that these transitions result from the maturation of new capacities for cooperation and social coordination with others - first joint intentionality with particular others and then collective intentionality with the group - which make possible new kinds of sociocultural experience and social self-regulation.

6:00pm Poster Session A & Welcome Reception at New World Center



Miami Beach features radiant sun, surf and sand in close proximity to Art Deco architecture, nightclubs, and restaurants.

Friday May 3, Morning

8:00am-9:00am Breakfast

9:00am Symposium 1 Social Neuroscience Meets Network Neuroscience



Avram Holmes: The functional connectomics of affective and psychotic pathology

Converging evidence indicates that groups of patients with nominally distinct psychiatric diagnoses are not separated by sharp or discontinuous neurobiological boundaries. In healthy populations, individual differences in behavior are reflected in variability across the collective set of functional brain connections (functional connectome). These data suggest that the spectra of transdiagnostic symptom profiles observed in psychiatric patients may map onto detectable patterns of network function. To examine the manner through which neurobiological variation might underlie clinical presentation, we obtained functional magnetic resonance imaging (fMRI) data from over 1,000 individuals, including 210 diagnosed with a primary psychotic disorder or affective psychosis (bipolar disorder with psychosis and schizophrenia or schizoaffective disorder), 192 presenting with a primary affective disorder without psychosis (unipolar depression, bipolar disorder without psychosis), and 608 demographically matched healthy comparison participants recruited through a large-scale study of brain imaging and genetics. Here, we examine variation in functional connectomes across psychiatric diagnoses, finding striking evidence for disease connectomic "fingerprints" that are commonly disrupted across distinct forms of pathology and appear to scale as a function of illness severity. The presence of affective and psychotic illnesses was associated with graded disruptions in frontoparietal network connectivity (encompassing aspects of dorsolateral prefrontal, dorsomedial prefrontal, lateral parietal, and posterior temporal cortices). Conversely, other properties of network connectivity, including default network integrity, were preferentially disrupted in patients with psychotic illness, but not patients without psychotic symptoms. This work allows us to establish key biological and clinical features of the functional connectomes of severe mental disease.



Social relationships imbue life with meaning, whereas loneliness diminishes the sense of meaning in life. Yet the extent of interdependence between these psychological constructs remains poorly understood. Loneliness and meaning are associated with different patterns of functional connectivity; however, no studies have investigated this directly. We took a multivariate network approach to examine resting-state fMRI functional connectivity's association with loneliness and meaning in a large cohort of adults (N=942). Loneliness and meaning in life were negatively correlated with one another. Functional brain regions were individually parcellated. Whole-brain measures of functional connectivity were then related to meaning and loneliness and a significant and reliable pattern was observed. Greater loneliness was associated with dense, and less modular, connectivity between default, frontoparietal and externally-directed attention and perceptual networks. A greater sense of life meaning was associated with higher between-network connectivity. These findings advance our understanding of loneliness and life meaning as distinct, yet interdependent, features of sociality. The results highlight a potential role of the default network as a central hub, providing a putative neural mechanism for shifting between feelings of isolation and purpose.

Meghan Meyer: Social by Default: Characterizing the Social Functions of the Resting Brain

Social neuroscience research has identified a set of medial frontoparietal brain regions that reliably engage during social cognition. At the same time, cognitive neuroscience research has shown that these regions comprise part of the default network, so named because they reliably activate during mental breaks 'by default.' While the anatomical similarity between the social brain and the default brain is well-documented, *why* this overlap exists remains a mystery. Does the tendency to engage these regions by default during rest play particular social functions and if so, what might these be? Here it is suggested that the default network performs two critical social functions during rest: *social priming* and *social consolidation*. These constructs will be defined, recently published empirical findings that support them will be reviewed, and directions for future research on the topic will be proposed.





Emily Falk: Brain and Social Network Dynamics Associated with Susceptibility to Social Influence

Brain dynamics shape learning and behavior, and social context shapes brain structure and function. In this talk, I will present evidence from a series of studies in adolescents linking brain network dynamics to individual differences in social network structure. Specifically, I will focus on how brain systems implicated in processing social rewards, social threats, and more general understanding of others' mental states are associated with different types of social network properties, and in turn how these differences relate to adolescent susceptibility to social influence.



The Everglades National Park provides a habitat for rare and endangered species like the crocodile.

Friday May 3, Morning

10:30am Data Blitz

- 1. Kevin Tan: Mentalizing about the self and others: a human intracranial electrophysiology study
- 2. Eliska Prochazkova: Body-to-body synchrony: real-life dating experiment
- 3. Arjun Ramakrishnan: Determining biomarkers for anxiety by studying the neural basis of foraging behavior
- 4. KM Sharika: Acetaminophen reduces the sensitivity of macaque anterior cingulate gyrus neurons to the valence of decision outcomes for self and other
- 5. Anita Tusche: Individual differences in mentalizing are associated with social network size and real-world social functioning
- 6. Mark Thornton: Neural representations of others' current actions accurately predict their likely future actions
- 7. Micah Edelson: Learning when to choose for others
- 8. Diego Reinero: The role of brain-to-brain synchrony in collective performance
- 9. Meg Speer: Finding positive meaning in past negative events adaptively updates memory

<u>12:00pm Lunch</u> Academic climate discussion for registered attendees



The Venetian Pool was created in 1923 from a coral rock quarry and is fed with spring water.

Friday May 3, Afternoon

1:30pm Symposium 2 Affective Neuroscience: From Neurons to Neighborhoods

Jonathan Fadok: *Defining the neural circuit mechanisms controlling passive and active defensive strategies*

Fear and anxiety lie on a continuum, with discrete suites of defense responses elicited as a function of threat imminence and context. We currently have little understanding of the neural mechanisms that regulate transitions from passive responses such as freezing behavior to high intensity, active defensive states such as escape. In this talk, I will discuss our recent work using a behavioral paradigm in which mice rapidly switch between freezing and escape in response to conditioned stimuli. Employing electrophysiology and optogenetics in this paradigm, we identified distinct populations of neurons in the central nucleus of the amygdala that mediate freezing or escape responses. Interestingly, we also found that these populations are reciprocally connected via inhibitory synapses, which suggests that competitive interactions between these populations allow for rapid and flexible action selection. We subsequently used neuroanatomical tracing approaches to identify both the downstream targets of these neuronal populations as well as their inputs. We are now working to monitor and manipulate these pathways to determine their functional role in generating bodily responses to threat. These studies are fundamental to understanding how neural circuit dysfunction leads to the maladaptive responses associated with numerous psychopathologies.

Catherine Hartley: *The affective* benefit of experiential diversity and its neural mechanisms Laboratory studies in animal models indicate that diversity in one's daily experience has sustained benefits for affective well-being. However, studies have not objectively examined how diversity in humans' everyday realworld experiences influences their affective state. In this talk, I will present data from studies using geolocation tracking, affective experience sampling, and in vivo neuroimaging that link day-to-day increases in the variability of an individual's physical location to increases in positive affect. We identify neural correlates of this affective sensitivity to diversity in real-world experience and examine developmental variation in this effect.

Andrew Fox: A cross-species approach to bridge the gap between mechanism and experience

The neurobiology of emotion cannot be understood in a single modality, or as a function of genes, neurons, or life experiences alone. My lab focuses on affective-style, and the neurobiology of dispositional anxiety and the risk to develop anxiety and depressive disorders. To this end, we have performed neuroimaging and RNA-sequencing of relevant brain regions in nonhuman primates. These studies allow us to gain insight into how particular molecules can contribute to the distributed neural circuits that underlie dispositional anxiety. Here, I will show a series of studies implicating the central extended amygdala in dispositional anxiety and demonstrate how a singlemolecule in this region can causally contribute to anxiety-like behavior. More specifically, I will show how dorsal amygdala neurotrophin-3 decreases anxiety-like behavior in nonhuman primates. This work will be discussed in the context of bridging the gap between human neuroimaging and molecular studies in rodents.

Chris Browning: *Exposure to adverse* sociospatial environments and neural outcomes during adolescence: A geographically explicit ecological momentary assessment approach Adversity in the social and spatial environments of urban youth - including chronic exposure to violence - has been linked to a range of health and developmental outcomes. However, spatial exposure has traditionally been measured using imprecise methods (e.g. reliance on census tract of residence as a proxy for exposure). The Adolescent Health and Development in Context (AHDC) study uses a combination of smartphone-based GPS tracking and ecological momentary assessment as well as geospatial interview measures to capture routine activity locations (activity spaces) and experiences in those locations. These data are then used to generate highly precise measures of sociospatial exposure with respect to environmental adversity and resilience. In the third wave of the AHDC study, adolescents completed a functional neuroimaging battery at the conclusion of the week of smartphone tracking. This battery included functional measures of reward and threat reactivity, as well as structural data. We review opportunities and challenges associated with activity space measurement and present preliminary results on neural correlates of geospatial exposures.



View looking west from Miami Beach any given Sunday.

Friday May 3, Afternoon

3:00pm Symposium 3 Controversies in Oxytocin Research

James Rilling: Intranasal oxytocin effects on human brain activity during social interactions

Oxytocin (OT) is a naturally occurring endogenous neuropeptide that is known to modulate social behavior across a wide range of animal species. We conducted a doubleblind, placebo-controlled, pharmaco-functional magnetic resonance imaging (fMRI) study in which healthy normal subjects were randomized to treatment with either 24 IU intranasal OT (INOT; n=100) or placebo (PBO, n=104) and imaged with fMRI as they played an interactive social decision-making task known as the iterated Prisoner's Dilemma (PD) game with same-sex partners. INOT altered the neural response to reciprocated cooperation (a positive social interaction) within areas involved in reward and salience such as the nucleus accumbens and dorsal ACC, and also altered the response to unreciprocated cooperation (a negative social interaction) within areas involved in salience and threat detection, like the anterior insula and the amygdala. Furthermore, INOT altered functional connectivity within a social behavioral neural network in response to both reciprocated and unreciprocated cooperation. These findings support the potential utility of OT to treat stress and anxiety disorders as well as disorders involving deficits in social motivation. However, INOT effects were highly heterogeneous, depending on sex, OXTR genotype, and stimulus novelty vs. familiarity. Furthermore, effects may also differ by dose, patient status (healthy subjects vs. patients) and between endogenous and exogenously administered OT.

Daniel Quintana: Identifying central targets for intranasal oxytocin administration and the optimal dose

The neuropeptide oxytocin has garnered considerable interest for its role in social behavior and its potential for the treatment of psychiatric illnesses characterised by social dysfunction. However, research needs to first demonstrate engagement of intranasal oxytocin targets and to define the optimal dose before it can be translated to the clinic. I will describe a study identifying whole brain voxel-by-voxel gene expression patterns of the oxytocin receptor (OXTR) gene and its association with cognitive states via a large-scale fMRI meta-analysis of 14,371 studies. OXTR gene expression was increased in subcortical and olfactory regions and expression patterns were associated with anticipatory, appetitive, aversive, and social cognitive states. Data from two clinical trials will also be presented demonstrating that compared to placebo, 8IU intranasal oxytocin (but not 24IU intranasal oxytocin or 1IU intravenous oxytocin) modulates social cognition, pupil diameter, and neural activity. Altogether, these studies provide the first steps towards identifying targets for oxytocin receptor engagement in the human brain and suggest that a lower 8IU intranasal dose might be more efficacious than the conventional 24IU dose.

Robert Froemke: Oxytocin enables social transmission of maternal behavior

Oxytocin is important for social interactions and maternal behavior. However, little is known about when, where, and how oxytocin modulates neural circuits to improve social cognition. I will focus on experience-dependent plasticity in auditory cortex and hypothalamus related to recognizing the significance of pup distress calls, which are important for mother mice retrieving lost pups back to the nest. Surprisingly, this behavior, neural responses, and oxytocin receptor expression were lateralized to the left side of the auditory cortex, perhaps similar to the lateralization of language abilities in humans. I will also describe a new system we have built to combine continuous days-to-weeks-long audio-video monitoring of homecage behavior synchronized with continuous neural recordings from the auditory cortex and oxytocin neurons of the hypothalamus in vivo, to identify when oxytocin release and cortical plasticity might occur during natural social and maternal experience. Our data indicate that rather than being a fully innate behavior, maternal care in mice can be learned from observation and social interaction.

Ben Tabak: Controversy can make us more careful: Lessons from null behavioral effects of oxytocin administration to measurement inconsistencies

Early enthusiasm for human research on the role of oxytocin in socioemotional processes has cooled recently due to a host of methodological and practical issues. A healthy dialogue between engaged skeptics and nuanced proponents is emerging, which has led some to abandon work in this area, while other research groups have been recalibrating their efforts to systematically uncover the complex nature of oxytocin in human sociality. As such, controversy in this field (and others) is making us more careful. I will first discuss an effort by our research group to examine a host of null behavioral effects of oxytocin administration across a range of socioemotional tasks. Overall, this work suggests that one-time intranasal administration of oxytocin (24IU) may have less generalizable effects on social cognition and behavior than previously assumed, and underscores the importance of conducting well-powered studies. I will also discuss issues related to inconsistent measurement techniques in studies examining endogenous oxytocin. A lack of consistency in measurement across studies makes it difficult to synthesize results and make inferences about the role of peripheral oxytocin in human sociality.











The Venetian causeway crosses Biscayne Bay between Miami and Miami Beach, and follows the original route of the wooden Collins Bridge built in 1913.

Friday May 3, Evening

4:30pm Keynote Address Frans B. M. de Waal



Evolution of Emotions and Empathy in the Primates

Emotions suffuse much of the language employed by students of animal behavior -- from "social bonding" to "alarm calls" -- yet are still regularly avoided as explicit topic in scientific discourse. Given the increasing interest of human psychology in the emotions, and the neuroscience on animal emotions such as fear and attachment, the taboo that has hampered animal research in this area is outdated. The main point is to separate emotions from feelings, which are the subjective experiences that accompany the emotions. Whereas science has no access to animal feelings, animal emotions are as observable and measurable (face, voice, physiology, neural activity) as human emotions. They are mental and bodily states that potentiate behavior appropriate to mostly social situations. I will discuss early ideas about animal emotions and draw upon research on empathy and the perception of emotions in primates to make the point that the study of animal emotions is a necessary complement to the study of behavior. Emotions are best viewed as the organizers of adaptive responses to environmental stimuli.

5:30pm Poster Session B

7:00pm Reception at Surfcomber Hotel



Matheson Hammock Park on Old Cutler Road in Coral Gables opened in 1930 as the first park of Dade County.

Saturday May 4, Morning 8:00am-9:00am Symposium 4 Affective Science: Human Neuroimaging 9:00am Breakfast

Greg Samanez-Larkin: Using social and affective neuroscience to resolve a persistent dualism in aging research

In the psychology literature it's not uncommon to read speculation about whether adult age differences in behavior are due to "biological declines" OR "motivational changes". The implication of these alternatives is that motivational change or preservation is not biological. The authors speculating are not necessarily dualists, but rather these questions have emerged as an artifact of the tools being used to study adult age effects on cognition and motivation. There has been a historical incompatibility in the field between motivational theories that are largely verbal and based on behavioral evidence and cognitive theories which are often more computational and based on a combination of behavioral and neurobiological evidence. In this more theoretically leaning talk, I will briefly present a series of findings from studies using fMRI and PET imaging of the dopamine system that are beginning to provide a neurobiological account of motivation and aging. In addition to resolving dualistic accounts of aging, the studies have identified preservation of motivational systems that may be used to further enhance function in older age.

Rachael Jack: *Modelling dynamic facial expressions of emotion using data-driven methods*

Understanding how humans use facial expression for social communication is challenging due to the sheer number and complexity of the face movements the human face can make. Consequently, knowledge of facial expressions has remained limited on several important dimensions such as cultural variability. To address this challenge, we use a novel social psychophysics approach that combines social and cultural psychology, vision science, mathematical psychology, and 3D dynamic computer graphics to map the dynamic information space of human face movements against social perception in different cultures. Using this data-driven approach, we provide a precise characterization of the culturally common and culture-specific face movements that convey broad dimensional (e.g., positive, high arousal) and specific (e.g., delighted) emotion information and show that four, not six, core expressive patterns are common across cultures. We also show that facial expressions transmit signals in an evolving hierarchy of broad-to-specific information over time. Together, our work challenges longstanding dominant views of universality and forms the basis of a new theoretical framework that has the potential to unite different views (i.e., nature vs. nurture; dimensional vs. categorical). Our most recent work also informs the design of socially and culturally intelligent robots by providing a generative syntactical model for social face signaling.

Maital Neta: In the 'face' of uncertainty: Charting variability in response to emotional ambiguity

Our daily lives are saturated with affective value (e.g., a visit from a friend, the ringing of an alarm clock, a beautiful sunset, a hot cup of coffee). When we encounter new information (new people, sounds, locations, flavors), we readily sort this information into emotional valence categories: good or bad, reward or threat, approach or avoid. Facial expressions, in particular, convey rich information about another person and the environment. Some expressions are clear-cut (angry face predicts threat/avoidance), whereas others are more ambiguous, because they can readily predict both rewarding or threatening outcomes. For example, a surprised facial expression is associated with both positive (an unexpected visit from an old friend) and negative (hearing that a loved one was in a car accident) information. We and others have documented a wide range of individual differences in 'valence bias,' or the tendency to categorize ambiguous cues (e.g., surprised faces) as having a positive or negative valence. In this talk, I will discuss just a few of the approaches (behavioral, neuroimaging, developmental) that we have used in the lab to examine these individual differences in valence bias, and to test both its stability and its malleability. In the end, I will also discuss a few of the approaches we are beginning to use to move these paradigms from the lab into the wild.

Tor Wager: Decoding convolutional neural network representations of emotion schemas from distributed patterns of brain activity in the human visual system Emotions are thought to be canonical responses to situations ancestrally linked to survival or the well-being of an organism. Although sensory elements do not fully determine the nature of emotional responses, they should be sufficient to convey the schema or situation that an organism must respond to. However, few computationally explicit models describe how combinations of stimulus features come to evoke different types of emotional responses, and further, it is not clear that activity in sensory (e.g., visual) cortex contains distinct codes for multiple classes of emotional responding in a rich way. Here we develop a convolutional neural network that accurately decodes images into 11 distinct emotion categories. We validate the model using over 25,000 images and movies and show that image content is sufficient to predict the category. valence, and arousal of human emotion ratings. In two fMRI studies, we demonstrate that patterns of human visual cortex activity encode emotion category-related model output and can decode multiple categories of emotional experience. Comparing decoding performance across multiple brain regions, we find that emotion schemas are best characterized by distributed codes in the occipital lobe and that redundant information about schemas is contained in other brain systems. These results indicate that rich, category specific emotion representations are embedded within the human visual system. Further, they suggest that psychological and computational accounts of emotion should explain the sensory qualities that are naturally associated with emotional outcomes, as well as those that are reliably learned through experience and influenced by culture.

<u>10:30am</u> Poster Session C <u>**2:00pm</u>** Lunch Break</u>





The Miami Beach Botanical Garden is and urban greenspace founded in 1962 to showcase native Florida plants and trees.

Saturday May 4, Afternoon

1:30pm Symposium 5 Social Neuroinformatics and Big Data



Phillippe Schyns: From Brain Activity to Information Processing

We can now measure brain activity very well, in space, in time and at different levels of granularity. However, what we really want to know is not brain activity *per se*, but the processing of information that this activity reflects. To bridge this brain-activity-to-information explanatory gap, we need to reconsider brain imaging from the foundations of psychology. I will outline a new data-driven framework that delivers information processing from brain activity and thereby addresses the promise of brain imaging.



Emily Finn: Predicting behavioral phenotypes from brain activity during naturalistic viewing

organization may provide meaningful improvements for a variety of mental disorders.

Naturalistic neuroimaging paradigms, such as having subjects watch a movie or listen to a story in the scanner, allow researchers to better probe the complexities of realworld cognition, and yield rich datasets that can be analyzed using a number of innovative approaches. I will discuss recent large-scale datasets and data sharing efforts that include naturalistic paradigms, and the advantages of using such paradigms relative to either traditional cognitive tasks or resting-state acquisitions. While naturalistic neuroimaging studies have traditionally focused on the striking consistency of stimulus-evoked activity across brains, recent evidence suggests that these paradigms also have great potential to reveal meaningful individual differences. I will share results from our recent work to develop and apply novel, data-driven analysis methods to reveal patterns of brain activity during naturalistic viewing that reflect trait-level individual differences in personality and cognition.

Michael Cole: Brain network organization as the computational architecture of cognition: Implications for emotion regulation and mental health

Understanding neurocognitive computations – such as those involved in social and affective processing – will require not just localizing cognitive information distributed throughout the brain but also determining how that information got there. Brain connectivity clearly has something to do with it, and decades of "connectionist" (and recent "deep learning") theory suggests connectivity patterns specify distributed neural computations. I will share my laboratory's efforts to map the human brain's large-scale functional network organization and to determine how that organization shapes distributed cognitive processes. First, we have identified a role for large-scale cognitive control networks in the regulation of mental health, especially emotion regulation in the context of depression. Second, we found that whole-brain functional network organization is only minimally altered between mentally healthy and unhealthy individuals, across those with autism spectrum disorder, attention-deficit hyperactivity disorder, and schizophrenia. This suggests that the emotion dysregulation inherent in a variety of mental disorders may result from relatively small changes to the brain's network organization can result in large alterations in task-related brain activations. These findings provide hope that small, well-targeted alterations to brain network



Simon Eickhoff: Consolidated functional networks as priors for machine-learning of brain-behavior relationships

The long predominant paradigm in neuroimaging has been to compare imaging markers between groups or correlate these to behavioral phenotypes. Recently, the increasing availability of large cohort data and tools for multivariate statistical learning, however, also allow the prediction of individual affective, cognitive or clinical phenotypes in new subjects. Yet, such approach is currently impeded by a sub-optimal relationship between the extremely wide feature-space and the comparably low number of subjects. This is particularly true when approaching neuroimaging machine-learning in a naïve fashion, i.e., when ignoring the large body of existing work on human brain mapping. In turn, robust knowledge on functional should thus provide critical a priori information for dimensionality reduction and feature selection. This talk will outline the need for robust consolidation of the existent large but heterogeneous literature on functional brain organization and introduce the statistical tools that have been developed to this end, namely coordinate based meta-analyses. I will then outline, how the ensuing knowledge on functional brain networks can be leveraged towards the extraction of multiple sets of individual-specific features from task-free data, namely resting-state fMRI, providing a broad set of functional probes into an individual subjects or the prediction of diagnoses and subtype in individual patients with, e.g., Parkinson's disease or Schizophrenia. Providing a bidirectional trans in previously unseen individual variability and the development of individualized healthcare while at the same time contributing to a better understanding of the human brain.



Little Havana, or Calle Ocho, is a neighborhood in Miami that is a center of social and cultural activity, home to Cuban exiles as well as immigrants from Central and South America.

Saturday May 4, Afternoon

3:00pm A Conversation with Chuck Carver





moderated by Ajay Satpute



4:00pm Presidential Closing Remarks Thalia Wheatley



The lifeguard towers on Miami Beach are an expression of the city's identity and culture.

Lucina & Aaron's Favorite Eats on the Beach

Restaurants

- Barceloneta
- Byblos
- Joe's Stone Crab
- The Cafe at Books & Books
- A La Folie Cafe
- Front Porch Cafe (in the Betsy Hotel)
- Umi Sushi (in the Delano Hotel)
- News Cafe
- Lucali's Pizza
- Mister 01 Pizza
- Pane & Vino
- Silvano's
- Pied a Terre (in the Cadet Hotel)
- Babylon
- Cleo
- Orange Blossom
- Suviche
- Havana 1957

<u>Grab n Go</u>

- La Sandwicherie
- The Empanadas at the Valero on 23rd street and Park
- Las Olas Café
- Bodega Taqueria y Tequila
- Panizza Bistro
- Al Basha Grill
- Whole Foods

<u>Drinks</u>

- Broken Shaker
- The roof of 1 Miami
- Monty's on South Beach
- Abbey Brewing Company



Poster Session A

A-1

Narcissists Show Different Psychological and Neural Motivations for Interpersonal Sharing

Elisa C. Baek - University of Pennsylvania; Christin Scholz - University of Amsterdam; Emily Falk - University of Pennsylvania

Trait narcissism has been associated with negative outcomes for the individual, such as inability to maintain healthy relationships. One behavior integral to maintaining relationships is interpersonal sharing of information. Sharing can promote social bonding, and by extension well-being, but it is unknown whether and how narcissism is related to neural and psychological antecedents of sharing. We investigated how individual differences in narcissism may affect the decisions leading to sharing and the social consequences of sharing. In a neuroimaging task, participants read headlines and teasers about news articles and rated their likelihood to share each article. On each trial, they were instructed to consider one of three different motivations for sharing—to help others, describe themselves, and spread information. Trait narcissism was associated with noverall lower intentions to share articles. However, there was a positive interaction between narcissism and motivation such that narcissists were more likely to share information when they considered sharing articles with the motivation to describe themselves, compared to the motivation to help others. Narcissists were also less likely to achieve interpersonal connection with receivers of their shared messages. Narcissism was further associated with narcissists have different neural and psychological motivations in sharing information, and are less successful at connecting with receivers of their shared message, which may contribute to the negative consequences of narcissism for longer term outcomes.

A-2

The obedient mind: a neural basis of preserved sense of agency under coercion

Emilie Caspar - Netherlands Institute for Neuroscience; Frederike Beyer - Queen Mary University of London; Steve Fleming - Wellcome Centre for Human Neuroimaging; Axel Cleeremans - Université libre de Bruxelles; Patrick Haggard - University College London

The famous experiments conducted by Stanley Milgram (Blass, 1999; Milgram, 1963) showed that obeying the orders of an authority can lead to extreme antisocial behaviors. Under certain circumstances, a majority of individuals could be coerced into inflicting harm on others at levels generally deemed unacceptable. While these studies have described the social conditions under which coercion is effective, they have failed to address the central question of how coercion influences moral behavior. The current study explores the neural mechanisms by which coercion reduces sense of agency (SoA) and sense of responsibility. Two participants turned to be either agent or 'victim'. In the free condition, agents were free to choose whether to administer a shock to the 'victim' in order to increase their financial gain. In the coerced condition, the experimenter ordered the 'agent' to administer the shock or not. Across subjects, we found that the more participants reduced their SoA under coercion, the less the medial forotal cortex (MFC), a brain region associated with conformity to social norms, was active in coercion trials. A similar effect was found for explicit responsibility ratings. Interestingly, this region had never been found to be associated to the sense of agency before, probably because previous MRI studies only evaluated SoA in socially irrelevant tasks. Our findings suggest that resilience against agency-reducing effects of coercion is associated with recruitment of volitional processes reflected in MFC activity.

A-3

Eye contact facilitates shared attention during natural conversation

Sophie E. Wohltjen - Dartmouth College; Thalia P. Wheatley - Dartmouth College

Previous research has indicated that attention is associated with the pupillary response (see Laeng et al., 2012 for review) and that spontaneous pupillary synchrony between individuals indexes shared attention (Kang & Wheatley, 2017). We recorded the pupillary dilations of dyads while they conversed freely for ten minutes to investigate whether natural eye contact increases pupillary synchrony. We computed the similarity of partners' recorded pupillary time series using Dynamic Time Warping. We then compared pupillary synchrony during moments with eye contact to pupillary synchrony during moments without eye contact. Moments of eye contact during a conversation were identified via video captured by cameras located at the nasion of both participants' eye-tracking glasses. This perspective allowed us to annotate moments when both participants were looking at their partner's eyes. We found that pupil dilations of shared attention in natural conversation. Furthermore, eye contact appears to be an effective modulator of shared attention and may be deployed strategically to maximize the attention of another mind. Kang O & Wheatley T (2017). Pupil dilation patterns spontaneously synchronize across individuals during shared attention. JEPGen, 146(4), 569–576. Laeng B, Sirois S & Gredebäck G (2012). Pupillometry: A window to the preconscious? PPS, 7(1), 18–27.

Neural responses to sad self-face mediates the relationship between self-compassion and depression severity among depressed adolescents

Guanmin Liu - Center for Healthy Minds, University of Wisconsin; Na Zhang – Department of Family Social Science, University of Minnesota; Jia Yuan Teoh – Department of Psychiatry, University of Minnesota; Christine Egan - Department of Department of Neuroscience, University of Minnesota; Thomas A. Zeffiro - Neurometrika & Department of Diagnostic Radiology, University of Maryland; Richard J. Davidson - Center for Healthy Minds & Departments of Psychology and Psychiatry, University of Wisconsin; Karina Quevedo - Department of Psychiatry, University of Minnesota

Given the prevalence of adolescent depression and the modest effects of current treatments, evidence is needed for developing effective ones. Evidence has shown that self-compassion (SC) is inversely associated with depression and SC intervention may reduce depression severity (DS). However, little is known about the neural mechanism underlying the relationship between SC and DS. Considering self-processing is abnormal among depressed adolescents and sal self-face processing is especially relevant to both SC and DS, this study is to investigate whether neural responses to sad self-face mediates the relationship between SC and DS among adolescents. Eighty-two depressed adolescents and the seven healthy controls participated in the study. In the scanner, they were instructed to identify whether morphed self- or other-faces with sad, happy or neutral expression displayed looked like them. We found that both SC and DS correlated with neural activations in the right middle frontal gyrus (MFG) and the left cerebellum during sad self-face processing. Further mediation analysis showed that neural activations in these regions mediated the relationship between SC and DS. This relationship was only found among depressed adolescents, but not among healthy controls. We further ruled out the possibility that the found relationship was common to general self-other or sad-neutral stimuli processing differences. Though DS was also correlated with self-processing, these results imply that SC may reduce DS via weakening the salience of sad self-face processing, these rules are not correlated with SC. Considering the right MFG is associated with self-processing, these results imply that SC may reduce DS via weakening the salience of sad self-related stimuli.

A-5

The Weight of Bullying: Weight Status and Peer Victimization are Associated with Neural Response to Anticipating Unpredictable Peer Feedback

Yvette Karvay - Temple University; Tessa Clarkson - Temple University; Johanna M. Jarcho - Temple University

Adolescents with overweight are more commonly bullied, which causes emotional distress. Adolescents with overweight who have been victimized may therefore expect unfamiliar or unpredictable peers to treat them more poorly than their average-weight counterparts. This may result in heightened engagement of brain regions implicated in threat and salience processing, such as the dorsal anterior cingulate (dACC). Alternatively, blunted engagement of the dACC may serve a protective function in the face of uncertainty. We tested whether dACC differentially responds to anticipating predictable and unpredictable social evaluation in youth who varied in weight status and exposure to peer victimization. Adolescents (N=36; M±SD=12.64±1.18 years) underwent fMRI while completing a Virtual School-based social interaction task. Participants anticipated social evaluation from purported peers with reputations for being predictable, mean, or unpredictable. Body mass index (BMI) (21.18±3.69) and school-based peer victimization (PV; 5.31±6.09) were assessed. A Reputation (nice, mean, unpredictable) X BMI X PV repeated measures ANOVA revealed an interaction in the dACC, F(2,32)=4.69, p=-018. BMI and PV uniquely influenced brain function while anticipating unpredictable (F(1,32)=5.45, p=-03) but not predictable (p's>.45), evaluation. Specifically, more severe PV was associated with heightened dACC engagement in youth with high BMI but blunted engagement in youth with low BMI. This suggests PV may sensitize or de-sensitize youth to potential threat in unpredictable social situations depending on weight. Sensitization among youth with high BMI may promote the lasting effects of PV whereas desensitization may be a protective factor in youth with low BMI.

A-6

Neural correlates of political efficacy: Brain activity in response to civic information associated with political efficacy

Prateekshit Pandey – University of Pennsylvania; Matthew O'Donnell – University of Pennsylvania; Michael X. Delli-Carpini – University of Pennsylvania; Jason Coronel – Ohio State University; Emily B. Falk – University of Pennsylvania

Internal political efficacy is the belief in one's own ability to understand and engage in politics. Greater internal political efficacy can motivate political participation (Gastil & Xenos, 2010; Stenner-Day & Fischle, 1992). Thus, it is important to understand the underlying psychological mechanisms and outcomes that differentiate more and less efficacious individuals. Here, we examine differences between people high and low in political efficacy in terms of their neural response to civic information (proposed state laws/initiatives), and how these activations correlate with their later retention of the information. We focused on neural regions associated with self-relevance and perspective taking, because individuals confident in their ability to engage in political affairs are also likely to find civic information more self-relevant, and potentially consider multiple perspectives when evaluating civic information. During fMRI scanning, 52 participants viewed clips where news anchors (actors) reported civic information. After, participants were asked to recall and recognize the information from the clips.

Internal political efficacy was significantly associated with higher correct recognition of information from the clips. Higher internal efficacy was also associated with greater brain activity in ROIs associated with self-relevance and perspective taking (neurosynth reverse inference map for "self-processing" and "mentalizing") while watching. Further, activity in these region- was associated with better memory for the later information (lower false alarm rate). In sum, internal political efficacy may be associated with greater self-relevance of political information and facilitate considerations of other people's knowledge, beliefs or opinions, which in turn contribute to greater retention of new political information.

A-7

Manipulating Neural Coupling during News Propagation

C. Scholz - University of Amsterdam; E.C. Baek - University of Pennsylvania; M. Brook O'Donnell - University of Pennsylvania; E. B. Falk - University of Pennsylvania

During interpersonal communication, conversation partners synchronize across various biological systems including neural activity. This has positive outcomes like mutual understanding and liking. In two fMRI studies, we investigated whether this phenomenon supports the propagation of ideas from communicators to their receivers and whether it can be manipulated experimentally using a simple set of instructions to communicators.

Study-1 showed that neural coupling occurs even when a single Facebook message about news articles is exchanged between strangers. Coupling was particularly pronounced in meta-analytically defined ROIs often associated with value-related, self-related, and social processing.

In Study-2, we introduced a simple intervention to test whether the extent of communicator-receiver coupling was dependent on a communicator's motivation for sharing the same articles used in Study-1. Specifically, we asked communicators to follow certain motives (randomly assigned within subjects) when propagating news to receivers, namely to use the article to objectively spread the information it contains (control), describe something about themselves (self), or help the receiver (social). We pre-registered hypotheses testing intervention effects on communicators, receivers, and, coupling between them (https://osf.io/pxnmw/).

First, as in Study-1, we found significant communicator-receiver coupling within the ROIs across all trials in Study-2. In addition, the extend of coupling partially depended on the communicator's motivation for sharing the article. Specifically, communicators' neural activity within the ROIs was more strongly coupled with receiver neural activity in the 'help' compared to the 'describe yourself' condition. This work provides new insight into the role of neural coupling in information transmission between communication partners.

A-8

Investigating individual differences in the late positive potential

Andrew J. Graves - University of Virginia; James P. Morris - University of Virginia

Previous research suggests that the Late Positive Potential (LPP) can index sustained attention and affective processing of visual stimuli (Cuthbert et al., 2000). The LPP is an event-related potential (ERP) maximal at centroparietal electrodes, observable as early as 400 ms post-stimulus and up through stimulus termination. The current research examined a plausible individual difference in the LPP in response to affective pictures, the Autism Spectrum Quotient (ASQ). The ASQ estimates autistic-like traits in the neurotypical population, including an individual's proclivity to enjoy or engage in social behavior (Baron-Cohen et al., 2001). Previous research suggests individuals with autism spectrum disorder exhibit smaller LPP waveforms in response to faces (Benning et al., 2016). In our experiment (n = 62), we presented a series of affectively neutral pictures and affectively salient pictures. First, we hypothesized that LPP would systematically increase across the affective value of a picture. Second, we hypothesized that LPP would trend as a negative linear function of ASQ for social pictures (i.e. faces) but not for non-social pictures (i.e. scenes). The results suggest strong support for our first hypothesis, and some evidence for our second hypothesis. We observed smaller LPP waveforms for neutral social pictures as a negative linear function of ASQ, but not for affectively salient social pictures, with the affective value of the picture strongly modulating the LPP. Future analyses will examine the LPP in relation to DNA methylation of the oxytocin receptor (OXTR), a plausible biomarker of individual differences in the LPP in relation.

A-9

Training-induced changes in a whole-brain signature of cognitive reappraisal are related to reductions in grief and depressive symptoms in bereaved spouses

Anoushka D. Shahane - Rice University; Richard B. Lopez - Rice University; Bryan T. Denny - Rice University

Prior work examining brain-based correlates of emotion regulation (ER) has demonstrated that cognitive reappraisal (CR), a strategy involving changing one's cognitive construal of an emotionally evocative stimulus to alter its emotional impact, engages cognitive control regions such as the dorsomedial prefrontal cortex (PFC), dorsolateral PFC, ventrolateral PFC, and posterior parietal cortex. Whether bereaved spouses, a highly stressed and under-studied population in ER research, can benefit from CR training is largely unknown. In the present study, we examined whole-brain pattern expression of CR (via correspondence with a reappraisal meta-analysis; Buhle et al., 2014) and symptoms of depression and complicated grief following longitudinal CR training among 21 bereaved spouses. Participants completed five sessions of CR training over two weeks and also underwent functional neuroimaging while completing a CR task at Sessions 1 and 5. Grief symptoms significantly decreased with training. Further, during reappraisal pattern expression showed significant increases at Session 5 relative to Session 1. In addition, there was a significant association between change in grief symptoms and change in whole-brain reappraisal pattern expression from Session 1 to Session 5, such that greater increases in reappraisal pattern expression were associated with greater reduction in grief symptoms. The same pattern applied for change in symptoms of depression. We are further examining the effect of training in specific reappraisal tactics (i.e., psychological distancing versus reinterpretation). Overall, these results suggest mechanisms through which CR interventions may yield mental health benefits among bereaved spouses.

A-10

The role of attention in reward learning from adolescence to adulthood

Gail M. Rosenbaum - NYU; Catherine A. Hartley - NYU

Individuals must deploy selective attention to learn about rewarding aspects of the complex environment and use this learned information to make decisions. Adolescence confers novel decision-making opportunities that require the use of experientially learned information to make choices. A large literature suggests that adolescents exhibit heightened sensitivity to rewards relative to adults. Further, prior research has demonstrated protracted development of selective attention from adolescence into adulthood. However, few studies have examined how developmental changes in attention may alter the ability to discover reward-predictive features in complex environments. In the present study, we investigated how age differences in attentional allocation might directly influence reward learning and decision making. Forty-nine participants ages 13-25 played a reward learning task while undergoing eye tracking to measure attentional shifts. Each stimulus in the task included three feature dimensions, but only one of the dimensions was predictive of reward. Therefore, the task required participants to shift their attention within and between dimensions to learn which stimulus was most rewarding across several trials. Surprisingly, despite substantial individual variability in task performance, there were no age differences in overall task accuracy. Computational analyses of eye tracking and choice data will elucidate whether adolescents use different underlying attentional strategies to achieve similar task performance to adults.

A-11

Exploring Outgroup Membership Impact on Fear Learning Processes

Sarah M. Carlisle - University of California Riverside; Kalina J. Michalska - University of California Riverside; Jay Trieu - University of California Riverside

Biases towards outgroup members often manifest implicitly, through physiology and behavior. Adult research shows outgroup members are more readily associated with aversive stimuli than ingroup members. Whether such biased fear learning is observable during childhood remains unknown. This study tests hypotheses that children exhibit greater implicit fear responses to outgroup than ingroup members, which will be moderated by explicit stereotype endorsement and outgroup peer contact. Participants are 80 girls (40 Hispanic, 40 Caucasian); 12 have completed testing (M = 10.39±1.29 yrs). Fear conditioning includes three phases: in pre-acquisition, children view two neutral female faces (i.e., conditioned stimuli (CS)). During acquisition, one face (CS+) predicts the unconditioned stimulus (UCS), a fearful face and scream, the other (CS-) does not. During extinction, both faces are presented without the UCS. Children view one outgroup and ingroup (Hispanic/Caucasian) face while skin conductance responses (SCRs) and self-report are collected. Stereotype endorsement and outgroup peer contact are assessed. Preliminary data show a phase x stimulus interaction for SCR, F(2, 22)=4.09, p=.031 and self-report, F(2, 20)=5.21, p=.015. At acquisition, both measures were greater to the CS+ than CS- (SCR: M = 7.80±1.96 vs M = 5.43±1.71, t(11) = 3.193, p=.009; Self-report: M = 6.0±0.81 vs M = 2.82±0.74, t(11) = 3.19, p=.004) but not pre-acquisition (SCR: p=.380; Self-report: p=.852) or extinction (SCR: p=.533; Self-report: p=.6.33) or. Subsequent analyses will test interactions with group membership and outgroup members are stimuling toward outgroup peer contact. Findings will inform aversive learning toward outgroup members during development.

A-12

2019 SANS Poster Award Winner

Flow Dynamics During Naturalistic Gameplay: Results from Behavioral and Functional Magnetic Resonance Imaging Studies

Richard Huskey - Cognitive Communication Science Lab; School of Communication, The Ohio State University; Justin Robert Keene - Cognition and Emotion Lab; College of Media and Communication, Texas Tech University; Shelby Wilcox - Cognitive Communication Science Lab; School of Communication, The Ohio State University; Robyn Adams - College of Communication Arts and Sciences, Michigan State University; Christine J. Najera - Cognition and Emotion Lab; College of Media and Communication, Texas Tech University; Natalie Petit - Cognitive Communication Science Lab; School of Communication, The Ohio State University

Media interaction has been theorized to result in flow - a rewarding state of engagement and attention directed at and induced by an immersive task when there is a balance between task difficulty and individual skill. The synchronization theory of flow outlines a neuropsychological framework to identify the neural mechanisms of this state, specifically that flow results from the synchronization of cognitive control and reward networks (Weber et al., 2009). How exactly these networks dynamically synchronize, and how dynamic interactions between task difficulty and individual skill contributes to this synchronization is yet to be clarified. To examine these processes, we behaviorally validated (n=74) Secondary Task Reaction Times (STRTs) as a dynamic index of reward modulated cognitive control during naturalistic gameplay in three experimental conditions: boredom (low-difficulty), furstration (high-difficulty), and flow (balanced-difficulty). Additionally, subjects (n=35) completed this task while undergoing fMRI. Replicating previous findings, results show that self-reported feelings of flow and enjoyment are highest, and that STRTs are longest, for the balanced difficulty condition. Interestingly, we also find time-windowed STRTs are invariant within conditions but differ between conditions. We also replicate previous graph theoretic results showing lowest global efficiency brain network organization occurs during flow while extending these into an analysis of brain network dynamics. Our results offer support for synchronization theory's core predictions and demonstrate that flow is a motivationally relevant, cognitively involved, yet metabolically efficient state. Broadly, these results provide a starting point to link dynamic changes in media content to the unfolding of psychological states like flow.

A-13

Decoding proposers' motivations in the ultimatum game from multivariate brain activity patterns

Sebastian Speer - Rotterdam School of Management, Erasmus University; Maarten Boksem - Rotterdam School of Management, Erasmus University

In the Ultimatum Game (UG), the proposer may have different motivations for splitting their endowment evenly. They may act out of fairness concerns or because they want to avoid rejection of the offer on the responders' side. Here, we used fMRI to identify neural patterns that discriminate between these two motivations. Participants played twelve rounds of the UG and Dictator Game (DG), involving real money, as proposers. As responders cannot reject the offer in the DG, the offers as well as the neural mechanisms underlying decision-making between these two games should differ for fairness driven versus strategic decision makers. We used support vector classifiers trained on whole brain activation patterns to classify which game the participants were playing. Further, a representational similarity searchlight procedure was used to investigate where in the brain the neural similarity between games.

We were able to decode neural patterns associated with UG and DG trials. More importantly, we found that the classification accuracy correlated strongly with average difference in offer size between UG and DG, indicating that for selfish players neural mechanisms differ more strongly between games. Moreover, we found that dissimilarity between neural patterns associated with the two games correlated significantly with differences in offers between games in the inferior frontal gyrus, dorsolateral prefrontal cortex and the Precuneus. This suggests that differences in fairness may be driven by variations in the degree to which self-control and theory of mind processes are engaged during decision-making.

A-14

The cerebellum's structural and functional role in social cognition

Athanasia Metoki - Temple University; Yin Wang - Temple University; Ingrid R. Olson - Temple University

Project Consortium (n=673) to functionally define regions in the cerebrum and cerebellum sensitive to ToM. These regions were used as seeds in probabilistic tractography. Our results showed that there are distinct bilateral cerebellar clusters, in triplet, sensitive to ToM demands. In addition, we were able to resolve input/output cerebrocerebellar white matter pathways. These results are complimented by resting-state coupling which revealed the same pattern of cerebrocerebellar connectivity. Lastly, white matter integrity and strength of the pathways revealed a relationship to performance in ToM tasks.

A-15

Believing, Desiring, or Just Thinking About: Toward a Neuroscientific Account of Propositional Attitudes

Regan M. Bernhard – Harvard University; Steven M. Frankland – Princeton University; Joshua D. Green – Harvard University

Human minds can relate to a single idea in different ways. One can believe that it will rain, desire that it will rain, or merely think about its raining. How does the brain connect "propositional attitudes," such as believing or desiring, to "propositions," ideas that can be true or false? Here we use fMRI and a novel task inspired by the street-side "shell game" to examine the neural architecture of propositional attitudes. First, we identified sets of regions preferentially engaged by beliefs versus desires. Moreover, we find that a region of right IFG is preferentially engaged when propositions are represented without being believed. This is consistent with the "Spinozan" theory of belief, whereby control processes suppress an automatic tendency toward the belief of comprehended propositions. We also used MVPA to identify regions encoding information about object-location propositions (e.g., "the mop is in the upper right corner") that were either believed, desired, or merely though tabout. We found that the left parahippocampal gyrus encodes the identity of a target object (e.g. mop), independent of whether it is the object of a belief, desire, or mere thought. By contrast, the left putamen encodes object identity, but appears to do so only when participants have a desire about that object's location. Likewise, a region of right posterior STG appears to preferentially encode object information only in the context of belief. These findings provided the first systematic guide to how the brain integrates representations of propositions with the attitudes we hold about them.

A-16

Examining Emotion Dysregulation in Young Children With and Without ADHD: A Transdiagnostic Approach

Alexis Garcia - Florida International University; Paulo Graziano - Florida International University; Anthony Dick - Florida International University

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder which affects up to 5% of school aged children. Impairments associated with the symptoms of ADHD affect social, academic, and familial functioning. Given suboptimal outcomes in these domains across the lifespan, it is imperative to identify early markers of this lifelong disorder. These markers can include identifiable neurobiological and electrophysiologic markers of the disorder. In the present study, we scanned (using structural magnetic resonance imaging; MRI) 96 4-7-year-old children with and without ADHD (n = 40 ADHD; n = 56 Control). We also recorded baseline and task-related respiratory sinus arythmia (RSA) withdrawal during a candy frustration task assessing emotion regulation. After accounting for whole brain cortical thickness, demographic variables, and baseline RSA, cortical thickness obtained from the T1-weighted MRI scans was associated with physiological indicators of emotion dysregulation in the following brain regions: left anterior insula, posterior inferior frontal gyrus, posterior cingulate, and pericallosal sulcus. In the case of the other regions, greater cortical thickness was associated with lower RSA withdrawal. In the case of the other regions, greater cortical thickness was associated with lower RSA withdrawal. We also found associations with RSA withdrawal and parent-teacher report indices of oppositional, hyperactive, and inattentional behaviors across the ADHD-Control grouping. These results suggest that reliable physiologic and brain-structural indicators can be identified, and that a transdiagnostic approach to ADHD may yield a more nuanced understanding of the disorder.

A-17

Measuring Emotion Sensitivity & Expressivity with Psychophysics

Monica K. Thieu - Columbia University; Kevin N. Ochsner - Columbia University

People vary in their emotional responses to the same event. How do differences in emotion sensitivity and reporting thresholds contribute to differences in emotional experience? We investigated this by showing 168 participants a series of short video clips designed to elicit varying levels of positive and/or negative emotion. From their reported emotional responses, we used a multilevel probit regression to estimate each participant's emotion threshold, or how much "affective information" a video must contain for a participant to experience an emotional response. We also administered a battery of questionnaires selected to sweep a variety of affective tendencies. Principal component analysis on our questionnaires revealed a first component tracking with affective psychopathology, and a second component tracking with emotional expressivity. Probit regressions on our task data showed that participants high on the expressivity PC were more likely to report any emotional response, and older participants (aged 50-78, N = 64) were more sensitive to negative emotion than younger participants (aged 18-35, N = 104). These results suggest that our emotion thresholds may index individual differences in emotion sensitivity and criterion to our threshold measure.

A-18

The role of Theory of Mind and Cognitive Control in prosociality: A large-scale assessment of the neural correlates of Social Value Orientation

Andrea Fariña - Leiden University; Michael R. Giffin - Leiden University; Jörg Gross - Leiden University; Carsten C. K. De Dreu - Leiden University, University of Amsterdam

The question of whether humans are fundamentally good or evil has plagued philosophers for millennia, but has been recently formalized and examined with the tools of neuroeconomics. Various findings support the idea of an intuitive prosociality: the theory that individuals must exert control to choose more strategically and selfishly. Others support the notion of inherent selfishness, where individuals must exert control to overcome self-serving tendencies and abide by social fairness norms. Not only has much of the extant literature produced conflicting results, but many studies have also been statistically underpowered. To redress these issues, this study set out to address the ongoing debate regarding the role of cognitive control in prosocial behavior.

Using a validated measure of social value orientation, we quantified the value placed on rewards for oneself and the value placed on rewards for others in 205 participants. We also assessed cognitive control (CC) and associated neural activity using a modified Stroop task in an fMRI scanner. Additionally, we measured participants' cortical thickness using structural MRI. While the neural correlates of CC were replicated, we found no associations between value for self or others and performance or associated brain activity. Crucially, however, we found that value for others' rewards was reflected in greater cortical thickness in the temporoparietal junction, a region consistently linked to perspective taking in social contexts. Our findings suggest that prosociality cannot be explained by CC abilities (or lack thereof), but they highlight it's link to brain regions supporting social cognition.

A-19

The social situation affects how we process feedback about our actions

Artur Czeszumski - University of Osnabrück, Germany; Benedikt V. Ehinger - University of Osnabrück, Germany; Basil Wahn – University of British Columbia, Canada; Peter König - University of Osnabrück, Germany, University Medical Center Hamburg-Eppendorf, Germany

Humans achieve their goals in joint action tasks either by cooperation or competition. In the present study, we investigated the neural processes underpinning error and monetary rewards processing in such cooperative and competitive situations. We used electroencephalography and analyzed event-related potentials triggered by feedback in both social situations. 26 dyads performed a joint four-alternative forced choice visual task either cooperatively or competitively. At the end of each trial, participants received performance feedback about their individual and joint errors and accompanying monetary rewards. Furthermore, the outcome, i.e. resulting positive, negative or neutral rewards, was dependent on the pay-off matrix, defining the social situation either as cooperative or competitive. We used linear mixed effects models to analyze the feedback-related-negativity (FRN) and used the Threshold-free cluster enhancement (TFCE) method to explore activations of all electrodes and times. We found main effects of the outcome and social situations, bowever, the FRN amplitudes differed between social situations. Our exploratory TFCE analysis revealed that processing of feedback differs between cooperative and competitive situations at right temporoparite electrodes. Further, the differences induced by the social situations were stronger in participants with higher scores on a perspective taking test. In sum, our results replicate previous studies about the FRN and extend them by comparing neurophysiological responses to positive and negative outcomes in a task that simultaneously engages two participants in competitive and cooperative situations.

A-20

Increased BNST Reactivity to Affective Images is Associated with Greater α-Amylase Response to Social Stress

Walker S. Pedersen – University of Wisconsin – Madison; Tammi R. A. Kral – University of Wisconsin – Madison; Melissa A. Rosenkranz – University of Wisconsin – Madison; Jeanette A. Mumford – University of Wisconsin – Madison; Richard J. Davidson – University of Wisconsin - Madison

While rodent research suggests that the bed nucleus of the stria terminalis (BNST) and centromedial amygdala (CM) play complementary roles in coordinating the hormonal stress response, little is known about the role of the BNST in the human stress response. However, human research has found that the BNST responds to negatively-valenced stimuli, which likely subserves the role of the BNST in responding to signals of threat. As such, individual differences in BNST reactivity to negatively-valenced stimuli may be associated with individual differences in the stress response. We measured participants' blood-oxygenated-level-dependent response to a fifterive images, and measured salivary cortisol and a-amylase (AA) levels in response to a subsequent Trier Social Stress Test (TSST). We predicted that greater BNST activation to emotionally evocative images was associated with a larger TSST-evoked AA, but not cortisol response. This associated remained significant after controlling for CM activation, which was not significantly related to the cortisol or AA response. These results suggest that the BNST response to negatively-valenced images may subserve its role in coordinating the human stress response and suggest a BNST role in the stress response is needed. Our findings are critical for the future study of mood and anxiety disorders, as dysregulation of the stress response is needed. Our findings are critical for the future study of mood and anxiety disorders, as dysregulation of the stress response is needed.

A-21

Inverse reinforcement learning as a computational model of theory-of-mind

Bryan S. González - Dartmouth College; Jeroen van Baar - Brown University; Luke J. Chang - Dartmouth College

While a consistent set of brain regions are known to be involved in representing another person's mental states, the specific computations used to make these inferences from observing another's actions are unclear. For example, how do we infer food preferences based on someone's order at a restaurant? This task is extraordinarily difficult for cutting-edge artificial intelligence algorithms, yet humans accurately perform this computation effortlessly. In this study, we sought to understand how people infer someone else's social preferences or moral principles from observing their behavior in a social interaction. Participants (n=400) played as third-party observers in a modified trust game and were tasked with predicting the trustee's behavior as they interacted with different investors. We hypothesized that participants learn which rule, from a finite set, best explains the trustee's behavior. More formally, we attempted to characterize participants' predictions using an inverse reinforcement-learning model (RL), which learns the utility function a given player might be using to make reciprocity decisions. We compared this model to a standard model-free RL algorithm, which simply learns the distribution of behavior over time. Overall, our inverse RL model outperforms the model-free algorithm in accounting for participants' predictions and, importantly, achieves accurate performance as quickly as human participants. It accomplishes this even when the same trustee behavior can be explained by different motivations. This work provides a framework to understand how the brain carries out theory-of mind computations by modeling how individuals learn to represent another person's internal motivations.

A-22

Subjective responses to dynamic socioemotional incentives across adulthood

Sade Abiodun - Center for Cognitive Neuroscience, Duke University; Kendra L. Seaman - Center for Cognitive Neuroscience, Duke University; Gregory R. Samanez-Larkin - Center for Cognitive Neuroscience, Duke University

Many of our day to day choices are dependent on a series of factors, including the degree to which the projected outcomes are incentivized. While most studies have traditionally examined incentivized decision-making using money, fewer studies have examined the impact of socioemotional incentives. Here, we explored the viability of utilizing dynamic facial stimuli as socioemotional incentives that vary in magnitude to facilitate comparison to monetary incentives. A total of 101 participants (range = 21yo - 76yo, M = 48.31) were recruited to make valence and arousal ratings after viewing a dynamic emotional expression as a first step to validate these stimuli for use in future studies. Using the Dynamic FACES (Holland et al, 2018), we created videos of three emotional expressions (anger, happiness, sadness) that each varied in magnitude of expression (low, medium, high/full).

Participants rated happy faces as more arousing and positive than sad or angry faces. High magnitude expressions were rated as more arousing than medium or low magnitude expressions, which was more pronounced for the happy faces than other emotions. Valence ratings also varied with expression magnitude; higher compared to lower magnitude happy faces were rated as more positive and higher compared to lower magnitude angry and sad faces were rated as more negative.

These results demonstrate that across adulthood, there is congruence between displayed (stimulus) and perceived (participant) emotion with both valence and arousal varying with expression magnitude. This will allow these stimuli to be used in future studies of social and monetary decision making.

A-23

Brain structure and skin conductance predict treatment-related improvements in autonomic dysfunction in veterans with Gulf War Illness

Danielle C. Mathersul - Veterans Affairs Palo Alto/Stanford University; Carla M. Eising - Maastricht University/Stanford University; Danielle D. DeSouza – Stanford University; David Spiegel – Stanford University; Peter J. Bayley - Veterans Affairs Palo Alto/Stanford University

Gulf War Illness (GWI) is a poorly understood condition experienced by many veterans who served in the Gulf War in 1990-1991 and is characterized by a constellation of symptoms including affective and cognitive dysfunction, chronic pain and fatigue, and gastrointestinal problems. While the pathophysiology of GWI remains unknown, a growing body of evidence demonstrates autonomic nervous system dysfunction in individuals with GWI, including disruptions in cardiac function and structural abnormalities in subcortical brain regions such as the amygdala. Few published treatment studies exist for GWI. Cognitive behavioral therapy (CBT) is the standard evidence-based psychological treatment for many of the independent symptoms of GWI (mood disruption, cognitive complaints, chronic pain, chronic fatigue/fibromyalgia, irritable bowel syndrome), yet, efficacy for GWI remains low. Yoga – an ancient mind-body practice that combines mindfulness meditation with controlled breathing and physical postures – is proposed to balance the autonomic nervous system. Here, we present pilot structural magnetic resonance imaging (voxel-based morphometry in FSL; n=10) and tonic autonomic activity (8-min resting-state skin conductance [SCL]; n=12) data from a small subset of veterans in a recently completed randomized controlled trial comparing CBT to yoga for veterans with GWI (ClinicalTrials.gov NCT02378025; N=75 randomized). Pre-treatment right amygdala volume (R²=.43, p=.038) and pre-treatment minimum SCL (R²=.47, p=.014) significantly predicted treatment-related changes in self-reported autonomic dysfunction in GWI.

A-24

Common and distinct brain networks associated with risky, ambiguous and perceptual decision-making

Ranjita Poudel - Department of Psychology, Florida International University; Michael Riedel - Department of Physics, Florida International University; Taylor Salo - Department of Psychology, Florida International University; Jessica S. Flannery - Department of Psychology, Florida International University; Lauren D. Hill-Bowen- Department of Psychology, Florida International University; Angela R. Laird -Department of Physics, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University

Decision-making is a pervasive aspect of everyday life and dysregulated decision-making are implicated in various neuropsychiatric conditions. However, neuroimaging decision-making paradigms are varied and constructed to interrogate slightly different mental operations; for example, risky decision-making (RDM; outcome probabilities are defined), ambiguous decision-making (ADM; outcome probabilities unknown) and perceptual decision-making (RDM; outcome based on sensory information). The degree to which common and/or distinct brain networks contribute to these distinct decision-making processes remains unclear. We performed a literature search for neuroimaging studies reporting whole-brain results for RDM, ADM and PDM paradigms and conducted meta-analyses utilizing all studies combined and individual sub-groups of studies separately. Additionally, we performed a conjunction analysis to identify common neural substrates and contrast analyses to identify distinct neural substrates. When considering all decision-making paradigms. When considering sub-groups of studies, greater convergence of activation was observed in the insula, caudate and sup-groups of studies, and in right angular gyrus for RDM compared to ADM tasks, in the striatum and anterior cingulate cortex for RDM compared to PDM tasks. These results suggest that although RDM, ADM and PDM could be mediated by a common substrate (right insula), more complex dissociable networks are linked with different decision-making processes.

A-25

2019 SANS Poster Award Winner

Trait space as a conceptual map that guides social perception

Ryan M. Stolier - New York University; Eric Hehman - McGill University; Jonathan B. Freeman - New York University

People effortlessly infer the expanse of personality traits about others, whether from their facial appearance or group affiliations. Psychologists have long noted the similarity in impressions across domains, where dimensions of others' warmth and competence consistently emerge. We propose this occurs due to perceivers' domain-general application of conceptual beliefs about how traits correlate - this correlation structure commonly known as 'trait space'. Classic research shows people hold beliefs about how traits correlate (e.g., 'kind people are smart') which strongly shape impressions (e.g., 'this kind person must be smart'). In this way, impressions may be similarly shaped across domains (e.g., 'kind faces and groups are smart'). In one study, we apply representational similarity analysis and find the structure of trait impressions across domains (e.g., faces, person knowledge, stereotypes) shows considerable similarity to conceptual trait space, or beliefs of trait correlations. Then, in several studies, individual differences in conceptual trait space subjective trait impressions, where perceivers infer each trait (e.g., 'smartness') from a target to the extent they infer other traits believed correlated from that target (e.g., if the target appears 'kind', to the degree they believe 'kindness' and 'smartness' correlate). This suggests trait space is not an emergent property of social perception (e.g., competence and warmth dimensions), but is a cognitive conceptual map perceivers use in initial impression formations. This may serve as a cornerstone of social perception, where noisy and sparse information from the social world is transformed into rich impressions via navigation of such cognitive maps.

A-26

Differential electrocortical representation of peers' and babies' vocal outputs in the temporal lobe

Michele Morningstar - Research Institute at Nationwide Children's Hospital; The Ohio State University; Andrew D. Engell – Kenyon College; Whitney I. Mattson - Research Institute at Nationwide Children's Hospital; The Ohio State University; Eric E. Nelson - Research Institute at Nationwide Children's Hospital; The Ohio State University; Eric E. Nelson - Research Institute at Nationwide Children's Hospital; The Ohio State University; Eric E. Nelson - Research Institute at Nationwide Children's Hospital; The Ohio State University; Eric E. Nelson - Research Institute at Nationwide Children's Hospital; The Ohio State University; Vocal cues, such as the cries of a baby or the voices of peers and familiar individuals, are highly salient social stimuli for humans from a young age. The neural profiles of responses to salient vocal cues are poorly understood, and primarily derived from functional MRI and EEG studies performed on adults. To investigate how the motivational-emotional salience of different vocal stimuli are represented at a neural level, the current study presented a series of sounds to individuals undergoing intracranial EEG for intractable epilepsy.

Adolescent participants (aged 9, 15, and 18) were implanted with grid, strip, and depth electrodes primarily targeting frontal and temporal areas for surgical planning. EEG was recorded while participants listened to a series of auditory stimuli, including infant cries and vocalizations by familiar others. ERP and time-frequency analyses were performed to determine differential responses to classes of stimuli in each electrode.

At sites along the superior temporal gyrus (STG), the broadband ECoG response to recordings of spoken sentences was modulated by the age of the speaker (adolescent vs. adult). Using a steady-state auditory evoked potential paradigm, we found that some STG sites also discriminated babies' cries from other sounds that were conceptually similar (adult cries) or acoustically similar (ambulance sirens, time-scrambled babies' cries).

These preliminary findings suggest that areas of the temporal lobe can differentiate and selectively process various motivationally salient auditory cues, such as inputs of peers or babies. These results contribute to our understanding of the cortical representations of affective environmental sounds.

A-27

It was not your fault!: the aging effect on the (mis)perception of intentionality - an ERP study

Rita Pasion - Laboratory of Neuropsychophysiology, University of Porto; Carina Fernandes - Laboratory of Neuropsychophysiology, University of Porto; Ana R. Gonçalves - Laboratory of Neuropsychophysiology, University of Porto; Fernando Ferreira-Santos - Laboratory of Neuropsychophysiology, University of Porto; Fernando Barbosa - Laboratory of Neuropsychophysiology, University of Porto; João Marques-Teixeira -Laboratory of Neuropsychophysiology, University of Porto

Empirical evidence on moral decision-making across lifespan is still limited. The current study aims to unveil the neural correlates of moral transgressions judgment in older adults, by examining the time-locked responses (P2, N2, LPP) elicited by the observation of intentional and accidental harmful actions in three groups of healthy participants: young adults (age range: 18–35), middle-aged adults (age range: 40–55), and older adults (age range: 60–75). Behavioral ratings were further asked. Older adults were less accurate in rating intentionality, compared to the younger groups. The older group showed increased P2 amplitude allocated to moral transgression scenarios, which was predicted by poorer performance on neuropsychological tests. Reduced amplitudes were found on critical ERP components to social cognition (N2 and LPP) while processing intentional harmful scenarios, probably to compensate the age-related decline in executive functioning. The younger groups show a more pronounced negativity while detecting harm (N2) and an increased neural activation to encode intentions (LPP).

A-28

Age-Related Differences in Goal-Directed Emotion Regulation

Sydney M. Krueger - Columbia University; Colombo Shane; Rodrik Odile - University of Wisconsin; Sky Zhang - Columbia University; Yi Zhang - Columbia University; Jochen Weber - Columbia University; Teal Eich - University of Southern California; Yaakov Stern - Columbia University; Kevin Oschsner - Columbia University

The distinction between pro-hedonic goals (i.e. minimizing negativity and maximizing positivity) and contra-hedonic goals (i.e. maximizing negativity and minimizing positivity) with regard to the regulation of emotion is important when considering life-span changes in emotion processing, since older adulthood is marked by a shift towards a more pro-hedonic outlook in daily life. Aging is also accompanied by increasing deficits in brain structure and function, which likely impair older adults' ability to implement cognitive change-based regulation. To test whether there are age-related differences in goal-directed regulation, in the present study, while in the fMRI, we instructed 23 younger adults (18-35) and 20 older adults (60-75) to reinterpret positive images to be both more and less positive, and negative images to be both more and less negative. We constructed a multilevel linear model with trial type (look naturally, enhance

affect, and minimize affect) interacting with age as predictors for individuals' emotion ratings after the execution of each strategy, and allowing individuals to have random slopes and intercepts for each trial type. With regard to both negative and positive images, both age groups are successfully able to execute goal-directed regulation of negative (p < .0005), and positive (p < .0001) emotions, and there is an interaction, such that older adults demonstrate less emotional flexibility than younger adults independent of valence (p < .005 for both). This suggests that older adults are not as good at reappraising as younger adults, regardless of their regulatory goal.

A-29

High value reward associations selectively improve subsequent cognitive control: Adolescent emergence of value-based transfer and neurodevelopmental mechanisms Catherine Insel – Harvard University; Mia Charifson – Harvard University; Gina Falcone – Suffolk University; Leah H. Somerville – Harvard University

Adolescents exhibit unique motivational and cognitive profiles, but it remains unclear how the interactions between these systems change with age to guide successful goal directed behavior. While adolescents may be hyper-attuned to value cues in the environment, the ability to integrate learned value associations with new cognitive demands may not emerge until later adolescence when coordination between motivational and cognitive control systems refines. To test this question, participants (N=82) aged 13-20 performed two tasks during fMRI. First, participants completed a probabilistic reinforcement learning task with four incentive cue pairings: high gain (+50¢/+0¢), how gain (+25¢/+0¢), how gain (+25¢/+0¢), and low loss (-25¢/-0¢). Next, participants completed a go/no-go task where the no-go targets comprised the previously learned cues to test how prior value associations influence cognitive control performance. There was an emerging improvement of no-go accuracy with age for previously high-gain relative to low-gain cues, but not for previous loss cues. This suggests that for older participants, high-value associations may enhance later goal directed behavior by increasing attentional capture and context monitoring, processes which allow an individual to optimize action selection. Preliminary neuroimaging analyses demonstrate that previously rewarded no-go cues, relative to loss cues, urgulate recruitment of the prefrontal cortex and striatum, systems that subserve value representation, motor coordination, and cognitive control. Ongoing analyses will interrogate whether age-related differences corticostriatal recruitment to the late emerging facilitation of value-guided cognitive control.

A-30

Age-related change in the effects of causal judgments on learning from reinforcement

Alexandra O. Cohen - Department of Psychology, New York University; Kate Nussenbaum - Department of Psychology, New York University; Hayley M. Dorfman - Department of Psychology, Harvard University; Xinxu Shen - Department of Psychology, New York University; Haniyyah Sardar - Department of Psychology, New York University; Daphne Valencia - Department of Psychology, New York University; Morgan Glover - Department of Psychology, New York University; Samuel J. Gershman - Department of Psychology & Center for Brain Science, Harvard University; Catherine A. Hartley – Department of Psychology, New York University

The ability to learn from positive and negative outcomes is essential throughout the lifespan. Previous research in adults has shown that valence-dependent learning can be modulated by beliefs about the causal structure of the environment. I The present study examined whether causal judgments similarly influence learning across development. Participants completed a reinforcement learning task in which they chose between two options with fixed reward probabilities. Participants made choices in three distinct environments in which a different hidden agent occasionally intervened to generate positive, negative, or random outcomes. This manipulation has been shown to bias learning, such that participants update their value estimates of each option to a lesser extent when the outcomes of their choices can be attributed to the agent. I Preliminary data analyses including 72 individuals ages 7 to 25 (planned sample size n = 90) show that participants' beliefs about hidden agent intervention align with the manipulation of positive, negative, or random outcomes in each of the three environments. Computational modeling of the learning data revealed that while both adults and adolescents are best fit by a Bayesian reinforcement learning model that incorporates beliefs about hidden agent intervention, children are best fit by a two-learning-rate model that updates value estimates based on choice outcomes alone. Together, these preliminary results suggest that while children demonstrate explicit awareness of the causal structure of the task environment, unlike adolescents and adults, they do not implicitly use beliefs about hidden agent intervention.

A-31

Delta-beta coupling and the anxiety-related attention bias in anxious youth

Sarah Myruski – Hunter College, The City University of New York; Samantha Denefrio - The Graduate Center, The City University of New York; Hunter College, The City University of New York; Mariah DeSerisy – Fordham University; Amy Roy - Fordham University; New York University Langone Health; Tracy Dennis-Tiwary - Hunter College, The City University of New York; The Graduate Center, The City University of New York York

Deficits in emotion regulation (ER), the ability to modulate emotional responses, are related to psychological vulnerabilities throughout the lifespan. During adolescence, a period of peak anxiety onset and rapid neurodevelopment (Casey, et al., 2008), poor ER may contribute to the emergence and maintenance of anxiety disorders. One proposed aspect of ER, affect-biased attention (Todd et al., 2017), or the anxiety-related attention bias (AB), is driven by disruptions in threat detection and attentional control, processes regulated by limbic and prefrontal areas, respectively (Roy et al., 2015). An emerging index of functional coherence of limbic-cortical circuitry is resting-state delta-beta coupling (DBC; e.g. Knyazev, 2007). This study investigated DBC in relation to AB in anxious adolescents. Seventeen (10 female) anxious 13-to-15-year-olds (M = 14.10, SD = 0.60) completed an EEG baseline task. DBC was quantified as log-transformed power densities at delta (1-3 Hz) and beta (13-30 Hz) bands, across frontal (F3/Fz/F4), central (C3/Cz/C4), and parietal (P3/Pz/P4) sites. AB toward and away from threat was quantified via reaction times following threat versus neutral faces during a dot-probe task. Low DBC predicted higher parent-reported social anxiety [$\beta = .66$; t(17) = 3.20, p = .006]. Participants with a bias toward threat showed no DBC (r = .66, p = .16), while those with a bias away showed high DBC (r = .69, p = .018, z = 2.42, p = .016). Findings support the use of DBC as an index of ER in adolescents that is linked to AB and anxiety.

A-32

Age-related differences in the neural correlates of loneliness and social isolation in young and older adults

Laetitia Mwilambwe-Tshilobo - Montreal Neurological Institute, McGill University, Montreal, QC, Canada; Amber Lockrow - Montreal Neurological Institute, McGill University, Montreal, QC, Canada; Roni Setton -Montreal Neurological Institute, McGill University, Montreal, QC, Canada; Sara Fernández-Cabello - Center for Cognitive Neuroscience, University of Salzburg, Salzburg, Austria; Gary R. Turner - Department of Psychology, York University, Toronto, ON, Canada; R. Nathan Spreng - Montreal Neurological Institute, McGill University, Montreal, QC, Canada

Loneliness and social isolation can negatively impact cognitive function, and this effect is particularly salient in late adulthood. Yet little is known about the neural changes that produce such deleterious outcomes. In the current study, 118 young adults (mean age = 22y) and 91 older adults (mean age = 68y) underwent resting-state multi-echo fMRI and completed self-report measures of loneliness, social network size, and social network diversity. We used multivariate partial least squares to identify age-related differences in whole-brain functional connectivity patterns associated with individual differences in behavior. The analyses yielded two significant and distinct connectivity patterns. The first connectivity pattern showed a common pattern of covariance in older and younger adults. In both age groups, greater loneliness, was associated with dense connections between somatomotor and salience networks; whereas larger social network size and social network diversity were associated with greater connectivity between default, frontoparietal, and attention networks. The second connectivity pattern dissociated older and younger adults. In older adults, connections involving predominantly default, frontoparietal and dorsal attention networks were associated with greater loneliness, while larger and more diverse social networks were related to more connectivity between default and somatomotor networks. This brain-behavior relationship was inverted in young adults. Default-executive control network dynamics play an important role in neurocognitive aging, therefore we assessed the covariance of fluid and crystallized cognition with each connectivity may have implications on cognition in adults with poor social relationships.

A-33

Examining the influence of acetaminophen on evolved psychological mechanisms

Andrew C. Gallup - Psychology Program, SUNY Polytechnic Institute; Brianda Gagnon - Psychology Program, SUNY Polytechnic Institute; Omar Tonsi Eldakar

Acetaminophen (paracetamol, Tylenol) is the most widely used medication in the United States, with estimates suggesting that nearly one in four adults consumes a drug containing acetaminophen each week. While the physical painkilling properties of acetaminophen have long been established, recent findings show that the neuromodulation produced by this drug extends well beyond these targeted effects and can even diminish psychological pain and distress. In the last few years, laboratory studies have revealed that, by blunting neuronal activity within critical brain regions, acute doses of acetaminophen produce a generalized dampening effect on a variety of acetaminophen are sufficient to disrupt some of our more deeply rooted and domain-specific evolved psychological mechanisms. Using a double-blind placebo-controlled experimental design, we systematically examined the influence of acetaminophen on affective and cognitive processes that vary in evolutionary salience. In particular, we investigated the effects of acetaminophen on: (1) automatic attention and visual orienting towards threatening vs. non-threatening faces, (2) arousal and affective responding to ancestral vs. modern fear-related stimuli, and (3) jealousy in response to sexual and romantic infidelity

among men and women. Data collection is ongoing, but the results from this research will help characterize the magnitude of the psychological consequences of this drug and have direct applications for the millions of people that consume it on a regular basis.

A-34

Medial Prefrontal Cortex Activation for Food Tracks Individual Differences in Food-reward Sensitivity

Timothy D. Kelley - Texas Tech University; Jason Van Allen - Texas Tech University; Tyler H. Davis - Texas Tech University

Individual differences in food reward motivation are associated with important health related outcomes. Within participants, valuation mechanisms in the medial prefrontal cortex (mPFC) are known to track differences in subjective value between items. Between participants, previous research has found that individual differences in subjective value of food items relative to non-food items are associated with differences in food consumption. However, there have been fewer studies on how mPFC activation relates to individual differences in subjective value of food items relative to non-food items in the mPFC are associated with participants. Between participants in the mPFC are associated with and the participants in the obtain food. The current study investigated whether valuation mechanisms in the mPFC are associated with participants of food items and non-food items while in the MRI scanner. They then completed a relative reinforcing value (RRV) task outside of the scanner that involved playing a virtual slot machine for food or non-food rewards. RRV tasks have been used extensively in pediatric obesity work and can predict individual differences in food-related health behaviors. We found that mPFC activation to food cues was positively associated with the amount that participants later played the RRV task to obtain food rewards. The current results add to the growing body of research on how mPFC activation tracks within and between participant differences in valuation and how these might relate to important health behaviors. For example, relative to survey or neuroeconomic measures previously used to measure individual differences in food.

A-35

Neurobiological reactivity to uncertain and certain threat

Hyung C. Kim - Department of Psychology, University of Maryland; Juyoen Hur - Department of Psychology, University of Maryland; Jason F. Smith - Department of Psychology, University of Maryland; Kathryn A. DeYoung - Department of Psychology, University of Maryland; Jinyi Kuang - Penn Social Norm Group, University of Pennsylvania; Allegra A. Anderson - Department of Psychological Sciences, Vanderbilt University; Rachael M. Tillman - Department of Psychology, University of Maryland; Alexander J. Shackman - Department of Psychology, Maryland Neuroimaging Center, and the Neuroscience & Cognitive Science Program, University of Maryland

When extreme, anxiety—a heightened state of arousal, vigilance, and apprehension in response to diffuse or uncertain danger—can be debilitating. Anxiety disorders are common and existing treatments are inconsistently effective, underscoring the urgency of developing a deeper understanding of the underlying neurobiology. Although considerable progress has been made using animal models, the translational significance of these discoveries remains unclear. Work in humans has been hampered by small samples and neuroimaging paradigms that do not permit crisp dissociations. Here, we optimized a psychophysiologically validated 'count-down' task for use with fMRI. This paradigm enabled us to rigorously compare neural activity associated with the anticipation of uncertain and certain threat (noxious visual, auditory, and electrical stimulation), while minimizing perceptual and other differences, in 99 young adults. Multiband fMRI and other 'best-practices' maximized spatial resolution. Results revealed elevated fear and anxiety during threat anticipation (ps<.001), confirming task validity. Neuroimaging results uncovered several cortical regions showing elevated activity during the extended amygdala, hippocampus, putamen, and caudate (qs<.05, corrected). In contrast, a number of subcortical regions evinced greater activity during the stage for refining animal models and ultimately developing more effective biological interventions for pathological anxiety.

2019 SANS Poster Award Winner

Habitual use of suppression but not reappraisal is associated with distributed intrinsic connectivity in the brain

Daisy A. Burr – Duke University; Tracy d'Ardeloff – Duke University; Maxwell Elliott – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Maria Sison – Duke University; Bartholomew Brigidi – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Bartholomew Brigidi – Duke University; Annchen Knodt – Duke University; Bartholomew Brigidi – Du

Previous emotion regulation research has attempted to develop a neural signature of emotion regulation. For example, studies have shown that decreased activity in the amygdala and increased activity in the ventromedial prefrontal cortex are associated with suppression and reappraisal—two common types of regulating. Although these findings help inform which brain areas may be key to certain regulation techniques, they fail to distinguish between regulation techniques, they fail to distinguish between regulation connectivity are predictive of behavioral phenotypes. We created a correlation matrix for each participant (N = 1316, Duke Neurogenetics Study) of general functional connectivity (GFC) based on distributed intrinsic connectivity during resting-state and task scans. With connectome-based predictive modeling, we used these matrices to predict variability in suppression and reappraisal phenotypes. GFC patterns predicted variability in habitual use of suppression, R = .135, p < .001. This robust and cross-validated approach illustrates that whole-brain functional connectivity can be used as a neuromarker of habitual use of suppression. Conversely, the data do not suggest a comparable neuromarker of habitual use of suppression phenotypes. Future work should examine how using GFC as a neuromarker for suppression can allow insights into vulnerability to psychopathologies characterized by habitual use of suppression, such as depression.

A-37

A-36

Learning to feel safe: A translational study of the influence of safety learning on anxiety-related overgeneralized fear

Hyein Cho - The Graduate Center, The City University of New York; Boyang Fan - The Graduate Center, The City University of New York; Itzik Nahmoud – Hunter College; Rohini Bagrodia – Hunter College; Ekaterina Likhtik – Hunter College; Tracy A. Dennis-Tiwary – Hunter College

Overgeneralized fear (OF), or indiscriminate fear responses to threat and non-threat, is a core feature of anxiety. This tendency to respond to non-threat as if it were threatening is an etiological mechanism in anxiety, and is reflected in reduced discriminative learning about threat-safety signals. While research has focused on maladaptive fear learning in the emergence of OF, recent evidence suggests that maladaptive safety learning may play a unique role. Yet, the independent influence of these types of learning on OF in anxiety is still unclear. For example, early suggestive evidence with rodents shows that safety learning reduces behavioral indices of anxiety.

Using methods that are directly translated from rodent research, the goal of our study was to test if safety, versus fear learning, will result in enhanced discriminative learning about threat-safety signals, indicating less OF, and reduced subjective/observed anxiety. Findings from our rodent study revealed that safety (M = 18.40, SE = 4.70) versus fear learning (M = 6.40, SE = 3.10) showed enhanced ability to discriminate threat from relative safety, t(24) = .026, p = .048. Further, safety learning yielded increased non-anxiety-related behaviors such as exploration in open field (M = 0.91, SD = 0.22) compared to fear learning (M = 0.33, SD = 0.11), t(24) = .002, p = .034. We will present findings from an ongoing investigation in humans that integrates neurocognitive, physiological measures of fear discrimination to clarify the unique roles of fear and safety learning in anxiety-related OF. Findings will inform development of innovative treatment approaches.

A-38

Individual differences in dopamine support self-control of everyday desires

Jaime J. Castrellon – Duke University; Jacob S. Young – University of California, San Francisco; Linh C. Dang – Vanderbilt University; Christopher T. Smith – Vanderbilt University; Ronald L. Cowan – Vanderbilt University; David H. Zald – Vanderbilt University; Gregory R. Samanez-Larkin – Duke University

Although laboratory experiments have shown that individual differences in dopamine (DA) function impacts one's ability to inhibit impulsive actions, no study to date has shown whether such associations translate to inhibition in everyday life. Using ecological monetary assessment (EMA), we repeatedly sampled healthy adults' desires over the course of ten days. Participants used smartphone-based surveys to indicate desires they experienced in their daily lives along with the strength of those desires and degree of conflict with personal goals. These participants (N = 74) also underwent a positron emission tomography (PET) scan with the radiotracer [18F]fallypride, which indexes DA D2-like receptor availability. Using mixed-effects logistic regression, we identified novel associations between EMA and PET measures. Within EMA measures, desire strength and degree of conflict with personal goals strongly predicted attempts to resist desires was moderated by DA D2-like receptors in the ventral striatum (OR = 1.25, CI = [1.00, 1.41], p < .001) and midbrain (OR = 1.22, CI = [1.08, 1.38], p = .001). The effect of conflict on predicted attempts to resist desires was stronger in individuals with higher DA D2-like receptor availability. Receptor availability did not moderate the role of desire strength on attempts to resist desires. The results are the first to demonstrate that dopamine impacts self-control in everyday life and suggest that individual differences in this system attenuate the impact of conflict on attempts to resist

A-39

Neural responses during aggressivity judgements of interracial police-civilian interactions

Tzipporah P. Dang - University of Delaware; Bradley D. Mattan - University of Delaware; Denise M. Barth - University of Delaware; Jasmin Cloutier - University of Delaware; Jennifer T. Kubota - University of Delaware

Despite video evidence from police body cam and civilian recordings, juries and members of the public frequently draw differing conclusions regarding legitimacy when police use force on a civilian. This fMRI study (n=68 White participants) examined neural responses to interracial police-civilian interactions when watching 38 videos of White police officers and Black and White civilians. In the current study, we examined how VMPFC activity was modulated by ratings of police officer and civilian aggression. Among other processes, the VMPFC has been implicated in the generation of affective meaning and has been shown to be positively related to favorable person evaluation. As ratings of police officer aggression toward White civilians increased, we observed a significant reduction in VMPFC response, t(67)=-2.772, p=.007. However, VMPFC activity was not sensitive to the perceived aggression of police officers toward Black civilians or to the perceived level of civilian aggression, irrespective of their race. Taken together, these results suggest that greater perceived aggressivity towards ingroup members, but not outgroup members, leads to less positive evaluations of police officers.

A-40

When join a group: anticipated and experienced regret in individual and collective decisions

Marwa El Zein - University College London; Bahador Bahrami - Ludwig Maximilian University

Regret is a powerful negative emotion that individuals anticipate and try to avoid experiencing by choosing options minimizing future regret. Here we were interested in how group decisions interact with such behaviour and tested whether: 1) Individuals anticipate less regret during a group decision 2) Experienced regret as individuals or groups changes the propensity to voluntarily engage in group decisions. 3) These predictions are specific to regret or apply to other negative emotions such as loss. In an online behavioural experiment, 125 participants had to choose between two gambles and were shown the outcome of both the chosen and unchosen gambles to induce regret and loss both changed individually or in group following a majority vote rule. Using computational modelling to assess what drives participants to join a group, we show that experienced regret and loss both changed individuals' propensity to join groups on a trial-by-trial basis: the higher the regret or loss experienced alone, the more participants switched to playing in group. Only when disagreeing with the group, participants switched back to playing alone after high experienced regret or loss as a group. When participants agreed with their group, there was no effect of experienced loss and regret, suggesting that confirmation from the group disrupts strategies based on experiencing negative emotions. This could be explained by the fact that making decisions with others, while agreeing with them, allows to share responsibility for negative decision outcomes, thereby protecting against negative emotions.

A-41

About Face: Affective Response Inhibition of Own vs. Others' Facial Expressions

Evan T. Burdette – University of Miami; Jaclyn E. Foster – University of Miami; Emilio A. Hospedales-Mohammed – University of Miami; Siriveena Nandam – University of Miami; Jennifer C. Britton – University of Miami

Maladaptive emotion regulation strategies such as repetitive negative thinking (RNT) and dampening of positive affect (DoPA) may develop as manifestations of dysfunctional affective response inhibition (ARI; i.e., cognitive control in the emotional domain; Joormann & Vanderlind, 2014). However, no work has been done to examine ARI within self-referential facial expression paradigms.

Participants aged 9-21 (N = 16, Mage = 18.94, 63% female) completed an affective go/no-go paradigm where targets (75% Go trials) and distractors are either their own happy and sad facial expressions, or those of a same-sex individual from a standardized set. We administered the Perseverative Thinking Questionnaire to assess RNT, and the Responses to Positive Affect Scale to assess DoPA.

We conducted a repeated measures ANOVA to compare mean differences between No-Go errors for participants' own facial expressions and others' facial expressions. The difference between self vs. other No-Go errors approached significance, F(1,15) = 3.76, p = .07. On average, participants made more errors when distractor stimuli were their own affective facial expressions (M = 16.69 ± 7.71) compared to others' facial expressions (M = 14.28 ± 7.36). No other differences were observed (ps = .82). Although preliminary, these findings provide support for a novel ARI paradigm comparing response inhibition of participants' own happy and sad facial expressions to inhibition of others' affective faces. Interactions between stimulus type, valence, and RNT and DoPA are expected after recruiting a larger sample size. Understanding ARI within the context of one's own emotions will have important implications for elucidating emotion dysregulation.

A-42

Functional connectivity in mirroring and emotional empathy networks is associated with social cognitive performance across individuals with schizophrenia spectrum disorders and healthy controls

Lindsay D. Oliver - Centre for Addiction and Mental Health; Colin Hawco - Centre for Addiction and Mental Health; University of Toronto; Anil K. Malhotra - Zucker Hillside Hospital; Robert W. Buchanan - Maryland Psychiatric Research Center; Aristotle N. Voineskos - Centre for Addiction and Mental Health; University of Toronto

Background: Schizophrenia spectrum disorders (SSDs) often feature social cognitive deficits, linked to functional outcome, though their neural basis remains unclear. Our objective was to determine how functional connectivity of mentalizing, mirroring, and emotional empathy networks relates to social cognitive performance and functional outcome across individuals with SSDs and healthy controls. We hypothesized that increased connectivity in social cognitive networks during a naturalistic interpersonal understanding task would be associated with better social cognitive performance.

Methods: Across three sites, 178 people with SSDs and 118 healthy controls completed the Empathic Accuracy task during functional magnetic resonance imaging. Participants also completed measures of social cognition and functional outcome outside the scanner. Background connectivity analysis was used during the Empathic Accuracy task to extract functional connectivity in social cognitive networks.

Results: The Empathic Accuracy task engaged regions of the mentalizing, mirroring, and emotional empathy networks. Background connectivity analysis revealed greater connectivity in the mirroring network and reduced connectivity in the emotional empathy network in participants with lower social cognitive performance in comparison to higher social cognitive performers. Mirroring network and emotional empathy network connectivity also showed opposing associations with social cognitive performance outside the scanner across individuals with SSDs and healthy controls.

Conclusions: Our results suggest that increased connectivity in the emotional empathy network and reduced connectivity within the mirroring network during an interpersonal understanding task are associated with better social cognitive performance across people with SSDs and healthy individuals. This may support a network efficiency model for better social cognitive performers.

A-43

Sleep during consolidation facilitates memory performance following stress at encoding

Kelly A. Bennion - California Polytechnic State University, San Luis Obispo; Sandry M. Garcia - Boston College; Elizabeth A. Kensinger - Boston College

Although sleep and stress have independently been shown to enhance emotional memory, their interactive effect is less defined. Our prior work showed that higher levels of resting cortisol facilitated emotional memory only if sleep occurred during the consolidation delay (Bennion et al., Cerebral Cortex, 2015), but it is unknown whether these effects hold under stress. Here, participants (N=62) underwent a stress induction (cold-pressor test) prior to encoding scenes composed of a negative on neutral objects on a neutral background either in the morning (preceding 12 hours awake; Wake group) or evening (preceding 12 hours including a night of sleep; Sleep group). At retrieval, participants viewed objects and backgrounds separately, distinguishing new objects and backgrounds from those studied. Within the stress responders (N=37), the Wake group showed a negative correlation between the magnitude of their stress response and memory for negative objects (R=-.55, p=.016), while the Sleep group did not. Additionally, there was a significant interaction (p=.001) between group and stress response on the emotional memory for backgrounds paired with negative vs. neutral objects): The Wake group showed a negative correlation (R=-.64, p=.005) between the magnitude of their stress response and memory trade-off score, while the Sleep group did not. This suggests that sleep during consolidation may have protected participants from the detrimental effects of stress on memory and facilitated the adaptive preservation of memory for emotional aspects of the scenes.

A-44

Default Mode Network Connectivity in TBI Predicts Emotion Perception and Social Integration
Katie Lancaster - Kessler Foundation; Umesh M. Venkatesan - Translational Research Center for Traumatic Brain Injury and Stress Disorders (TRACTS), VA Boston Healthcare System; Jean Lengenfelder - Kessler Foundation; Helen M. Genova - Kessler Foundation

Following moderate-severe traumatic brain injury (TBI), many individuals have difficulty perceiving others' emotions, which can negatively affect social functioning. As proficiency in other aspects of social cognition, such as mentalizing, have been linked to resting-state functional connectivity (RSFC) in the default mode network (DMN), we sought to determine whether DMN connectivity strength explains individual differences in emotion perception. To this end, we examined facial affect recognition (FAR) ability of 21 individuals with TBI and 27 healthy controls in relation to RSFC between DMN regions. Across all participants, decreased FAR was related to increased connectivity between dorsomedial prefrontal cortex (dmPFC) and temporal regions (temporal pole and parahippocampal gyrus). Furthermore, within the TBI group, connectivity between dmPFC and parahippocampal gyrus predicted level of social integration on the Community Integration Questionnaire, an important index of post-injury social functioning in TBI. This finding was not explained by FAR scores, indicating that DMN connectivity predicts social functioning independent of emotion perception. These results advance our understanding of the neural underpinnings of social cognitive processes in both healthy and injured brains, and suggest that RSFC may be an important marker of social outcomes in individuals with TBI.

A-45

Gray Matter Density Patterns in the Prefrontal Cortex Predict Irritability Scores

M. Catalina Camacho - Center for Neuroscience, University of Pittsburgh; Helmet T. Karim - Department of Psychiatry, University of Pittsburgh; Laura Quinones-Camacho - Department of Psychiatry, University of Pittsburgh; Lauren S. Wakschlag - Department of Medical Social Sciences at the Feinberg School of Medicine, Institute for Innovations in Developmental Sciences, Northwestern University; Susan B. Perlman - Center for Neuroscience and Department of Psychiatry, University of Pittsburgh

Background: Irritability is a temperamental domain that spans the normative-to-severe spectrum, with the latter end often reported as a symptom of nearly every psychiatric disorder. Recent work has found alterations in prefrontal, parietal, striatal and limbic function in children with higher irritability. Little is understood, however, about how structural brain development during childhood is related to the full spectrum of irritability.

Methods: T1-weighted structural MRI data was collected from 185 children ages 4-12 (age=7.98±1.94 years, 53% male) across 4 studies (3 sequences). Irritability was assessed using the Multidimensional Assessment of Preschool Disruptive Behavior. Regional gray matter density (GMD) was derived from the structural MRI using a custom segmentation pipeline developed for preschool data. We used support vector regression to assess the relationship between irritability and whole brain, voxel-wise gray matter density. Model accuracy was derived from regressing the predicted and actual irritability scores and cross-validating across scanner sequences. The voxel-wise multivariate maps that informed the significant model were then examined.

Results: Preliminary analyses (N=117, age=8.11±1.88 years, 58% male) suggest that higher irritability scores (Temper Loss scale; sample score range 0-81) were associated with distinct patterns of decreased GMD in the bilateral dorsolateral prefrontal cortex (PFC), the orbitofrontal cortex, and the striatum.

Conclusions: These results suggest that childhood irritability may be associated with distinct development of the PFC-mediodorsal thalamus-striatum loops, which could be a potential target for cognitive or behavioral intervention. A-46

Willingness to pay for social stimuli varies with social anxiety traits

Johannes Schultz - Center for Economics and Neuroscience, University of Bonn, Germany; Tom Willems - Master of Science Program in Neurosciences, University of Bonn, Germany; Bernd Weber - Center for Economics and Neuroscience, University of Bonn, Germany; René Hurlemann - Division of Medical Psychology, University of Bonn, Germany

Social anxiety is associated with avoidance of social situations. This avoidance may be related to differences in the value of social stimuli between socially anxious compared to sociable people. To quantify this value experimentally, we measured the willingness to pay for social stimuli using an econometric method (Becker, Degroot & Marschak, 1964). In our task, participants were presented with the picture of a face. They then placed a bid regarding how much (0-1 Euro) they were willing to pay to see this face perform an admirative expression (positive outcome) or to avoid seeing this face perform a condescending expression (negative outcome). A random-number generator then created the reference price that the participant's bid needed to surpass in order to obtain the positive outcome or to avoid the negative outcome. Six different faces were presented in random order to 48 healthy participants (undergraduate students from various departments), in separate runs for positive and negative outcomes. One randomly selected trial was played out at the end of each run, with the expression presented as a video of 1s duration. The results revealed no difference between bids to avoid negative outcomes or obtain positive outcomes (F(1,46)=0.41, p=0.53), but a two-fold increase in bids (from 0.2 to 0.39 Euro) for more compared to less socially anxious participants (F(1,46)=0.98, p=0.004, interactions: F(1,46)=0.09, p=0.77). These results suggest that social anxiety traits influence the way in which social stimuli are valued, a difference perhaps related to differences in the desire to control the outcome of social

A-47

Neural Partisanship In the Middle East: An fNIRS Study

Macrina A. Cooper-White - UCLA; Grace S. R. Gillespie - UCLA; Shannon M. Burns - UCLA; Ian A. McCulloh - Johns Hopkins University; Daniel A. Ames - UCLA; Munqith M. Dagher - IIACSS; Matthew D. Lieberman - UCLA

How do our beliefs shape the way our brains process messages out in the real world? The current study, which was conducted in the Middle East, used functional near infrared spectroscopy (fNIRS) to examine the neural responses of partisans to naturalistic stimuli. Studies have shown that messages that are strong, emotional, and/or persuasive command more similar neural processing in areas of the brain associated with social processing, such as medial prefrontal cortex (mPFC) and the superior temporal gyri (STG) (Schmälzle et al., 2015; Nummenmaa, 2014; Imhof et al., 2017). In addition, previous research has found that friends show more similar neural responses compared to people who are farther apart in a social network (Parkinson, Kleinbaum, & Wheatley, 2018). Thus, we hypothesized that partisans would be more likely to process speeches more similarly to those who shared similar beliefs. To test this hypothesis, we recruited pro-choice and pro-life participants in Jordan (N=72) to watch videos of a pro-life speech and a pro-choice speech. We found that participants showed greater ISC with their partisan in-group compared to the partisan out-group throughout medial and dorsolateral prefrontal cortex; this effect occurred regardless of whether participants were pro-life or pro-choice. This research demonstrates that (1) partisanship shapes how our brains process naturalistic stimuli and (2) fNIRS is a useful tool for studying shared neural processing in "non-WEIRD" samples.

A-48

Exposure to violence disrupts adaptive moral impression formation and trust behavior

Jenifer Siegel – University of Oxford; Suzanne Estrada – Yale University; Arielle Baskin-Sommers – Yale University; Molly Crockett – Yale University

Exposure to community violence is a reliable predictor of negative life outcomes (e.g., problems with health, mental health, chronic aggression, incarceration). Theoretical accounts suggest that disruptions in learning underlie the link between exposure to violence and maladaptive social behaviors (e.g., aggression). However, empirical evidence specifying these processes is sparse. Here, we bridge this gap by combining a harmfulness learning task with computational modelling in a population of adult offenders in a high-security prison. Participants predicted the choices of two agents who repeatedly decided whether to inflict painful electric shocks on another individual in exchange for money. The agents differed substantially in their harmfulness, in that the "good" agent required more compensation to harm than the "bad" agent. Participants periodically rated their subjective impressions of the agent's moral character, as well as their certainty of their impressions. After completing the task, we assessed how participants interacted with each agent in a one-shot trust game. Results indicated that the computational mechanisms of harmfulness learning were largely intact in individuals with increasing exposure to violence. However, exposure disrupted the ability to translate those predictions into moral impressions that dissociated between agents. Consequently, offenders with higher exposure to violence havior towards agents who significantly differed in their harmfulness, which in turn predicted antisocial behavior in prison. Our findings reveal a novel cognitive process that may

A-49

Age-related improvements in the assessment of environmental controllability

Hillary A. Raab – New York University; Romain Ligneul - Champalimaud Research, Lisbon, Portugal; Careen Foord – New York University; Katerina E. Frangulova – Vanderbilt University; Sophia Mascialino – New York University: Catherine A. Hartlev – New York University

The accurate detection of how much influence, or control, one has over their environment enables adaptive behavior. In controllable environments, actions can be deliberately selected to yield a desirable outcome. The degree to which the environment is controllable must be monitored in order to exploit rewards when outcomes are contingent upon one's actions and to minimize cognitive resources in uncontrollable environments in which actions are inconsequential. The ability to accurately infer control, or the lack thereof, may show different developmental trajectories due to the differing cognitive demands required by these environments. Here, we examined age-related changes in the ability to

assess control over the environment. Children, adolescents, and adults (aged: 8-25, n=71) completed a child-friendly adaptation of a task in which the next state is determined by (controllable condition) or independent of (uncontrollable condition) one's actions. The conditions alternated covertly, requiring participants to adjust their estimates of control to accurately predict the subsequent state. Across ages, accuracy was higher for the controllable than uncontrollable condition, suggesting an enhanced ability to detect action-outcome contingencies. We also found that the ability to detect control, or the lack thereof, improved from childhood to adulthood. Children showed relatively small improvements in performance for the controllable condition. This performance difference between conditions grew larger with age (age x condition interaction), and was greatest in adolescents (age-squared x condition interaction). During adolescence, enhanced sensitivity to controllable contexts may foster exploration in environments where actions can be leveraged to bring about reward. **A-50**

Socially transmitted placebo effects

Pin-Hao Andy Chen – Dartmouth College; Jin Hyun Cheong – Dartmouth College; Eshin Jolly – Dartmouth College; Hirsh Elhence – Dartmouth College; Tor D. Wager – University of Colorado Boulder; Luke J. Chang – Dartmouth College

Medical treatments typically occur in the context of a social interaction between healthcare providers and patients. Although modern medical treatments tend to ignore these interactions, decades of research on placebos have demonstrated that patients' expectations can dramatically impact treatment outcomes. Less is known, however, about the influence of providers' expectations on patients' experiences. Here, we systematically manipulated providers' expectations in a simulated clinical interaction involving administration of thermal pain and found that patients' subjective experiences of pain were directly modulated by providers' expectations of treatment success (Study 1; N=48; 24 dyads). These effects did not appear to be simply a reporting bias, as we also observed changes in objective measurements of pain such as skin conductance responses and facial expression behaviors. The belief manipulation also impacted patients' providers' empectations are providers' as they replicated in an independent sample (Study 2; N=86; 43 dyads). Together, these results provide evidence of a socially transmitted placebo effect, highlighting the importance of how healthcare providers' behavior and cognitive mindsets can impact clinical interactions.

A-51 (Unable to present)

Network-based evidence of a relationship between racial biases in spontaneous visual perspective taking and mentalizing

Bradley D. Mattan – University of Delaware; Grace Handley – University of Delaware; Jennifer T. Kubota – University of Delaware; Jasmin Cloutier – University of Delaware

Debates continue regarding whether visual perspective taking is more meaningfully related to mentalizing or social salience. In this fMRI study, we tested these possibilities in the intergroup context. While being scanned, 49 White participants evaluated the mental state (i.e., mentalizing) and symmetry (i.e., non-mentalizing) of White and Black faces. In a separate post-scan visual perspective-taking task, participants completed a perspective-taking task involving two third-person avatars of different races: Black and White. Critically, while adopting the perspective of one avatar, the other served as a distractor. Using this paradigm, we assessed individual differences in spontaneous distraction by White (vs. Black) avatars (i.e., neglect of the Black perspective). Using a behavioral partial least squares analysis, we assessed whether racial bias in spontaneous perspectival neglect would predict racially biased patterns of brain co-activation during mentalizing versus non-mentalizing tasks completed in the scanner. Greater spontaneous neglect of Black (vs. White) visual perspectives was associated with an increase in co-activation in a network of cortical regions implicated in face processing (fusiform, STS, temporal poles), attention (lateral fronto-parietal cortex, precuneus), and social salience (e.g., amygdala, insula) only when participants assessed the symmetry of Black faces (i.e., non-mentalizing) but not their mental states (i.e., mentalizing): latent variable cross-block covariance, 60.0%, p=.045. Taken together, these results suggest that inattention to the visual perspectives of Black individuals may have less to do with enhanced attention and effort during low-level processing of Black faces.

A-52

Patterns of day-to-day affect differentially mediate the effect of repetitive negative thinking on depression and anxiety symptoms

Nikki A. Puccetti - University of Miami; Caitlin A. Brown - University of Miami; Kiara R. Timpano - University of Miami; Aaron S. Heller - University of Miami

Repetitive negative thinking (RNT) is a transdiagnostic cognitive factor that is associated with vulnerability for both anxiety and depression. RNT produces increased negative affect in laboratory settings; however, it is unclear how RNT manifests in day-to-day patterns of affect, and whether such patterns of adjust and equives of momentary affect every other day. From these surveys, we calculated within-subject patterns of average daily affect and affective instability (large, unexpected shifts in affect between observations) for positive and negative affect. We hypothesized that initial RNT scores would predict depression and anxiety symptoms at the end of the semester, and that metrics of daily negative affect would mediate these associations. As expected, significant direct effects of RNT on anxiety (p < .001) and depression (p < .001) symptoms emerged. Mediation models yielded evidence of specificity by disorder symptoms. Results revealed a significant indirect effect of RNT on anxiety symptoms via increased average negative affect (p = .021), but not negative affect instability. In contrast, we found a significant indirect effect of RNT on depression via increased average negative affect (p = .025). These findings suggest that RNT is associated with specific patterns of day-to-day affect, which appear to differentially influence symptomology.

A-53

Social touch in the rhesus monkey: functional MRI brain responses to observation of grooming actions

Saloni Sharma - Lab for Neuro- & Psychophysiology, Department of Neurosciences, KU Leuven, Belgium; Koen Nelissen - Lab for Neuro- & Psychophysiology, Department of Neurosciences, KU Leuven, Belgium; Koen Nelissen - Lab for Neuro- & Psychophysiology, Department of Neurosciences, KU Leuven, Belgium; Several studies in humans suggest that besides parieto-frontal motor regions, also somatosensory and insular cortex yield vicarious responses when witnessing others' actions, sensations or emotions (Gazzola and Keysers, 2009). Recently it was demonstrated that mere observation of non-social touch elicits responses also in monkey somatosensory SII and posterior insula regions (Sharma et al., 2018), which also respond during non-social (Ishida et al., 2013, Sharma et al., 2018) and social touch (Grandi and Gerbella, 2016) sensation. Here we investigated to what extent observation of social touch, related to grooming actions, might elicit responses in these monkey somato-motor fields. Rhesus monkeys (Macaca mulatta, male, 5-7 kg) were scanned (Siemens 3T) while they fixated on videos depicting different examples of grooming actions. Videos were made by filming monkeys engaged in social interactions in their cages and by zooming in on the touch component related to grooming the fur with the hands, excluding other social features like faces. Phase-scrambled videos were used as controls. Observing grooming actions yielded significant responses in somatosensory SII and posterior insular fields that also respond to non-social to on-social touch observation of SNR studies (Nelissen et al., 2018). Interestingly, grooming observation in addition elicited responses in a more anterior ventral insular region, corresponding to portion of the affiliative insular field where microstimulation elicits affiliative and emotional responses (Caruana et al., 2011; Jezzini et al., 2012).

A-54

Support is not in the eye of the supporter - the impact of social support interactions on already acquired threat

Lisa Espinosa - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Emily Holmes - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas Olsson - Department of Clinical Neuroscience, Division of Psychology, Karolinska Institutet, Stockholm, Sweden; Andreas N

Research on the regulation of learned threat and fear responses has shown an increased interest in the mechanisms underlying social forms of regulation. Reports have indeed demonstrated the compelling effect of social buffering on acquisition of learned threat. However, it is still unclear how social interactions could affect the expression of already acquired threat in humans.

The aim of this study was to investigate how a social interaction (with varying levels of social support) affected the expression of emotional memory measured by fear extinction, fear reinstatement and frequency of intrusive memories. Participants underwent Pavlovian fear conditioning pairing neutral images (conditioned stimuli, CS), with an electric stimulation (unconditioned stimulus). Next, participants were randomly assigned to receiving either High, Low or No social support. Skin conductance responses (SCR) were collected to index threat responses during acquisition, extinction and reinstatement (7 days later). During the 7 days following conditioning, participants were asked to report the frequency of intrusive memories of the CS.

Analyses of the SCR revealed successful conditioning during acquisition and successful extinction. Threat was not successfully reinstated. Our results indicated that Pavlovian conditioning elicited intrusive memories of the CS. Furthermore, participants reporting low perceived social support reported significantly higher frequency of intrusive memories during the first day after conditioning.

Our results suggest that varying levels of social support might not differently impact already acquired threat, but call attention to the importance of perception of support in the development of intrusive memories after an aversive experience and suggest interesting clinical implications.

A-55

The Triarchic Model of Psychopathy: ERP evidence for Trait Fearlessness and Externalizing Vulnerability

Tiago O. Paiva - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto; Pedro R. Almeida - School of Criminology and Interdisciplinary Research Center on Crime, Justice and Security, Faculty of Law of the University of Porto; Rui C. Coelho - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto; Rita Pasion - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto; Fernando Barbosa - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto; Fernando Ferreira-Santos - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto; António Bastos-Leite -Faculty of Medicine of the University of Porto; João Marques-Teixeira - Laboratory of Neuropsychophysiology, Faculty of Psychology and Educational Sciences of the University of Porto;

Introduction: dimensional approaches to the study of psychopathic traits point to two distinct etiological vulnerability factors for the expression of psychopathic related behaviors: trait fearlessness and externalizing vulnerability (Patrick, Fowles, and Krueger, 2009). The present study aims to study the behavioral and neurophysiological correlates (ERPs) of aversive associative learning and inhibitory control in a community sample varying in the expression of psychopathic traits.

Hypothesis: using the Triarchic Model of Psychopathy, we hypothesize that boldness is associated with lower LPP and CNV amplitudes to the cue signaling the occurrence of a noxious stimulus and that disinhibition is associated with reduced ERN amplitudes after error commission in a behavioral inhibition task.

Method: forty-seven healthy participants (24 female) were recruited and completed an aversive conditioning task (adapted from Bacigalupo and Luck, 2018) and a Go No-Go task (adapted from Maruo, Sommer and Masaki, 2017) while recording high density EEG.

Results: in the aversive conditioning task, and besides the expected experimental effects (higher LPP and CNV amplitudes for CS+ when compared with CS-), linear regression models showed that boldness predicted lower amplitudes for both LPP and CNV amplitudes to the CS+. In the Go No-Go task, disinhibition was associated with lower ERN amplitudes, suggesting lower error related reactivity.

Discussion: our results support the dual process models of psychopathy and shed light to the understanding of the mechanisms underlying the low-fear dimension typically associated with psychopathy and with amygdala mediated associative learning processes.

A-56

Neural Activation underlying Executive Function in Young Children with Prenatal Marijuana Exposure and Unexposed Controls

Xiaoxue Fu - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Whitney I. Matton - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Michele Morningstar - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Holly Blei - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Alexis Dkeama - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Sarah Keim - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Bark Klebanoff - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital; Eric E. Nelson - Ce

Previous studies have indicated that prenatal marijuana exposure (PME) is associated with deficits in executive function (EF) in young adults. Early childhood is a developmental period marked by rapid growth of brain networks underlying EF, including inhibitory control and working memory. However, the impact of PME on EF and the neural systems that underlie EF during early childhood is not known.

This ongoing study is slated to perform neuroimaging on 50, 6-7-year-old participants (25 PME and 25 matched controls) as they perform a Go/Nogo and a Face Memory (FM) task while undergoing fMRI, and a sustained attention task (Track-It) outside the scanner. Data from the first 20 participants indicates that correct inhibition of Nogo trials occurred on approximately 66% (SD=17.2) of trials and was associated with activation in regions associated with inhibitory control (anterior cingulate, insula, and prefrontal regions). The FM task generated activity in regions associated with face processing and working memory (occipito-temporal, limbic, and prefrontal regions), and participants varied substantially in face recognition accuracy (mean accuracy=60%, SD=21.4) Lastly, performance in the Track-It task also showed considerable individual differences in sustained attention (mean accuracy=62%, SD=31.4). Preliminary comparisons suggest group differences in both patterns of brain activation and behavioral regions profiles between the PME and unexposed controls. Results of this study will provide a clearer picture of how prenatal exposure to marijuana alters the developmental trajectory of brain and behavioral maturation in early childhood.

A-57

I see your fears: The role of empathy and mental imagery in contagious worries

Erik C. Nook - Harvard University; Emily A. Holmes - Karolinska Institutet; Leah H. Somerville - Harvard University; Andreas Olsson - Karolinska Institutet

Although studies show that mental disorders spread within social networks, we lack insight into the mechanisms underlying this contagion. Based on basic research showing that i) empathy facilitates vicarious fear learning and ii) mental imagery amplifies emotions, we hypothesized that these processes would mediate the interpersonal spread of worries—repetitive anxious thoughts about potential threats. In Study 1, online participants were told they would be exposed to extremely distressing pictures that could cause intrusive mental images ("flashbacks"). Participants rated how anxious they felt and wrote their thoughts about the upcoming study before seeing ratings and text ostensibly provided by another participant. Participants were then assigned to either the worried partner condition (in which the other participant was extremely worried about the long-term impact of the study) or the neutral partner condition (in which the other participant was extremely worried anxiety-related words when writing about the study) or the neutral partner condition (in which the other participant was extremely worried anxiety-related words when writing about the study) or the neutral partner condition (in which the other participant was extremely worried anxiety-related words when writing about the study significantly increased following exposure to the worried partner but not the neutral partner. Thus Study 1 established a paradigm that induced contagious worries. Study 2 used this paradigm to test mediating mechanisms. Results showed that worry contagion was stronger in participants who felt more empathy when reading the worried partner's text and who had more vivid mental imagery of the anticipated distressing pictures. These studies document the spread of worries online and suggest that modulating empathic responses and mental imagery might "inoculate" individuals against this contagion.

A-58

Aging with Grace: Resting-state Brain Connectivity and Association of Sex with Episodic Memory in Successful Agers

Judith D. Lobo - University of Miami; Roger C. McIntosh - University of Miami

Episodic memory (EM) is sensitive to age-related decline (Salthouse, 2009). Yet, there are successful aging (SA) adults aged >65 years with EM abilities comparable to adults 20-30 years younger. Studies suggest SA individuals are more resistant to age-related loss of subcortical volume, however women are vastly over-represented in these studies (Macorra et al, 2018; Sun et al., 2016). Resting-state connectivity can help elucidate the contribution of various brain regions implicated in EM loss in older adults, such as hippocampus and posterior cingulate cortex (PCC), however differences in resting-state connectivity of SA and the contributions of sex to their EM performance has not been determined. Here, a seed-to-seed connectivity analysis of the left and right hippocampus and PCC compared the effect of SA status in 20 SA individuals (Mean age= 73.4 SD= 5.19; 15 women and 6 men) versus 18 older adults (Mean age= 69.84 SD=7.9; 8 women 11 men). SA status predicted 16% of the variance in rsFC between the left hippocampus and right PCC F(2,35)=3.16, p<.05, however, sex was not a significant covariate. In a secondary regression analysis of verbal EM abilities in the 20 SA together with a larger control group of 62 adults (Mean age= 67.52 SD=10.67; 41 women and 21 men) female sex was predicted by EM (F(3,77)= 8.737, p<.001). Results suggest that SA status may be protective of connectivity between brain structures implicated in EM. Furthermore, in older adults, verbal EM performance is preserved by female sex and SA status.

A-59

Event-related potentials as predictive indexes of the anxiety-related attention bias in adolescents

Samantha Denefrio - The Graduate Center, The City University of New York; Hunter College, The City University of New York; Sarah Myruski - Hunter College, The City University of New York; Megha Ahmed -Hunter College, The City University of New York; Mariah DeSerisy – Fordham University; Amy Roy - Fordham University; New York University Langone Health; Tracy Dennis-Tiwary - Hunter College, The City University of New York; The Graduate Center, The City University of New York

A key cognitive mechanism posited to underlie anxiety is the anxiety-related attention bias (AB), characterized by exaggerated attention towards threat. This study used a biobehavioral approach to quantify AB among anxious adolescents to identify metrics of AB showing predictive power beyond behavioral AB measures. We focused on two target event-related potentials (ERPs): the anterior N2 and the posterior N2, which reflect attention control resource allocation to visual stimuli and targets, respectively (e.g. Folstein & Petten, 2008). We hypothesized that greater N2 amplitudes to threatening faces and subsequent probes, indicating exaggerated attention toward whereat, will uniquely predict greater parent-reported anxiety symptoms, beyond the behavioral AB metric. Eighteen (11 female) 12-to-14-year-olds (M = 14.02, SD = 0.69) with clinically-significant anxiety completed a dot-probe task at FCz following face onset, behavioral AB scores indicating a bias toward threat. The anterior N2 was generated from 300-360 milliseconds at FCz following face onset,

and the posterior N2 was generated from 230-320 milliseconds at PO7/PO8 following probe onset. Results showed that greater anterior N2 to threat versus neutral faces predicted greater anxiety [β = -51; t(17) = -2.23, p = .041], and greater posterior N2 to threat probes predicted greater social anxiety [β = -.70; t(17) = -2.78, p = .015]. In contrast, behavioral AB scores did not significantly predict anxiety (p's > .05). These findings highlight the importance of using biologically-based approaches for characterizing anxiety in youth.

A-60

Neural Network Modeling of Attitude Strength

Thalia H. Vrantsidis - University of Toronto; Hyuna Cho - University of Toronto; Stephen J. Read - University of Southern California; William A. Cunningham - University of Toronto

Attitude strength – the resistance of an attitude to change – is influenced by a wide range of cognitive factors, such as certainty, amount of information, and ambivalence. Though these factors can have unique causes and consequences, they are often highly correlated. This has led to continued debates over which factors should be considered different, and how these different factors are related. One challenge is that some factors that influence strength might share similar cognitive mechanisms but with different content. To isolate cognitive mechanisms in a content-free way, we aim to formalize how attitude structure influences strength using biologically-plausible neural network simulations. We focus on modeling attitudes towards groups that are learned based on positive and negative experiences with individual group members. We then test how variations in the learned structure of the groups affects the strength of the attitudes learned. The current work provides a proof of principle for the use of this approach, successfully modeling effects of the perceived similarity of group members on attitude strength. The patterns of representations learned by the neural networks will provide predictions for future neuroimaging studies. Formalizing different attitude strength predictors using neural networks will allow us to better understand their unique and shared cognitive and neural mechanisms.

A-61

Multivariate analysis of fMRI data distinguishes forms of emotional distancing

John P. Powers - Duke University; John L. Graner - Duke University; Kevin S. LaBar - Duke University

Distancing is a type of reappraisal that involves simulating a new perspective to alter the psychological distance and emotional impact of a stimulus. Distancing can take different forms depending on the domain of psychological distance being altered. Previous meta-analytic results have demonstrated consistent activation of default mode and frontoparietal control networks across distancing studies, but it is not clear whether different forms of distancing uniquely recruit any neural resources. Based on prior work on representations of psychological distance, we hypothesize that different forms of distancing may yield dissociable patterns of activation in parietal cortex. To test this hypothesis, we trained healthy young adults (N=34) to decrease emotional responses to aversive pictures using three forms of distancing: spatial (imagine stimulus for away), temporal (imagine stimulus in the past), and objective (imagine stimulus from the perspective of a neutral observer). We used an event-related design to collect fMRI data while participants performed these techniques or responded naturally to aversive pictures (view). Univariate contrasts of each distancing technique against the others yielded no significant results. However, a more sensitive multivariate approach utilizing partial least squares discriminant analysis revealed distinct patterns of activation for these techniques in parietal and occipital cortices. These results suggest that different forms of distancing engage highly overlapping sets of brain areas but with subtle differences in posterior regions. These differences may reflect biases in associative cortical areas

A-62

I Knew You Weren't Going to Like Me! Social Anxiety is Associated with Neural Response to Accurately Predicting Rejection

Megan E. Quarmley – Temple University; Brady D. Nelson – Stony Brook University; Johanna M. Jarcho – Temple University

Social anxiety (SA) disorder typically emerges in adolescence, potentially due to a normative increase in desire for peer acceptance. However, neural response to reward has largely been examined in the monetary, not social, domain. Previously, we showed that the RewP, an EEG-based event related potential thought to index engagement of the reinforcement learning system, was elicited by both social and monetary rewards. However, when participants learned a peer disliked them, more severe SA symptoms were associated with a larger RewP. Thus, reinforcement learning from negative peer feedback may promote SA symptoms. This study extends this work using fMRI, and seeks to isolate relations between SA and striatal response to predicting positive and negative feedback in social and non-social domains. Adolescents (N=26, Mage=1.17) underwent fMRI while completing novel, well-matched monetary and social feedback tasks where they predict which of the two doors or age-matched peers they are presented will result in positive feedback (win money/social like), or negative feedback (lose money/social dislike). Self-reported SA was also assessed. A Task (monetary vs. social) X Prediction Valence (positive vs. negative) X Outcome (correct vs. incorrect) X SA repeated measures ANOVA revealed a significant interaction in right ventral striatum (p=.045). Unique relations between SA and brain function were observed in the social (p=.033), but not monetary task. Specifically, more severe SA symptoms were associated with accurately predicting peers who provided negative feedback. Paired with our prior findings, this suggests a mechanism that may support SA symptoms during this critical developmental phase.

A-63

2019 SANS Poster Award Winner

Top-down influences on the neural representation of facial emotion categories

Jeffrey A. Brooks – New York University; Junichi Chikazoe - National Institute for Physiological Sciences; Ryan M. Stolier – New York University; Norihiro Sadato - National Institute for Physiological Sciences; Maryam Bin Meshar – New York University; Jonathan B. Freeman – New York University

Growing behavioral evidence suggests that factors such as context and emotion concept knowledge may shape the way emotions are visually perceived, leading to variability - rather than universality - in the perceptual structure of emotion. However, the neural basis of such top-down impacts on emotion perception remains underspecified. In a neuroimaging study (N = 40), we used a representational similarity analysis (RSA) approach to measure the correspondence between the conceptual, perceptual, and neural representational structures of the 6 emotion categories Anger, Disgust, Fear, Happiness, Sadness, and Surprise. When viewing faces, the representational structure of multi-voxel patterns in the right fusiform gyrus (rFG) was significantly predicted by a subject's unique conceptual structure, even when controlling for multiple models of the potential physical similarity in the faces themselves. Conceptual structure also predicted multiple behavioral measures of emotion perception. In a second neuroimaging study (N = 37), we sought to explicitly manipulate the semantic context for facial emotion perception. Subjects viewed faces displaying angry, happy, or blended (ambiguous) facial expressions preceded by sentences describing a stereotypically anger- or happiness-eliciting scenario. Forthcoming multi-voxel pattern analyses will assess conceptual and contextual impacts on face representations in visual processing regions. We expect that response patterns to ambiguous faces will show representational similarity to angry/happy patterns when they are preceded by angry/happy conceptual and contextual impacts on categories, can be flexibly influenced by conceptual understanding of emotions.

A-64

The Psychophysiology of Guilt

Chloe A. Stewart - University of Western Ontario; Penny A. MacDonald - University of Western Ontario; R. W. J. Neufeld - University of Western Ontario; Derek G. V. Mitchell - University of Western Ontario; Elizabeth C. Finger - University of Western Ontario

The autonomic nervous system (ANS), which is responsible for the regulation of bodily functions, has been shown to play a role in the experience of emotions. Previous research has established physiological patterns of activation for numerous basic emotions. One emotion that has not yet been characterized, despite an anecdotally visceral experience, is guilt, an emotion that is elicited by realizing that one has caused actual or perceived harm to another. This study sought to identify the specific ANS patterns elicited during the experience of guilt. Fifty healthy individuals (25 female) completed a novel task, which involved viewing videos designed to elicit guilt and the comparison emotions of amusement, disgust, sadness, pride, and neutral affect. Participants' swallowing, heart, and respiration rates were continuously monitored. Preliminary analysis identified a significant interaction between emotion and physiological states (F(9.782, 459.769)= 2.070, p=.027). Post-hoc analyses found specific patterns of activation distinct from neutral affect for each of the comparison emotions, with guilt eliciting a unique pattern of increased swallowing (t(42)=3.828, p<.001) and increased sympathetic heart rate activation (t(41)=3.246, p=.002). There was no significant effect of guilt on respiratory sinus arrhythmia, (t(41)=.473, p=.639) or on respiration rate (t(42)=.952, p=.347). These results suggest that there is a distinguishable autonomic output representing guilt that is characterized by enhanced sympathetic outflow. Future studies will aim to identify whether alterations in these physiological responses may have implications for emotional abnormalities in disorders known to have altered levels of guilt, such as psychopathy and frontotemporal dementia.

A-65

Examining N170 encoding bias in intergroup face processing with multilevel modeling

Youngki Hong - University of California, Santa Barbara; Matthew S. Mayes - University of California, Santa Barbara; Anudhi P. Munasinghe - University of California, Santa Barbara; Kyle G. Ratner - University of California, Santa Barbara

Many consequential intergroup interactions occur face-to-face. As a result, understanding biases in faces processing can provide useful insights into understanding multiple aspects of intergroup responses. Previous studies have investigated face processing in intergroup context using EEG, but the results have not always been consistent. The current study replicated methods by Ratner & Amodio (2013) to examine the effects of a minimal group paradigm on cortical activity associated with structural encoding of faces. Participants were assigned to one of two arbitrarily-defined groups using a minimal group procedure and event-related potentials (ERPs) were recorded while they categorized faces of people identified as members of their novel ingroup vs. outgroup. Our analyses focused on the N170 component of the ERP, which peaks around 170 ms following face onset and reflects face structural encoding. A novel aspect of our analysis was that instead of the traditional signal averaging approach (collapsing N170 amplitudes across trials of the same type), we used multibel modeling to examine trial-level data. The results of our analysis revealed that ingroup faces elicited larger N170 amplitude to ingroup compared to outgroup faces, indicating superior structural encoding of ingroup faces. Our findings suggest that mere identification with a group may lead to biased encoding of ingroup faces and highlight how multilevel modeling can be utilized by EEG researchers interested in intergroup differences in face processing.

A-66

A comparative fMRI meta-analysis of altruistic and strategic decisions to give

Jo L. Cutler - The University of Sussex; Daniel K. Campbell-Meiklejohn - The University of Sussex

The decision to share resources is fundamental for cohesive societies. Humans can be motivated to give for many reasons. Some generosity incurs a definite cost, with no extrinsic reward to the act, but instead provides intrinsic satisfaction (labelled here as 'altruistic' giving). Other giving behaviours are done with the prospect of improving one's own situation via reciprocity, reputation, or public good (labelled here as 'strategic' giving). These contexts differ in the source, certainty, and timing of rewards as well as the inferences made about others' mental states. We executed a combined statistical map and coordinate-based fMRI meta-analysis of decisions to give (36 studies, 1150 participants). Methods included a novel approach for accommodating variable signal dropout between studies in meta-analysis. Results reveal consistent, cross-paradigm neural correlates of each decision type, commonalities, and informative differences. Relative to being selfish, altruistic and strategic giving activate overlapping reward networks. However, strategic decisions showed greater activity in striatal regions than altruistic choices. Altruistic giving, more than strategic, activated subgenual anterior cingulate cortex (sgACC). Ventromedial prefrontal cortex (vmPFC) is consistently involved during generous decisions and processing across a posterior to anterior axis differentiates the altruistic/strategic context. Posterior vmPFC was preferentially recruited during altruistic decisions. Regions of the 'social brain' showed distinct patterns of activity between choice types, reflecting the different use of theory of mind in the two contexts. We provide the consistent neural correlates of genesitos to give, and show that many will depend on the source of incentives.

A-67

Synesthesia and the insula

Cathy Lebeau - University of Quebec, Montreal; Francois Richer - University of Quebec, Montreal

Synesthesia is often a developmental condition in which atypical automatic associations are formed between some inducing perception (e.g. specific words) and other concurrent sensations (e.g. specific colors or tastes). It can also be induced through serotonin system manipulations (e.g. MDMA, psylocibin). We investigated cases of induced synesthesia to serotonin drugs which also show synesthesias during sex or childbirth which may also be linked to serotonin oxytocin systems. These cases also show signs of insula hyperconnectivity through manifestations like taste synesthesia, hyperempathy to pain or vestibular symptoms. These observations point to a link between some induced synesthesia and atypical insula connectivity which will be verified through MRI measures.

A-68

A Brain of Thrones: Narrative Transportation is Associated with Greater Neural Overlap between Self and Fictional Others for Close But Not Distant Characters

Timothy W. Broom - Ohio State University; Robert S. Chavez - University of Oregon; Dylan D. Wagner - Ohio State University

Prior research has shown that narrative transportation, or immersion into the events of a story and the minds of its characters, leads readers to incorporate fictional characters into their self-concept (Shedlosky-Shoemaker, Costabile, & amp; Arkin, 2014). Here, we use functional neuroimaging to investigate whether narrative transportation is associated with greater neural overlap between self and fictional others in the vMPFC. Nineteen self-identified fans of the television series Game of Thrones performed a trait-evaluation task while undergoing fMRI, the targets of which were the self, 9 personally familiar others (e.g. friends), and 9 fictional characters from the television show Game of Thrones. We found evidence of greater overlap in activation in the vMPFC for self and fictional characters for those higher in trait-level "narrative transportability" ($\mathbf{r} = .69$, $\mathbf{p} = .001$). This effect was specific to fictional characters, as transportability was not associated with self-real-other neural dissimilarity ($\mathbf{r} = .25$, \mathbf{p} & gt; .05) and the difference between these two slopes was significant ($\mathbf{z} = .29$, $\mathbf{p} = .02$). Further analyses demonstrated that this effect was specific to fictional characters ($\mathbf{r} = .77$, \mathbf{p} & lt; .001) compared to distant characters ($\mathbf{r} = .32$, \mathbf{p} & gt; .05; difference in slopes: $\mathbf{z} = 2.21$, $\mathbf{p} = .03$). The results of this fMRI study support the notion that transportation may lead individuals to incorporate fictional others into their self-concept, particularly for characters that are rated higher in closeness.

A-69

Perceiving others: from affective reaction to impressions

Nir Jacoby - Department of Psychology, Columbia University; Chelsea Helion - Department of Psychology, Columbia University; Kevin Ochsner - Department of Psychology, Columbia University As social interactions unfold, our affective reactions to people and situations move dynamically and ultimately inform our impressions. We capture these complex dynamics in a new experiment applying a naturalistic approach. Participants watched a TV show ("The Affair") which tells a similar story from two different perspectives (Rashomon structure). In addition, participants evaluated their impressions of the characters at three timepoints: 1) before watching any of the movies, 2) after watching the first perspective, and 3) after watching both perspectives (order of perspectives ac counter-balanced across subjects). The first group performed the task in the land was asked to track their feelings (i.e. affective tracking) about characters as they were watching the movies. The second group of 40 people performed a similar experiment while undergoing fMRI scan. The scanner version had similar structure with minimal changes for presentation timing during character evaluations, and critically with just free watching during the movies (no affective tracking). The average affect tracking trajectory from the lab experiment was then used as a regressor for brain activity. We found that this metric correlated with a network of subjective valuation regions, including the striatum, ventromedial-prefrontal and precuneus cortices. Moreover, we show relations between affective tracking and the static evaluations and their updates between timepoints. Altogether the study is linking different components involved in impression formation processes and person perception.

A-70

Objective measurement of movement during ADOS-2 assessment for young children with ASD

Jacquelyn Moffitt - University of Miami; Yudong Tao - University of Miami; Yeojin A. Ahn - University of Miami; Saad Sadiq - University of Miami; Mei-Ling Shyu - University of Miami; Daniel S. Messinger - University of Miami

Traditional diagnostic procedures for autism spectrum disorder (ASD) include structured behavioral observation by a trained clinician, and diagnosticians typically rely on the Autism Diagnostic Observation Schedule (ADOS-2). Expanding objective measurement of social communication and other behaviors during assessment would improve diagnostic accuracy and aid in advancing research endeavors. Tracking of the movement of children with ASD would allow for analysis of patterns of approach and positioning relative to other individuals in a social interaction. Six children with ASD (66% male, M age = 40.83 months, SD = 6.85) were administered the ADOS-2, which yields calibrated severity scores (CSS) for a total score, a measure of restricted and repetitive behaviors (RRB CSS), and social affect (SA CSS). Videos of the assessments were recorded using a ceiling-mounted Noldus Ethovision camera and processed using Mask R-CNN, a deep convolutional neural network which uses segmentation and key point detection within regions of interest to track the movement of individuals. A graphical user interface (GUI) was created to increase accessibility and encourage utilization of objective measurement of autism-relevant approach-avoidance behaviors. The average distance between child and parent was related to the child's RRB CSS at the level of a trend, r = .74, p < .10. Further application of these measures may improve diagnostic accuracy as well as elucidate the importance of child relative positioning and approach in social interactions. Implications for computational approaches to objective measurement of clinical symptoms will be discussed.

A-71

The role of mindfulness in neural and subjective indicators of self-view investment

Hadley M. Rahrig - Virginia Commonwealth University; Kirk W. Brown - Virginia Commonwealth University; David S. Chester - Virginia Commonwealth University

Self-concept is strongly influenced by the affective value that is placed on personal psychological attributes. Hence, it is a value-based investment in self-views of those attributes that helps to regulate and maintain stable self-concept. Self-view investment is relevant to numerous self-related functions, but high self-view investment is not necessarily beneficial. High investment in negative self-views is indicative of low self-esteem, and over-investment in positive self-views is associated with hubris and possibly social biases (e.g., prejudice). Previous research has identified two distinct forms of self-view investment: epistemic investment (the certainty with which a view is held) and emotive investment (the felt importance of this view). There are individual differences in the degree of epistemic and emotive self-view investment, but unknown is why these differences exist. Theory suggests that mindfulness cultivates a less personal, more objective perception of one's thoughts, emotions and behaviors, and training in mindfulness has been shown to alter self-referential processing. The current pilot study investigates the possible role of dispositional mindfulness in the degree of self-view investment, as indicated by self-reported and neural (functional magnetic resonance imaging-based) indicators of investment. Analyses explore the relation between trait mindfulness and both epistemic and emotive self-view investment in an initial effort to understand how the more objective stance conferred by mindfulness is related to degree of investment in positive and negative self-views. *2019 SANS Poster Award Winner*

A-72

Longitudinal training in cognitive reappraisal enhances emotion regulation success in borderline personality disorder patients; evidence from self-reported negative affect and whole-brain pattern expression

Bryan T. Denny - Dept. of Psychological Sciences, Rice University; Richard B. Lopez - Dept. of Psychological Sciences, Rice University; Jin Fan - Departments of Psychiatry and Neuroscience, Icahn School of Medicine at Mount Sinai; Department of Psychology, Queens College, City University of New York; Kurt Schulz - Department of Psychiatry, Icahn School of Medicine at Mount Sinai; Harold W. Koenigsberg - Department of Psychiatry, Icahn School of Medicine at Mount Sinai: James J Peters VA Medical Center

Borderline personality disorder (BPD) is the prototypical disorder of emotion regulation. We examined longitudinal training in cognitive reappraisal to enhance emotion regulation in BPD's. Specifically, the training targeted enhancement of psychological distancing, whereby negative stimuli are appraised as an objective, impartial observer. At each of 5 sessions over 2 weeks, 19 BPD and 18 healthy participants received training in distancing and then completed a widely-used image-based reappraisal task. fMRI data were acquired at Sessions 1 and 5. We performed whole-brain pattern expression analyses using independently-defined patterns for negative affect (PINES; Chang et al., 2015) and cognitive reappraisal (Buhle et al., 2014 meta-analysis) for each session for each participant. BPD's showed longitudinal decreases in self-reported negative affect during distancing training. In reappraisal pattern expression, BPD's uniquely showed sustained reappraisal-related activity over time. In BPD's, increasing reappraisal-related activity in independently-defined left ventrolateral prefrontal cortex was associated with increasing reappraisal success (i.e., via affect self-reports). Also among BPD's, decreases in PINES pattern expression were associated with increases in reappraisal pattern expression as well as increasing reappraisal success. This study represents the first longitudinally-scanned examination of cognitive reappraisal training, and these results suggest a potential role for reappraisal training in BPD treatment.

2019 SANS Poster Award Winner

Using Hidden Markov Modeling to uncover brain states associated with success and failure under stress

Chad E. Forbes - University of Delaware; Rachel Amey - University of Delaware; Robert Backer - University of Delaware; Mengting Liu - University of Delaware

Research within social and cognitive neuroscience provides consistent evidence that stressful contexts alter neural activity in brain regions and networks integral for executive function. Such alterations invariably are associated with underperformance on more cognitively intensive tasks. The exact brain patterns and network interactions that prompt such performance discrepancies are entirely unknown. Here we provide evidence that Hidden Markov Modeling (HMM) based on multivoxel pattern analysis provides a useful and fruitful means for uncovering unique hidden brain patterns that help predict when individuals will perform better or worse in stressful compared to neutral contexts. Two studies placed women in a social identity threatening context which are known to evoke stress responses at the neural level. Study 1 found that brain network stability and states underlying synchronous interactions in regions integral for problem-solving processes were key predictors of whether individuals succeed or fail in stressful situations. Study 2 applied HMM to network interactions, including the frontoparietal (FPN) and default mode network (DMN), operationalized as graph theory-based synchrony between regions integral for said networks during problem solving in stressful compared to neutral contexts. Findings revealed that states involving DMN integration to FPN synchrony were associated with success under stress, whereas FPN was most associated with success in neutral contexts. Findings overall highlight how hidden Markov modeling can provide myriad possibilities for quantifying and better understanding the role of global network interactions in the problem-solving process and how the said interactions predict success or failure in different contexts.

A-74

A-73

A win-win situation: Familiarity influences outcome valuation as indexed by a neural measure of reward in a gambling task

Abdulaziz Abubshait- George Mason University; Paul Beatty - George Mason University; Craig McDonald - George Mason University; Cameron Hassall - University of Victoria; Olav Krigolson - University of Victoria: Eva Wiese - Georae Mason University

Studies have shown that social factors such as the presence of an in-group member can disrupt mental processes that are associated with learning. By influencing the performance monitoring system, this disruption process and can lead to diminished valuation of outcomes, which impairs learn-ing, leading to poorer performance in reinforcement learning tasks. Valuation of outcomes can be indexed by an event-related brain potential (ERP) component termed the reward positivity (RewP), with larger amplitudes being associated with a higher magnitude of positive outcome valuation. Other social factors such as familiarity (i.e., the degree to which social bonding takes place between interaction partners) also have the potential to influence learning via processing of performance feedback, but have vet to be investigated. Here, participants received positive and negative outcome feedback in a gambling task in which they either gambled for themselves (self-outcome) or for the robotic agent Cozmo (other-outcome), with whom they either did (social bonding) or did not familiarize and interact with (no social bonding) before the gambling task. We hypothesized that participants who bonded with Cozmo would show larger RewP amplitudes than participants who did not. Data suggest that participants who bonded with Cozmo show larger RewP amplitudes than participants who did not. No differences were found between participants who won for themselves and those who won for Cozmo after familiarization. Results suggest that familiarity with a robotic agent can influence the magnitude of positive outcome valuation A-75

An EEG measure of shared audience engagement during real-life alcohol prevention videos

Martin A, Imhof - Department of Psycholoay, University of Konstanz; Ralf Schmälzle - Department of Communication, Michiaan State University: Britta Renner - Department of Psycholoay, University of Konstanz; Harald T. Schupp - Department of Psychology, University of Konstanz

Mass media health messages are a key strategy to combat risky drinking, particularly among young adults. However, messages often vary in their ability to engage viewers and prompt elaborate processing. The inter-subject correlation (ISC) offers an audience-centered neural measure of viewer engagement during reception of naturalistic messages (Hasson et al., 2004). While previous work mainly used fMRI - which has low temporal resolution - the approach has recently been adapted to EEG (Parra et al., 2018). Here, we expand on own fMRI work (Imhof et al., 2017) and test whether strong compared to weak messages against risky drinking prompt higher EEG-ISC. Thirty-two participants viewed strong and weak audio-visual PSAs, which were comprehensively characterized in terms of perceived message effectiveness (PME) previously and confirmed in the current sample (p < 0.001, t(18) = 7.89). Brain responses were recorded using 256-channel EEG (0.5 Hz HPF, 1000 Hz sampling rate) and submitted to EEG-ISC analysis to obtain maximally correlated components, EEG-ISC was extracted per subject and video, and compared using linear mixed models. The main finding is that stronger messages, as defined by PME, evoke stronger correlated brain responses. Moreover, the results are replicated within a second presentation of the messages. Our findings align with previous work and support the hypothesis that strong PSAs engage the brains of audience members more consistently. In sum, EEG-ISC can offer a temporally sensitive neural marker to assess health messages, track the grip of a message over time and provides an unobtrusive, low-cost measure of audience engagement.

A-76

Mirror system activity is modulated by eve contact, evidence from a multimodal TMS/EEG study

Jellina Prinsen – KU Leuven; Brent Vandenbroec – KU Leuven; Kaat Alaerts – KU Leuven

It is well established that eye contact is a controlling signal of human non-verbal social processes. For example, eye contact between actor and observer can readily increase the neural 'mirroring' of each other's actions and behaviors. Both TMS-induced motor evoked potentials (MEPs: an index of corticomotor excitability) and EEG-based mu rhythm (neural oscillations in the 8-13 Hz frequency band over the sensorimotor strip) have reliably demonstrated to capture neural mirror mechanisms during action observation. However, the relationship they bear with each other remains elusive. Furthermore, although the effect of observed eve contact on the mirroring of others' actions has mainly been demonstrated by means of the TMS technique, it remains unknown whether the mu rhythm is also susceptible to perceived eve contact.

Here, the link between both measures was further investigated. TMS-induced MEPs and EEG mu suppression was investigated in 32 participants (20 men; mean age: 24;8 years) while they observed a simple intransitive hand movement combined by either direct or averted gaze from the actor. Both measures of mirror-motor mapping were significantly modulated by perceived eve gaze; i.e. a significant increase in MEP amplitude and a significant attenuation of the mu rhythm when observing direct compared to averted gaze from the model. Interestingly, a significant correlation between both measuring systems was found at the individual level. These results suggest that both EEG mu rhythm and TMSinduced MEPs are sensitive to the social relevance of the observed actions, and that they may reflect similar processes within the mirror system network.

A-77

Laterality of the frontal aslant tract (FAT) explains externalizing behaviors through its association with executive function

Dea Garic - Florida International University; Iris Broce - University of California at San Francisco; Aaron Mattfeld – Florida International University; Paulo Graziano – Florida International University; Anthony Dick – Florida International University

We investigated the development of a recently identified white matter pathway, the frontal aslant tract (FAT) and its association with executive function and externalizing behaviors in a sample of 129 neurotypical male and female human children ranging in age from 7 months to 19 years. We found that the FAT could be tracked in 92% of those children, and that the pathway showed age-related differences into adulthood. The change in white matter microstructure was very rapid until about 6 years, and then plateaued, only to show age-related increases again after the age of 11 years. In a subset of those children (5–18 years; n = 70), left laterality of the microstructural properties of the FAT was associated with greater attention problems as measured by the Child Behavior Checklist (CBCL). However, this relationship was fully mediated by higher executive dysfunction as measured by the Behavior Rating Inventory of Executive Function (BRIEF). This relationship was specific to the FAT we found no relationship between laterality of a control pathway, or of the white matter of the brain in general, and attention and executive function. These findings suggest that the degree to which the developing brain favors a right lateralized structural biomarker to associated with executive function and attention. This novel finding provides a new potential structural biomarker to assess attention deficit hyperactivity disorder (ADHD) and associated executive dysfunction during development.

A-78

How is repetitive negative thinking associated with daily affective dynamics?

Lara Baez - University of Miami; Nikki Puccetti - University of Miami; William Villano - University of Miami; Chiemeka Ezie - University of Miami; Caitlin A. Brown - University of Miami; Kiara R. Timpano - University of Miami; Aaron Heller - University of Miami

Repetitive negative thinking (RNT) is a transdiagnostic cognitive risk factor for psychopathology characterized by patterns of repetitive, intrusive, and difficult-to-control thoughts. It is unknown how individual differences this cognitive style play out in real world affect. Thus, we sought to determine which aspect(s) of RNT are associated with various affective dynamics. 494 undergraduates were recruited from University of Miami Introductory Psychology courses. Participants completed the Perseverative Thinking Questionnaire (PTQ), a self-reported measure of RNT. Over the semester, students received SMS messages every other day with a survey assaying momentary affect. The survey contained items from the Positive and Negative Affect (PA/NA) Schedule, adapted to a 0-100 point visual analog scale. Affective dynamics calculated were: (1) mean PA (2) mean NA, (3) PA instability, and (4) NA instability. Exploratory and confirmatory factor analyses of PTQ items indicated a two-factor solution. Factor 1 included items related to repetitive and intrusive thinking. Factor 2 included items related to the functional impairing consequences of the thoughts. This measurement model was integrated into a full structural model to predict affective dynamics from the two PTQ factors (RMSEA = .054; SRMR = .026; CFI = .966; TLI = .958). Factor 1 marginally predicted day-to-day instability in both positive and negative affect (PA: b=.207, p=.054; NA: b=.197; p=.063). Factor 2 significantly predicted day-to-day mean levels of positive and negative affect (PA: b=.209, p=.004; NA: b=.387, p

A-79

Network dynamics of collective memory

Beau Sievers - Harvard University; Ida Momennejad - Columbia University

The act of remembering changes what we remember in the future. Retrieving a memory activates associated memories, which activate more distantly related memories in turn. This cascading activation induces plasticity, allowing links between memories to become stronger or weaker. Here, we present a simple computational model of memory as activation that spreads through a neural network, reweighting connections between neurons to change future memory behavior. The model is computationally inexpensive and biologically plausible. We then present a series of social network analyses showing that collective memory phenomena emerge when simulated agents converse by talking to each other about what they remember.

The model captures a range of individual-level memory phenomena, including context enhancement and retrieval-induced forgetting effects, where activating one memory strengthens or weakens more distant memories. At the social network level, these effects interact to produce collective memory phenomena, including synchronization of memories within interacting agent pairs, the emergence of echo chambers in social network cliques, and flocking behavior in memory over longer time scales. Further, the model implies the plausibility of targeted "forgetting attacks." Given an estimate of an individual's memory network, it is possible to construct a sequence of activations that weakens specific memories by strengthening other memories that are distantly related. We conclude by suggesting that such forgetting attacks are widespread in the wild in advertising and propaganda, and are a possible mechanism for the effectiveness of talk therapy in treating psychiatric disorders of memory, such as post-traumatic stress disorder.

A-80

Another's presence, not affiliative touch, increases zygomaticus activity while watching positive valence images

Tanja S. H. Wingenbach - SCNLab, Mackenzie Presbyterian University; Beatriz Ribeiro - SCNLab, Mackenzie Presbyterian University; Caroline Nakao - SCNLab, Mackenzie Presbyterian University; Paulo S. Boggio - SCNLab, Mackenzie Presbyterian University

Increased activity in the facial muscle zygomaticus major related to positive affect is often reported and well documented in response to watching positive affective images. Research has further shown that the presence of another person as well as affiliative touch can enhance self-reported positive affect. However, little is known about the effect of another's presence and affiliative touch on facial muscle activity related to affect. The current study investigated the effect of affiliative touch (i.e. forearm-stroking) on facial muscle activity (corrugator, zygomaticus) across five experimental conditions (self-touch, being touched, touching the experimenter, presence of experimenter in room, alone) applying a within-subject design.

It was expected that zygomaticus activity would be higher when watching positive valence images than neutral and negative ones and explored whether the presence of another person or receiving touch would modulate the activity. Female participants (N = 40, M(age) = 22.4 years, SD = 5.3) watched 150 affective images (10 images of negative, positive, and neutral valence per experimental condition), rated the valence of the images, while facial electromyography was recorded.

Zygomaticus activity was significantly higher for positive images than neutral and positive images and differed significantly between the experimental conditions with significantly higher activity in the presence condition compared to the 3 touch conditions. Zygomaticus activity did not differ between the experimental conditions while viewing negative and neutral images.

The results demonstrate that mere presence of another person (not their affiliative touch) in a situation eliciting positive affect increases facial muscle activity associated with positive affect.

A-81

Asymmetrical Effects of Positive and Negative Stock Returns on Sequential Decision-Making: A Neurocomputational Investigation

Matthew AJ Heflin - Icahn School of Medicine at Mount Sinai; Soojung Na - Icahn School of Medicine at Mount Sinai; Xiaosi Gu - Icahn School of Medicine at Mount Sinai

Previous research in financial decision making has shown that investment behaviors are driven by computationally defined learning signals such as value, reward prediction errors, and fictive errors (Lohrenz 2007 PNAS; Chiu 2008 Nat Neurosci; Gu et al 2015 PNAS). These studies used a sequential investment task wherein participants are given money to invest, shown stock market data, and asked to decide how many shares they would buy. We have adapted this task to include a way to short the stock, if participants believe there will be a drop in the stock's value. This was conducted in a group of healthy volunteers who were non-expert traders (n=33). Our preliminary results suggest that when stocks gave positive "for value change), participants' investing and shorting choices were both driven by values, prediction errors, and fictive errors as shown in previous studies and showed significant ventral striatal activity to these learning signals. However, when stocks gave negative returns (defined as negative % of value change), these signals no longer had a systematic impact on choices. Interestingly, we still found neural computation of these learning signals in the ventral striatum (for value and prediction error) and vmPFC (for fictive error). Together, these results suggest that positive and negative stock markets had asymmetrical effects on investment decisions and neurally, people's brains computed, but ignored, learning signals derived from stocks with negative returns.

Poster Session B

B-1

Mentalizing about the self and others: a human intracranial electrophysiology study

Kevin M. Tan - University of California, Los Angeles; Amy L. Daitch - Stanford University; Kieran C. R. Fox - Stanford University; Josef Parvizi - Stanford University; Matthew D. Lieberman - University of California, Los Angeles

Little is known about the spatiotemporal dynamics of social cognitive processing due to the low temporal resolution of fMRI. To probe the social brain with millimeter spatial resolution and millisecond temporal resolution, we conducted the first human intracranial electroencephalography (iEEG) study of mentalizing. iEEG provides direct electrophysiological measurements that reflect the spiking of neuronal populations immediately adjacent to an electrode. We recorded iEEG from ten neurosurgical epileptic patients presented with mentalizing prompts about others (social) and themselves (self). Both prompts recruited largely overlapping neuronal populations in typical default network regions: precuneus, dorsomedial prefrontal cortex (dmPFC), and ventromedial prefrontal cortex (wmPFC). However, the timing and magnitude of activations (360-1300 ms) than self prompts (400-960 ms). In dmPFC, social prompts evoked later but much more sustained activations (580-1800 ms) than self prompts (460-1000 ms). This timing may explain why dmPFC appears socially-selective in fMRI literature, despite little self/other anatomical selectivity in our results. Lastly, social prompts produced robust activation in a vmPFC subregion associated with schematic processing (800-2700 ms), while self prompts produced only marginal activation. Taken together, there appears to be a sequence of activation from precuneus to dmPFC to vmPFC, suggesting a feedforward processing hierarchy with schematic processing at the top. However, the extent of concurrent activation also implies significant recurrent processing. Mentalizing about others may be more computationally demanding than self-mentalizing, as social prompts evoked longer or stronger

B-2

Behavioral and neural correlates of impulsivity to Black faces under threat

Estée A. Rubien-Thomas – Yale University; Binyam Nardos - Oregon Health and Science University; Alexandra O. Cohen – New York University; Anfei Li - Weill Cornell Medical College; Alessandra Cervera – Columbia University; Jennifer L. Eberhardt – Stanford University; Kim Taylor-Thompson – New York University; Jennifer Richeson – Yale University; Damien Fair - Oregon Health and Science University; BJ Casey – Yale University

Violence against unarmed men of color by police has raised questions about what underlies these outcomes. Perceived threat is often cited as a contributor, but the specific factors at play are not well understood. Subjects performed a variant of an emotional go/no-go task task consisting of emotional faces as targets and rare non-targets under sustained neutral or threat states. Exploratory analyses from a larger dataset (Cohen et al. 2016) were conducted in a sample of 33 male participants (12 Black). Results suggested that individuals, regardless of their own race, are more impulsive to Black faces when under threat. This behavior was paralleled by diminished activity in the anterior cingulate cortex to Black faces. A replication sample of 106 Black and White adults (55 Black, 56 female) performed a version of the same task optimized to look at the effects of race cues. The results replicated increased impulsivity to Black faces under conditions of threat, regardless of subject race. Whole brain analyses will determine if frontoparietal, limbic, and face processing circuitry is differentially engaged in response to Black and White faces among Black and White participants. Contrasts of neural activity under neutral and threatening states will identify the neural circuitry contributing to increased impulsivity to Black faces which is specific to states of threat. The results highlight the contribution of perceived threat on impulsive behavior to Black faces and advances our knowledge of encounters with individuals from racial minority racial groups.

B-3

Neural Response to Reward Buffers Against Election-Related Distress Over Time

Sarah M. Tashjian - University of California, Los Angeles; Adriana Galván - University of California, Los Angeles

The shift in political climate following the 2016 US presidential election caused distress for some historically marginalized individuals (Tashjian & Galvan, 2018). Drawing from trauma research, we examined neural response to reward as a phenotype of vulnerability to depression within 4 months of the election (Wave 1) and at 1-year follow-up (Wave 2) (N=50). Sixty-eight percent of the sample identified with at least one historically marginalized group (gender, sexual orientation, ethnicity, religion, immigration) and reported at Wave 1 they felt the election result would negatively affect them (n=34). Participants performed the monetary incentive delay task in the scanner to probe reward circuitry. Activation in the bilateral nucleus accumbens (NAcc) was examined for the contrast of anticipation of reward>loss.

B-4

Perspective taking reduces group biases in neural motor resonance

Jeremy C. Simon - Brandeis University; Yanyi Jiang - Brandeis University; Jennifer N. Gutsell - Brandeis University

Similar neural circuits are activated during movement and the observation of movement and this motor resonance is thought to support action understanding and social coordination. Previous research shows that group biases can restrict motor resonance to the ethnic ingroup, with potential negative consequences for intergroup encounters and relations. We tested whether an empathic mindset can alleviate such group biases in motor resonance. Participants (n = 48) were told to adopt either an objective mindset or an empathic mindset as suppression of mu-wave oscillations (8-13 Hz) above left sensorimotor areas (electrode C3). Mindset and target group membership interacted such that participants resonance motor resonance, potentially fostering an intuitive understanding across groups. In addition, participants taking the perspective of an outgroup member were less prejudiced and prejudice moderated the effect of group on resonance. Higher prejudice participants actually resonated more with outgroup targets, perhaps because outgroups' motivational relevance increases with prejudice. These results suggest that attitudes do influence group biases in resonance and that taking an empathic mindset can affect both attitudes and neural motor resonance.

B-5

Brain mechanisms of narrative construal

Yaara Yeshurun - School of Psychological Sceince, Tel-Aviv University; Claire Hui-Chuan Chang - Department of Psychology and Princeton Neuroscience Institute, Princeton University; Christina Lazaridi -Creative writing program, Lewis Center of Arts, Princeton University; Kenneth A. Norman - Department of Psychology and Princeton Neuroscience Institute, Princeton University; Uri Hasson - Department of Psychology and Princeton Neuroscience Institute, Princeton University

We spend a major part of our life telling, listening and thinking in the form of narratives. However, narratives rarely unfold in a simple and linear fashion; understanding narratives often involves integrating information over time and creating connections between events and details across different timepoints. To study the brain mechanisms underlying these processes, we created a narrative with two seemingly unrelated story lines, A and B, that merged in the C part to pride a narrative. The narrative consisted of 45 segments. And B segments were presented in an interleaved manner in the first 30 segments followed by 15 C segments (ABABCC). The design of the experiment was created in collaboration with a professional screenwriter who authored the text with a focus on capturing audience's attention. Further, in A and B segments, the author incorporated unique memory plants that recurred in the C part to bridge specific events. Functional magnetic imaging data from 25 subjects was collected while they listened to the narrative. With representational similarity analysis, we found, higher similarity between segments from the same (A or B) than different story lines in precuneus, bilateral posterior superior/middle temporal gyrus, and bilateral insula. This distinction between story lines increased as the narrative unfolded over time. Moreover, in part C, we found that the memory plants triggered specific activation patterns observed during the encoding of the memory plants in the A and B segments. Our results shed light on how the brain retains and integrates information as a narrative unfolds.

Local and remote resting-state functional alterations in the VMPFC, hippocampus, and middle temporal gyrus among abstinent cigarette smokers

Lauren D. Hill-Bowen - Department of Psychology, Florida International University; Michael J. Tobia - Department of Psychology, Florida International University; Angela R. Laird - Department of Physics, Florida International University; Betty J. Salmeron - Neuroimaging Research Branch, National Institute on Drug Abuse, Intramural Research Program, NIH/DHHS; Thomas J. Ross - Neuroimaging Research Branch,

National Institute on Drua Abuse. Intramural Research Proaram. NIH/DHHS: Elliot A. Stein - Neuroimaaina Research Branch. National Institute on Drua Abuse. Intramural Research Proaram. NIH/DHHS: Matthew T. Sutherland - Department of Psychology, Florida International University

Resting-state functional magnetic resonance imaging (rs-fMRI) studies have revealed that extended nicotine use can be characterized by important differences in neural activity for both local (i.e. regional) and remote scales. Because changes in local activity profiles may affect remote integration, we investigated the relationship among the two. In the present within-subject, double-blind, placebo-controlled study, overnight-abstinent smokers (n=20) and nonsmokers (n=20) completed 6 fMRI sessions during a nicotine and varenicline crossover drug administration regime. Whole-brain voxel-wise rs-fMRI local measures of regional homogeneity (ReHo) and fractional amplitude of low frequency fluctuations (fALFF) revealed convergent altered activity profiles, including reduced local activity in the middle temporal gyrus (MTG) and cuneus, and increased local activity in the ventromedial prefrontal cortex (vmPFC) and hippocampus for smokers (vs. nonsmokers). To further elucidate how local changes in brain activity associate with remote integration, convergent regions were used in a seed-based functional connectivity analysis. Increased functional coupling between the MTG and middle frontal regions correlated with increased social anhedonia and higher scores on the Fagerstrom test for nicotine dependence (FTND) (pcorrected <: 0.05). Increased coupling between the MTG and posterior cingulate (PCC) correlated with higher addiction severity (FTND) in smokers. Additionally, increased functional coupling between the vmPFC and frontal regions, PCC, hippocampus, and supramarginal gyrus correlated with increased externalizing behaviors, and favorable attitudes toward risk. These results delineate altered resting-state brain activity for both local and remote scales in nicotine users and indicate that these alterations are linked with clinically-relevant constructs including addiction severity, anhedonia, and risk attitudes.

B-7

Individual differences in Pavlovian interference on reinforcement learning relates to better subsequent inhibitory control

Juliet Y. Davidow - Harvard University; Rahul Bhui - Harvard University; Catherine Insel - Harvard University; Amanda M. Brandt - Harvard University; Leah H. Somerville - Harvard University Goal directed behaviors are susceptible to influence from previous affective experiences, including value-driven learning. Value-driven learning is influenced by both Paylovian and instrumental learning systems. When information is consistent, these systems can cooperate enhancing learning; however, when information conflicts, e.g. when action and outcome valence are opposed, Pavlovian influence disrupts the instrumental system, decreasing learning. Employing inhibitory control during learning can reduce conflict from bias, increasing learning. However, the influence of such learning under conflict on subsequent inhibitory control has not been studied. Participants (N=68, data collection ongoing) learned from probabilistic reinforcement about 4 cues that signal whether to execute or withhold a button press (action factor) to obtain monetary reward or avoid monetary loss (valence factor); the intersection of these factors is congruent (press to obtain reward, withhold press to avoid loss) or incongruent (press to avoid loss, withhold press to obtain reward). After learning, these same cues became "NoGo" targets in a secondary Go/NoGo task, where, critically, all monetary incentives are removed. Preliminary results showed a significant interaction of action-by-valence on learning. Parameters estimated by a computational model showed that better learning was related to lower Pavlovian influence. For subsequent inhibitory control, NoGo accuracy significantly differed depending on the interaction between the previous action-by-valence condition and the extent of previous learning for that cue, with better previous learning related to better subsequent control. This association across tasks could reflect that individuals who employ greater control during the Go/NoGo task are also employing greater control during learning. **B-8**

Culture Impacts the Neural Response to Perceiving Outgroups Among Black and White Faces

Colleen Hughes – Indiana State University: Laura Babbitt – Tufts University: Anne C. Krendl – Indiana State University

Negative biases towards outgroups exist across cultures. However, it is not known whether these responses are learned through culture or are elicited from perceiving any outgroup. Cultural learning may influence the level of cognitive control in response to specific racial outgroups, whereas increased affect may result from perceiving any outgroup members. Because the neural regions involved in affect and control have been well-characterized, the current research used neuroimaging to disentangle these possibilities. Eighteen Caucasian-American, 18 Chinese-American, and 17 Chinese participants - who had immigrated to the United States less than 1 year prior - viewed images of Black and White individuals while undergoing fMRI. Participants also completed measures of implicit racial bias, awareness of cultural stereotypes, and experience with White and Black individuals in a separate testing session. Chinese-American participants were recruited to examine the influence of a shared cultural context with Caucasian-Americans but similar intergroup affiliations as Chinese participants. When viewing faces of Black (as compared to White) individuals. Caucasian-American (as compared to Chinese) participants had decreased activation in regions of the brain associated with cognitive control, including right dorsolateral prefrontal cortex and ventrolateral prefrontal cortex. Chinese-Americans' neural response to either race did not differ from Caucasian-American or Chinese participants. Behaviorally, Caucasian-American and Chinese-American participants had more intergroup contact with either race than Chinese participants, but there was no effect of group on awareness of stereotypes or implicit bias. Taken together, these results suggest that cultural learning contributes to bias towards outgroups.

B-9

Using automated measurements of movement and audio data to predict attachment behaviors

Vivian Nauven – University of Miami: Emily Prince: Arridhana Cintadi: Aaata Rozaa: James Reha: Anna Warlaumont: Daniel Messinaer

We applied novel, objective measurements to infant and parent behaviors to better understand early attachment patterns, Infant attachment security is typically measured with the Strange Situation Procedure (SSP), a gold-standard protocol where infants are briefly separated from and reunited with their parent. Experts rate attachment-related behaviors in the two reunion episodes of the SSP to inform categorizations of infant attachment security. However, expert ratings are time-intensive and do not provide objective descriptions of infant behavior. Automated measurement, of movement and infant vocalization, is a promising approach to objectively quantifying key attachment behaviors. Sessions were recorded with four Kinect video/depth cameras, and infant and mother head positions were tracked over time in 3D (XYZ) space. Each infant was outfitted with a Language Environment Analysis (LENA) recorder and the audio information was classified by LENA software, vielding measures of infant non-speech-related vocalizations (e.g. crving). A reliable expert rated four infant attachment behaviors in the two reunion episodes; proximity-seeking (approaching mother), contact-maintenance (staying close to mother), resistance (to contact with mother), and avoidance (ignoring or moving away from mother).

Using movement and audio data, we calculated a set of theoretically-informed objective measures of attachment-related behavior patterns (e.g. frequency of infant contact initiation with mother, time in proximity with parent, and crying duration). These measures were moderately to highly correlated with expert ratings (r= |.44| - |.81|, mean r=.60, all ps < .01).

The results demonstrate that objective techniques can reveal underlying behavioral patterns originally only captured via expert but necessarily subjective rating scales.

B-10

The value of choice facilitates subsequent memory across age

Perri L. Katzman - New York University; Catherine A. Hartley - New York University

To reliably bring about a desired outcome, one must remember the actions that can produce that goal and be able to act on that knowledge. Adults exhibit better subsequent memory for experiences over which they have, versus lack, control. However, it is unknown whether a subjective sense of agency alone is sufficient to produce this effect, or whether an agent must be able to meaningfully influence their environment. A further outstanding question is whether the mnemonic benefit of agency changes with age. To test this, we ran 91 participants, ages 8-25 in a "space exploration" paradigm manipulating both agency and its usefulness. In half of the task trials, participants chose between two planets; on the remaining trials, participants lacked agency and one planet was pre-selected. Participants then saw a trial-unique object deemed "treasure" or "trash". The utility of agency was manipulated by having different galaxies (pairs of planets) in which either one planet was more likely to have treasure or both planets had equal likelihood. Agency had greater utility when participants could successfully learn to select the planet that had more treasure. When memory was tested after a 24-hour delay, participants of all ages had better recognition memory for the items encoded with agency, but only in the context for which agency was maximally beneficial. Additionally, source memory for whether each item was "treasure" or "trash" varied by age such that performance for rewarded items selectively increased during adolescence, while performance for non-rewarded items had the opposite pattern.

B-11

Temporal Self-Appraisal in Developmental Amnesia

Iulia G. Halilova - York University, Toronto, Canada: Donna Rose Addis - Rotman Research Institute, Bavcrest Centre for Geriatric Care. Toronto, Canada: R. Shavna Rosebaum - York University, Toronto, Canada: Rotman Research Institute, Baycrest Centre for Geriatric Care, Toronto, Canada

According to temporal self-appraisal theory, people tend to evaluate themselves in the past and future in a way that makes them feel good about themselves in the present (Wilson & Ross, 2001). In line with this theory, studies have shown that neurologically healthy individuals tend to believe that their personality has changed more in a certain period of time in the past than it will change in the same period of time in the future. Here we investigated whether episodic memory plays a role in one's ability to adjust their appraisals of themselves in the past and future in order to maintain a favourable view of self in the present. We tested a developmental amnesic person with episodic memory impairment (H.C.) and a group of age-matched controls on tasks assessing the Big Five personality traits in the present, in the past (10 years ago), and in the future (10 years from now). Consistent with previous research, we found that controls believe that their personality has changed significantly more in the past 10 years than it will change in the next 10 years. Patient H.C. shows a similar pattern of results. No significant differences in absolute values of change from past to present and from present to future were found between H.C. and controls. The findings suggest that temporal self-appraisal does not require one to revisit specific unique experiences in episodic memory, but, instead, might be supported by a personal schema that emerges from multiple experiences over time.

B-12

Choosing sadness: How people compute the value of emotions

Ian D. Roberts - University of Toronto; Azadeh HajiHosseini - University of Toronto; Cendri Hutcherson - University of Toronto

People usually prefer positive emotions. Yet people clearly also value negative emotions in certain contexts (e.g., horror films). How do we flexibly compute the value of emotional states, and how does this process unfold over time? To investigate these questions, participants in Study 1 completed a novel "art curator" paradigm in which they created two art galleries with different themes: happiness and unhappiness. Participants (n=54) placed monetary bids on IAPS images for inclusion in each gallery and earned money to the extent that the resulting galleries elicited the target emotions. These bids confirmed that participants valued positive emotions in the happy gallery and negative emotions in the unhappy gallery. Yet results from a drift-diffusion model of choice suggested that people more easily integrated affect into their choices when affect and value were congruent: emotional valence received a higher weight in the evidence accumulation process in the happy gallery. Furthermore, non-decision time (typically assumed to reflect perceptual processing) took longer in the unhappy gallery, suggesting that valuing negative emotion required a transformation before initiating decision-making. When and how does this transformation occur? In Study 2, we used pupil dilation, EMG, and EEG to track dynamic representations of both emotional valence and value. Notably, preliminary EMG results suggest that neural mechanisms for representing value and valence may be distinct. Planned EEG analyses will address this question.

B-13

Neurogenetic basis of personality

Sofie L. Valk - Institute of Neuroscience and Medicine (INM-7), Forschungszentrum Jülich; Felix Hoffstaedter - Institute of Neuroscience and Medicine (INM-7), Forschungszentrum Jülich; Peter Kochunov - Center for Brain Imaging Research, University of Maryland; B. T. Thomas Yeo - Department of Electrical and Computer Engineering, National University of Singapore; Simon B. Eickhoff - Institute of Neuroscience and Medicine (INM-7). Forschungszentrum Jülich

2019 SANS Poster Award Winner

Personality traits and brain structure are both heritable, but to date, no study has investigated whether similar genetic factors influence brain structure and personality. Here, we assessed the genetic correlation between personality traits and cortical morphometry, based on a biologically informed parcellation, using the twin and sibling design of the Human Connectome Project.

Confirming previous findings, we first observed significant heritability of personality traits, cortical thickness, and surface area. Co-heritability of cortical thickness and surface area varied across the cortex, in line with previous accounts of different biological processes shaping these morphometric features. Performing a co-heritability analysis of personality traits and brain structure, we observed significant evidence for a shared genetic basis. Extraversion was genetically linked to thickness in temporal-parietal regions and neuroticism shared genetic variance with surface area in frontal cortex. We observed no significant influence of environment on the relationship between brain and personality traits.

Using functional decoding, we could show that the regions significantly co-heritable with personality traits were associated with (socio-) cognitive processing. Indeed, also behavioral variance in quality of social relationships showed a genetic link with regions co-heritable with personality. Last, patterns of genetic co-heritability were largely specific for each personality trait and morphometric measure. Together, these observations indicate correlations between personality traits and brain structure have a genetic basis, highlighting genetic correlations in brain regions involved in socio-cognitive processing.

B-14

Coordinated Neural State Transitions during Interpersonal Communication

Shannon M. Burns - UCLA; Matthew D. Lieberman - UCLA

How can we use neuroimaging to understand the emergent dynamics of interpersonal conversations? Recent work in cognitive and social neuroscience has leveraged naturalistic continuous stimuli and model-free neuroimaging analysis to reveal contexts in which peoples' neural representations merge or become more synchronous during communication. But in back-and-forth conversations, synchronous brain activation may not be as important to identify as complementary activity - bringing separate contributions to the colloquial table, yet integrating them in a way that's coherent and generative. In this study, we explore an application of complex systems analysis to identify not when interacting brains are in similar states, but when they are moving through neural state space in a coordinated fashion. Student dyads (n=107 dyads) participated in a joint decision-making task in which they created a collaborative solution to a hypothetical resource allocation problem while undergoing neuroimaging with fNIRS. Analysis of neural activity during the conversation revealed that coordination of neural state transitioning occurred more extensively in real vs. randomly paired dyads; increased over the course of the conversation as a joint answer was converged upon; and predicted group behavioral fluency. This approach expands the analytical tools available for investigating the neural mechanisms of social influence and interpersonal communication.

B-15

Low Decision Acuity, a 'd' factor for decision-making, is associated with low worrying, low prosociality and high aberrant thinking

Michael Moutoussis - Max Plank - UCL centre for computational psychiatry and ageing, UK; Sharon A. Neufeld - University of Cambridge, UK; Dominik R. Bach - University of Zurich, Switzerland; Francesco Rigoli -City University, UK; Ela Polek - University College Dublin, Ireland; Benjamin Garzon - Karolinska Institutet, Sweden; Marc Guitart-Masip - Karolinska Institutet, Sweden; NSPN; Neuroscience in Psychiatry Network Consortium; Raymond J. Dolan - Max Plank - UCL centre for computational psychiatry and ageing, UK

Decision-making (DM) ability may be underpinned by general and specific factors, as is the case with IQ, but this is unclear. Ineffective decision-making may simply be due to low intellectual ability, or other, distinct factors. Likewise, how DM relates to measures of mental-health is unknown.

We examined fundamental decision-making measures in a sample of 830 English 14-24 year olds using a seven-task battery and derived the factor structure of these DM measures. We compared how DM measures related to (i) age, sex and socio-economic indices (ii) verbal, performance and general IQ (iii) dispositional and symptomatic measures of mental health derived from bi-factor analyses.

'Decision acuity' (d), emerged as a common factor across 31 task measures. d was characterized by valuing more distant value-related prospects, higher task learning rates and importantly a high decision consistency. Although d was robustly correlated with IQ, it had distinct patterns of relationship with demographic measures, increasing with age and being greater in males. Striking associations were identified with mental health measures. Participants who worried more showed higher decision acuity (generally better DM), while aberrant thinking (schizotypal/obsessional symptoms), and less so misbehaviour or antisocial characteristics, were associated with lower d, controlling for IQ scores.

Common variance in decision-making across cognitive domains is underpinned by a broad latent construct which we term decision acuity (d). This is related, but is not reducible, to verbal and performance IQ, and shows some sexual dimorphism. d is associated with distinct patterns of mental health characteristics, which warrant further research.

B-16

Ghost busting: Mental imagery in the regulation of fear conditioned reactivity

Steven G. Greening – Louisiana State University; Tae-Ho Lee – Virginia Tech; Rachel Millin – University of Washingon; Laurent Gregorie – Louisiana State University; Mara Mather – University of Southern California; Jonas Kaplan – University of Southern California

We tested the prediction that mental imagery can regulate emotional reactivity, as internally generated representations can out compete externally generated representations for prioritized processing. Specifically, we predicted that imagining a fear conditioned stimulus (CS+) while viewing a CS- would up-regulate the behavioral, physiological, and neural fear response markers compared to simply viewing the CS-; on the other hand, imagining a CS- while viewing a CS+ would down-regulate fear response markers. Twelve participants complete our fear conditioning and mental imagery regulation task. Behaviorally, we found a significant interaction [F(1,11)= 72.40,

B-17

The Dynamics of Frustration

Bowen J. Fung - California Institute of Technology; Colin F. Camerer - California Institute of Technology; Dean Mobbs - California Institute of Technology

As an emotion or mood, frustration is likely to play a critical role in aggression, domestic violence, gambling, and education, and thus is of high relevance to current societal problems. One striking finding is that frustrative non-reward (the absence of an expected reward) can increase general motor vigor. We wished to examine under what conditions this "frustration effect" would arise. To do this, we applied a computational model that had not previously been applied

to human data. Subjects performed a motor control task while we surreptitiously recorded the vigor of non-instrumental motor responses. These motor responses were significantly larger after losses compared to wins, demonstrating a gross frustration effect. Moreover, despite a wide range of individual differences, the predictions of the computational model were able to accurately capture the trial-by-trial variation in these motor responses - with no free parameters to fit to the data. These findings provide robust evidence that the "frustration effect" can be examined from a reinforcement learning framework, and add to the growing repertoire of models that predict human behavior outside of the choice domain. Furthermore, the model parameters can provide precise estimates that are ideal for psychiatric classification and neuroimaging experiments.

B-18

To Feel or How to Feel: Practicing Empathy, Reappraisal, and Perspective-Taking with Shakespeare

Mark C. Pizzato – UNC-Charlotte

Through an interdisciplinary approach, this project investigates possible shifts between left-cortical, right-cortical, and limbic networks while subjects watch different video versions of the "To be or not to be" speech in Shakespeare's Hamlet. It builds upon the theatre metaphors of Bernard Baars (which set up the Global Neuronal Workspace Theory of Stanislas Dehaene and Jean-Pierre Changeux), social neuroscience functions mapped by Matthew Liebernan, cultural applications of cortical lateralization research by lain McGilchrist, and cognitive reappraisal experiments by Mario Beauregard. Also drawing on details from artistic practices (and ancient theories from Greece and India), theatrical elements of brain networks are modeled—as theorized in the recent book, Beast-People Onscreen and in Your Brain (2016), by the presenter, Mark Pizzato. His "inner theatre" model is applied to new data in a classroom experiment with college students, surveyed as they read Shakespeare's soliloquy and watch videos of film and stage productions of the "To be" scene, involving Laurence Olivier (1948), Richard Burton (1964), Nicol Williamson (1969), Derek Jacobi (1980), Mel Gibson (1990), Kevin Kline (1990), Kenneth Branagh (1996), Campbell Scott (2000), and Ethan Hawke (2000). Measuring subjective experiences of limbic, right-cortical functions, which sections of the speech—and details in the different presentations on screen—shift the students' empathetic (intuition and motor mirror-neuron) feelings toward imaginary identifications or symbolic reappraisals, offering new perspectives? How might the model and survey also be used as teaching tools?

B-19

A Neuroeconomic Perspective on Inter-Temporal Decision-Making Deficits in Hoarding

Caitlin A. Stamatis - University of Miami; Kiara R. Timpano - University of Miami; Ashley M. Shaw - University of Miami; Travis C. Evans - University of Miami; Jennifer C. Britton - University of Miami Hoarding disorder remains poorly understood and difficult to treat, suggesting a need for continued research into vulnerability factors. Models of hoarding emphasize decision-making deficits as central to the disorder's core features (i.e., difficulties discarding, excessive acquiring, and clutter). While several studies have examined neural correlates of decision-making in hoarding, no such studies have considered temporal aspects of decision-making, which is key to approximating real-world aspects of choice behavior. In the current study, we aimed to elucidate inter-temporal decision-making deficits across a sample with varying hoarding severity.

A dimensional sample (N = 45; 16 hoarding disorder; 15 collectors; 14 matched controls) provided behavioral and neuroimaging data on an inter-temporal decision-making task with two conditions (money versus objects). In a 3T scanner, we measured BOLD activity when individuals chose a smaller immediate reward or a larger delayed reward, with preference for immediate rewards indicating greater impulsivity. Participants also completed likeability ratings for object stimuli in the scanner. After modeling at the individual level, we extracted BOLD activation using an anatomically-defined region of interest reflecting the hippocampus. Hoarding severity related to lower activation in the right hippocampus while rating objects (r = -3, p<.05) and greater likeability ratings of these objects (r = .4, p<.05). Though unrelated to impulsive decision-making, hoarding was negatively linked with right hippocampal activation during decisions about objects (r = -.3, p=.07), but not monetary stimuli. Results using a hyperbolic discount function will also be presented. Findings implicating hippocampal dysfunction will be discussed in terms of hoarding vulnerability models.

B-20

Neural and computational dynamics underlying different self-regulatory strategies in dietary choice

Azadeh HajiHosseini - University of Toronto; Cendri Hutcherson - University of Toronto

Regulating one's dietary choices can be accomplished by applying distinct strategies, e.g., by trying to eat healthy, nutritious foods, or by avoiding eating food in general. Do these strategies operate differently? To answer this question, we combined computational modeling with electroencephalogram (EEG) while subjects made decisions about whether to eat different foods varying on tastiness and healthiness. On each trial, participants were asked to respond naturally (Natural Focus) or to regulate their choices either by focusing on healthy eating (Health Focus), or by focusing on decreasing their desire for all foods (Desire Focus). Computational results implied distinct mechanisms underlying the effects of regulation in each condition. Subjects' choices were driven more by healthiness in the Health Focus and by tastiness in the Natural Focus, while Desire Focus resulted in an overall bias to say no. EEG results also implied distinct regulatory mechanisms. Importantly, all three conditions were characterized by a similar fronto-central value-related positivity ~450ms post-stimulus. A similar fronto-central positivity ~450ms post-stimulus also correlated with tastiness in all conditions, suggesting that taste processing may resist modulation by regulatory processes. However, an early frontal negativity ~250 ms post-stimulus. These results only in the Health Focus, while Desire Focus resulted with healthiness only in the Health Focus, well as a stronger late-emerging value-related signal in a right parietal component ~550ms post-stimulus. These results suggest that regulatory strategies may be implemented by different enval

B-21

Multivariate cross-classification suggests a role of posterior cingulate cortex in self- and meta-referential processing

Shawn A. Rhoads - Georgetown University; Joscelin Rocha-Hidalgo - Georgetown University; Shiva Hassanzadeh - Georgetown University; John W. VanMeter - Georgetown University; Abigail A. Marsh - Georaetown University

The ability to simulate another person's perception of our own characteristics (meta-referential processing) is critical for managing interpersonal relations. While many studies have investigated which brain regions are engaged during perspective-taking, or when an individual simulates another person's knowledge, perception or experience, few research has characterized the brain regions implicated during meta-referential processing (Flagan et al., 2017; Veroude et al., 2014; Pfeifer et al., 2009; D'Argembeau et al., 2007). Since this type of perspective-taking requires the maintenance of self-knowledge in comparison to how well that knowledge corresponds to a meta-perception of what another person knows, the present study seeks to understand the cross-modality between self- and meta-referential processing. Participants (n=7; data collection ongoing) completed a modified self-referential processing task while undergoing functional magnetic resonance imaging. During the task, each participant was shown personality and physical trait words (controlled for frequency, length, syllable, and valence) and asked to think how characteristic each trait was of him/herself from his/her own perspective (self-condition) and from a partner's perspective (meta-condition). Using a leave-one-run-out approach, a multivariate support-vector-machine cross-classification (training on meta condition and testing on self-condition, and vice-versa) revealed classification accuracy (mean area-under-the-receiver-operating-characteristic curve = 60.55%) significantly greater than chance (T(1,6)=26.16, p-FWE

B-22

Examining TPJ Functions Using NS+ (A New Meta-Analysis Tool to Extend NeuroSynth Utility)

Meng Du - University of California, Los Angeles; Matthew D. Lieberman - University of California, Los Angeles

A vast amount of human neuroimaging research seeks to understand the functional mapping of brains with forward inference analyses, which show brain activities produced by specific manipulations but do not indicate causal relationships in the opposite direction. On the other hand, a reverse inference approach, such as NeuroSynth analyses, reveals the cognitive functions of brain regions but is limited in its flexibility. To address this issue, we developed a new meta-analysis tool (NS+) based on NeuroSynth, together with a graphical interface, to support highly customizable forward and reverse inference analyses within any given region of interest. Specifically, it allows analysis and comparison of custom terms, ranking of 3000+ NeuroSynth terms in any ROI, and multi-term comparison that shows the territory where each term dominates in a region. Here, we use NS+ to examine the functions and subdivisions of the temporoparietal junction (TPJ) as a demonstration. Based on previous literature and an exploratory term ranking, we consider a few customized NeuroSynth terms including mentalization (theory of mind), autobiographical memory, attentional orientation, and language comprehension. The results suggest a strong link between mentalization and most of the central TPJ, as well as associations of posterior TPJ with autobiographical memory, anterior right TPJ with attentional orientation, and anterior left TPJ with language comprehension. We also further recognized and examined the relatively non-selective TPJ areas. In this presentation, we will demonstrate how to conduct these analyses with original demonstrate how to conduct these analyses with

B-23

Blue Light has No Effect on Frustration

Martha Hall - Louisiana State University; Steven Greening - Louisiana State University

Research has shown the negative effects of fluorescent light but there is little research on the positive effects of blue LED light in a lab setting (Romeo, 2017). The West Japan Railway company introduced blue lights onto their platforms in place of fluorescent lights in 2006. An observational study showed that the amount of suicides on those platforms decreased by 84% (Matsubayashi, 2013). The present study tests the hypothesis that blue LED light reduces frustration and other anger mood states in a lab setting. Seventy-eight students first completed the Profile of Mood States (POMS; Grove, 1992) and then completed a frustrating impossible anagram task under blue LED light (n=44) or white fluorescent light (n=34). After completing the task, students for students on previous literature we hypothesized that students working under blue LED light would have a smaller increase in frustration as measured using those respective subscales on the POMS. The results of a two-way ANOVA showed that there was no significant difference in anger across the groups, F(1,75)=.297, p=.581. These results fail to reject the null hypothesis. This does not support the results from the 2006 observational study of suicides on train platforms. The current results suggest that the evidence from the 2006 study may be anecdotal, or some factor other than reduced anger or frustration affected the suicide rates that year.

B-24

Medial Prefrontal Activity During Face Perception Affects Older Adults' Social Cognition

Brittany S. Cassidy - University of North Carolina at Greensboro; Colleen Hughes - Indiana University; Anne C. Krendl - Indiana University

Shifting demographics in the United States suggest that older adults (OA) will rely more on a diversified younger adult (YA) population for support in the coming years. Identifying processes affecting OA' interactions is thus societally relevant. Trust, which is perceived in faces and often afforded more to ingroup White than outgroup Black faces, is a key component of these interactions. One process potentially affecting this racial trust disparity is mentalizing (i.e., thinking about others' mental states). OA engage medial prefrontal cortex (mPFC), a brain region involved in mentalizing, less than do YA in many mentalizing tasks. We examined if this deficit extended to perceiving faces and if the extent of OA' engagement affected mentalizing-related behavior and racial trust disparity. Both replicating and expanding upon past work by suggesting a mentalizing deficit, OA had less mPFC activity than YA when perceiving faces. Activation toward faces that was extracted from an mPFC ROI defined by a mentalizing localizer evinced that the extent of this deficit among OA influenced their mentalizing-related behavior. Here, mPFC engagement to faces positively related to OA' ability to detect mental states from faces. Importantly suggesting its contribution to OA' intergroup behavior, mPFC responses to Black versus White faces negatively related to OA' racial trust disparity. The extent of an age deficit in mentalizing-related neural activity may thus underlie broad and more specific intergroup aspects of OA' social cognition. Identifying these relationships may be critical to understand aging-related social dysfunction and to develop interventions aimed to reduce such dysfunction.

B-25

Gossip drives vicarious learning and facilitates robust social connections

Eshin Jolly - Dartmouth College; Luke J. Chang - Dartmouth College

Exchanging gossip is a ubiquitous and complex human behavior, yet most individuals regard it as socially taboo. At the same time, its precise social function remains poorly understood. Prior work has been thus far limited to self-report surveys, observational data, and laboratory experiments narrowly focused on group cooperation. Here we provide empirical evidence that gossip plays a critical role in vicarious learning and social bonding. Using modern web technologies, we recruited a large and diverse group of participants (N = 954) to interact in real time in the context of an economic game. Games varied such that some individuals could exchange private messages with another player while others could not. Games also varied such that individuals were either able to fully or partially observe the behavior of all other players. We find that gossip spontaneously emerges when individuals must rely on each other for social information and promotes the rapid spread of information about others' unobserved actions, which causally influences individuals' future behavior. Gossip also facilitates the formation of social connections between individuals, influence each other's future behavior, and form more similar social impressions of others. These results directly contradict the commonly held view that gossip is primarily defamatory in nature and instead demonstrate that gossip can provide a rich source of information to aid in navigating the social world that ultimately leads to more cooperative interactions by providing a mechanism to quickly forge social connections.

B-26

Opioids and social bonding: naltrexone reduces emotional and neural responses to social and physical warmth

Tristen K. Inagaki - University of Pittsburgh; Laura I. Hazlett - University of California, Los Angeles; Carmen Andreescu - University of Pittsburgh School of Medicine

Socially warm experiences, when one feels connected and close to others, have been linked with physical warmth. The endogenous opioid system, known to support social bonding with close others and, separately, thermoregulation, may underlie both experiences. However, the contribution of opioids to feelings of social connection toward one's own close others, neural activity to those we feel close to, and the potential overlap with physical warmth have not been conducted. In the current randomized, double-blind, placebo-controlled study 80 participants were administered 50mg of oral naltrexone (n = 40) or placebo (n = 40) before completing an fMRI scan where they (1) read messages from their own close others and strangers (social warmth task) and (2) held a warm, cool, and neutral object (physical warmth task). Feelings of social connection to before completing an fMRI scan where they (a) read messages from increases in affiliation-related neural activity. Further, feelings of social connection were positively related to neural activity to social warmth. However, naltrexone (vs. placebo) disrupted these effects by (a) reducing affiliation-related activity to social and physical warmth. (b) erasing the subjective experience-brain association to social warmth, and (c) disrupting the overlap between social and physical warmth. Together, the results suggest opioid saffect social bonding via two converging routes: feelings of social connection to close others, consistent with the brain opioid theory of social attachment, and thermoregulatory pathways, consistent with overlap. *2019 SANS Poster Award Winner*

A multivariate model of psychological and neural predictors of pain

Elizabeth A. Losin – University of Miami; Sierra A. Bainter – University of Miami; Tor D. Wager

Pain is a multifaceted biopsychosocial construct. Yet, many studies of pain focus on a contributing factors from a single domain (psychological, sociocultural, or neurobiological). Previously, we have proposed a neurocultural model of pain that integrates these, outlining different psychological, sociocultural, and neurobiological contributors to different stages of acute pain experience. Here, we use a variable selection technique, stochastic search variable selection (SSVS), to test this model by selecting the subset of psychological, behavioral, and predictors that explain the most variance in pain ratings during experience. Here, we use a variable selection technique, stochastic search variable selection (SSVS), to test this model by selecting the subset of psychological, behavioral, and predictors that explain the most variance in pain ratings during experience to the sociocultural context, and activity (IMRI) within several of the pain-related neural systems in the model. We found that the predictors most consistently selected in our statistical models and explaining the most variance in pain rating spanned all stages of our neurocultural model. These variables comprised both those consistently associated with pain in the literature (e.g., pain catastrophizing) and some that are more novel (e.g., illness beliefs and previous experiences of disrimination). We also found that neural measures were consistently included in the most pain-predictive models, particularly those brain regions related to the affective-motivational rather than the sensory-discriminative aspects of pain. Our findings provide a quantitative characterization of the multidimensional nature of experimental pain.

B-28

Rapid turn-taking during natural conversation predicts greater social connection

Emma M. Templeton - Department of Psychological and Brain Sciences, Dartmouth College; Luke J. Chang - Department of Psychological and Brain Sciences, Dartmouth College; Thalia P. Wheatley - Department of Psychological and Brain Sciences, Dartmouth College

Some conversations consist of slow and deliberate turn-taking. Others move quickly – bouncing from one idea to the next. Which type of conversation do people find more enjoyable and why? We recorded unstructured 10-minute conversations between 268 unacquainted same-sex dyads. Across conversations, dyads who engaged in more rapid turn-taking reported greater conversation enjoyment. Immediately following their conversation, participants continuously rated how connected they felt to their study partner while watching a video recording of their interaction. We related this dynamic measure of social connection to the changing rate of turn-taking reported greater conversations between 268 unacquainted same-sex dyads. Across conversation, gavids who engaged in more rapid turn-taking reported greater conversation enjoyment. Immediately following their conversation, between 268 unacquainted same-sex dyads. Across conversation, gavids who engaged in more rapid turn-taking reported greater conversation enjoyment. Immediately following their conversation, between 268 unacquainted same-sex dyads. Across conversation, gavids who engaged in more rapid turn-taking reported greater conversation enjoyment. Immediately following their conversation that naturally occurred over the course of each conversation. Moments of relatively faster turn-taking corresponded with feelings of increased social connection. One potential explanation is that rapid turn-taking relies upon both parties correctly anticipating and building upon the contributions of their partner, which requires mutual understanding and indicates a synergy between two minds. To test this idea, we provided a new set of participants reported they would have greater difficulty reconstructing the full conversation when speech turns were rapid as compared to slow. Together, these results suggest that rapid-turn-taking in conversation acts as a signal of sharing a mind and fosters feelings of mutual social connection between individuals.

B-29

Neuromodulation of Other-Regarding Preferences via HD-tDCS over the Right Temporoparietal Junction

Flora Li - Department of Economics, Virginia Tech; Sheryl Ball - Department of Economics, Virginia Tech; Xiaomeng Zhang - Department of Economics, Virginia Tech; Alec Smith - Department of Economics, Virginia Tech; Virginia Tech;

The structure and function of the right temporoparietal junction (rTP]) has been associated with social behavior, sensory integration, information processing, and attention allocation. We examine the effect of neuromodulation of rTPJ on other-regarding preferences and rational choice using focal high definition transcranial Direct Current Stimulation (HD-tDCS). The effects of stimulation on both other-regarding behavior and rationality (Monotonicity, WARP, and GARP) of individuals' choices are measured. We find that rTPJ not only plays a role in other-regarding behavior but also broadly affects the consistency and rationality of choices. The results suggest that comprehensive theories of rTPJ function in social behavior should account for the multifaceted role that rTPJ plays in processing sensory information.

B-30

Cultural differences in structural properties of the brain is moderated by the dopamine D4 receptor gene

Qinggang Yu – University of Michigan; Abe Nobuhito - Kyoto University; Anthony King - University of Michigan; Carolyn Yoon - University of Michigan; Israel Liberzon - Texas A&M Health Science Center; Shinobu Kitavama - University of Michigan

Previous evidence suggests that certain cultural differences in psychological processes (e.g., self-construal) are linked to structural properties of the brain. The directionality of this relationship, however, remains unclear. Here, we addressed this gap by adopting a unique genetic approach. People who carry the 7- or 2-repeat allele (7/2-R) of the dopamine D4 receptor gene (DRD4) have been described as being more sensitive to environmental influences, including cultural influences. We thus predicted that if culture shapes the brain, this link should be moderated by DRD4. We analyzed structural MRI images of 132 subjects (both European Americans and Asian-born East Asians). Approximately half in each cultural group carried the 7/2-R of DRD4. Consistent with previous work, voxel-based morphometry analysis revealed significantly greater gray matter (GM) volume at orbitofrontal cortex (OFC) and ventromedial prefrontal cortex (vmPFC) among European Americans than among East Asians. In addition, we found that the GM volume at the temporoparietal junction (TPJ), a region critical for perspective taking, was significantly greater among East Asians than among European Americans. More importantly, both of these cultural differences were significantly more pronounced among the carriers than among the non-carriers. Confirming that these structural brain differences are related to previously documented cultural difference in self-construal, we showed that OFC and vmPFC volume were inversely correlated with interdependence, and TPJ volume was inversely correlated with independence. The present study provides initial evidence that culture plays a powerful role in shaping the structural properties of the brain.

B-31

Neural mechanisms of distal simulation in creative experts

Judith N. Mildner - Princeton University; Meghan L. Meyer - Dartmouth College; Hal E. Hershfield - University of California, Los Angeles; Adam Waytz - Northwestern University; Diana I. Tamir - Princeton University

People have an immense capacity for imagination. We can simulate past and future times, far flung places, and the perspectives of other people. Despite this vast range of possibilities, imagination does have its bounds. The further away a scenario is in time, place, perspective, or likelihood, the more difficult it becomes to simulate. To investigate the neural mechanisms that underlie successful distal simulation, we studied individuals who routinely transcend the normal limits of simulation: creative experts. Behavioral data showed that individuals with real-world success in creative domains (Study 2). Compared to matched controls (Study 1). We used fMRI to investigate the neural mechanisms of proximal and distal simulation in creative experts and a control sample of successful professionals in non-creative domains (Study 2). Compared to controls, creative experts showed increased a control sample of successful professionals in non-creative domains. Study 2). Compared to controls, creative experts and a control sample of successful professionals in non-creative domains. Study 2). Compared to controls, creative experts and proximal administic reased functional connectivity in the dorsomedial subsystem of the default network during distal simulations, but not during proximal simulations. These results show that successful distal simulation and proximal simulation rely on distinct neural mechanisms. Further, the dorsomedial subsystem of the default network showed increased functional connectivity during resting state for creative experts. This suggests that creative experts are better prepared to engage this neural mechanism, or that they default to more distal simulation during rest. Together, these findings show that creative experts can exceed the traditional limits on distal simulation by recruiting a neural mechanism that less creative individuals do not recruit.

B-32

Age but not emotion impacts motor response inhibition

Samantha E. Williams - Department of Psychology, Saint Louis University; Jill D. Waring - Department of Psychology, Saint Louis University

Evidence is mixed about whether emotional information impacts motor response inhibition. Research has shown emotional information can impair, enhance, or have no effect on inhibition processing in younger adults. Additionally, older adults often display declining response inhibition performance to non-emotional information, but it is unclear if older adults have differential inhibition responses to emotional information compared to younger adults. An emotional adversely affect response inhibition for all types of faces, and that emotional faces would evoke less efficient stopping compared to neutral faces for both younger and older adults. Although older adults were slower than younger adults, there were no differences between responses to emotional compared to neutral stimuli, indicating emotion did not interrupt response inhibition in either age group. We theorized the lack of emotion effect was due to shallow stimulus processing during the fast-paced SST. Therefore, study two utilized gender of stimulus face (e.g., male or female, counterbalanced across runs) as stop signals to encourage deeper face processing, and we predicted the same pattern of results as in study one. Again, analyses revealed the predicted age effect but no emotion effect on response inhibition. Future research will investigate whether making emotion directly task-relevant (i.e., facial expression as stop-signal) will impact patterns of response inhibition.

B-33

Cultural Variation in Default Modes of Self: Evidence from Resting State Alpha Power

Cristina E. Salvador - University of Michigan; Brian T. Kraus – Northwestern University; Mayumi Karasawa - Tokyo Christian Women's University; Jon-Fan Hu - National Cheng Kung University; Aya Kamikubo - Tokyo Christian Women's University; Nai Ching Hsaio - National Cheng Kung University; Shinobu Kitayama - University of Michigan

Functional neuroimaging studies have revealed that at rest the brain shows high activation in a network of cortical regions known as the default mode network. Consistent with this work, electrocortical studies demonstrate that alpha, a neural oscillation, similarly increases in power during rest and when people engage in self-referential processing. However, there are substantial individual and cultural differences in alpha power during rest. Here, we explored whether variation in alpha power could be explained by culture and self-construal. Previous work established that American culture tends to emphasize the autonomy of the self (independence). We hypothesized that alpha power would be greater among Americans than Asians and should increase as a function of independent versus interdependent self-construal. To test these predictions, we collected data from a total 172 participants and compared Japanese to European Americans (Study 1) and Taiwanese to European Americans (Study 2). In both studies, we found greater parietal versus frontal alpha power was highly correlated with self-construal across cultures, such that more independent and less interdependent people showed greater alpha at rest. This effect in part explained the cultural difference in alpha power. Our findings provide evidence that cultural variation in default modes of self can be reflected in resting state alpha power, and highlight the promise of alpha oscillations to understand self-referential processing and variation across groups.

B-34

A Test of Physiological Synchrony as a Causal Factor in Interpersonal Trust

Austin Lair - Bradley University; Lane Beckes - Bradley University

Synchrony breeds preferences. Previous research suggests that physiological synchrony is associated with increased trust and liking between individuals (Mitkidis et al., 2015) The causal process by which synchrony is associated with trust remains ambiguous. For example, synchrony could emerge from emotion regulation mechanisms that are linked to individual differences in interpersonal connection and trust (e.g., Kok et al. 2013). Alternatively, synchrony may be intrinsically rewarding (Wheatly et al., 2011). If synchrony is rewarding, and drives trust per se, then synchrony between heart rhythms and an external rhythm from another person should increase trust. Alternatively, if physiological synchrony is associated with individual differences. Our current sample consists of 15 participants (target n=60). Participant ECG and EEG (to measure heart rate variability and EEG wave-form activity associated with autonomic control; e.g., Kubota et al., 2001) are recorded during the rhythmic drumming of two confederates, one beating a rhythm synched to participant heart rate and another 20 bpm faster or slower (coutner-balanced). Each confederate is then rated on trust. A preliminary rmANOVA showed higher trust in the asynchrony condition (t = 3.606, p = .003). These findings in conjunction with congruent heart rate variability and EEG findings could suggest that physiological synchrony per se.

B-35

Shared variance between observational learning and decision-making under uncertainty

Dongil Chung - UNIST; HeeYoung Seon - UNIST; HyungSeok Won - UNIST

In uncertain environment, individuals make choices based on their expectancy about the world and try to minimize the errors when they receive additional information indicating that their expectancy was wrong. Previous studies have shown that many species including humans can learn not only by direct experience, but also by observation. However, it is still unknown why some individuals rely more on their own experience, while others rely on information from social others. Here, we hypothesized that one's belief about the reliability of the source determines the extent to which one uses the information from the source. To test this hypothesis, we used a gambling task, including partially unknown probabilistic learning task where participants can learn about reward contingency by direct experience or by observation. We measured individuals' EEG and behavioral responses to ambiguous and vague gambles, and examined whether those individual characteristics explain their reliance on different sources of information in gambles learn more (larger learning rates) from their direct experiences than from observation. This result suggests that common individual characteristics may underlie in deciding strategies for observational reward learning—choosing from which source we learn—and in value-based decision-making—subjective valuation of uncertain outcomes.

Neural reward related reactions to monetary gains for self and charity in adolescence

Jochem P. Spaans - Leiden University; Sabine Peters - Leiden University; Eveline A. Crone - Leiden University

Prior studies have consistently found that adolescents show more reward-related activity in the ventral striatum (VS), for monetary and social rewards. This might explain increased risk-taking behavior seen in middle to late adolescence. Recently, it has been suggested that this increase in sensitivity to rewards might also lead to an increase in prosocial behavior. The social reward gained from performing a prosocial action may also be stronger in adolescence, and as such increase motivation to perform prosocial actions.

We collected fMRI data for 160 participants (ages 11-21) during a task in which they could earn money for themselves and for a self-chosen charity by selecting one of two options with unknown outcomes, to reveal an outcome for self, charity or both.

fMRI results revealed gaining for self and for both parties resulted in ventral striatum activity, but not for charity. Furthermore, with increasing age, activation in the ventral striatum when winning money for self and both decreased. After scanning, participants could donate to charity in a coin division task. Donation behavior was correlated to more charity-versus-self-related ventral striatum activation.

Our results demonstrate a link between VS activity and prosocial giving, and replicate the finding that reward-sensitivity for personal-rewards is stronger in early-adolescence. Interestingly, sensitivity to vicarious rewards was unrelated to age, but was significantly related to individual differences in prosocial behavior.

B-37

The neuroscience of harming others in different contexts

Pascal Molenberghs - School of Psychological Sciences, The University of Melbourne

How we interact with others is context dependent. Usually we act friendly towards others, but in extreme situations (e.g., war) we sometimes have to harm others to save our own life. To provide insight into how our brain adjusts to these different types of situations, three fMRI experiments were conducted. The first fMRI experiment showed that in groups that have no strong animosity towards each other, ingroup bias is more about ingroup love than outgroup hate. That is, brain regions involved in rewarding others (medial orbitofrontal cortex and striatum) were more active when rewarding ingroup members. However, brain regions involved in punishing others, such as the lateral orbitofrontal cortex (IOFC), were equally active when harming ingroup members. The second fMRI experiment showed that in warlike situations the group membership of the victim (i.e., innocent civilians vs. soldier) is very important. Harming innocent civilians to a person or not, depending on whether they believed the person was holding a gun or not. Similar as fMRI experiment 2, killing an innocent person (i.e., a person who was not holding a gun) led to an increase in IOFC activation. Combined, the results provide insight into how context modulates the neural responses involved in harming others.

B-38

The influence of close relationships on shared reward processing in older and younger adults

Dominic S. Fareri – Adelphi University; Victoria Kelly – Temple University; Nicole M. Henninger – Temple University; Katherine Hackett – Temple University; Dennis DeSalme – Temple University; Benjamin Muzekari – Temple University; Srikar Katta – Temple University; Crystal Reeck – Temple University; Tania Giovannetti – Temple University; David V. Smith – Temple University

Maintaining a network of close social relationships supports overall well-being throughout the lifespan, suggesting that close relationships are intrinsically rewarding. We have previously shown in healthy young adults that rewards shared with close friends (versus strangers) evoke stronger representations of value in the ventral striatum. However, the nature of our relationships with close others may change with age, coupled with changes in function and connectivity within neural circuits supporting reward processing (i.e., striatum, prefrontal cortex (PFC), amygdala). One outstanding question is how functional connectivity within this circuitry during shared reward processing is modulated by social closeness, and whether such connections change across the lifespan. We conducted a block design version of a reward processing, shared rewards (relative to punishment) evoked activation in the striatum. A seed-based psychophysiological interaction (PPI) analysis showed that amygdala connectivity with the right dorsolateral PFC increased when sharing monetary rewards with a close friend (versus a stranger). These findings suggest differential interactions within neural reward circuitry when sharing positive experiences with close versus unknown others. Future analyses will examine differences within reward-related circuitry when sharing rewards with close versus unknown others. Future analyses to the neural encoding of relationship value during shared positive experiences. **B-39**

Neural mechanisms of costly helping behavior: General population and Mirror Touch Synesthesia

Kalliopi Ioumpa - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Selene Gallo - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Christian Keysers - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Institute for Neuroscience, Royal Netherlands Academy of Arts and Sciences; Valeria Gazzola - Netherlands Ins

Brain regions active both when experiencing and witnessing somebody else in pain, are often interpreted as neural correlates of empathy and are thought to motivate helping. The variability of prosocial behavior in the population is high, especially when the costs of helping increases. In Mirror Touch Synesthesia (MTS) seeing someone else being touched triggers tactile sensations on the correspondent part of the synesthete's body. It has been proposed, that hese sensations result from increased activity in areas involved in vicariously experiencing other's sensations, and that this leads to increased empathy. Here, we explore if and how this influences prosociality. So far, twenty-five control and seven MTS participants performed a costly helping task in fMRI. Participants watched a confederate experiencing pain stimulations at the hand and they could reduce the intensity by donating money. Across all participants, the magnitude of activations in brain regions associated with the pain network (including the insula, ACC, SII and amygdala) correlates with the trial-by-trial donation of the participants. Moreover, participants with higher overall donation demonstrate increased activation of insula and SII. Behaviorally, we find that individuals with MTS act more prosocially than control participants, donating significantly more money in order to reduce the pain intensity of pain stimulations. Preding acquisition of further MTS participants, these results confirm that brain regions known to be implicated in pain observation are more active when individuals act more prosocially. In addition, we will explore what brain activation patterns mediate the observed difference in behavior between MTS and control participants.

B-40

Age Differences in Neural Correlates of Feedback and Fairness Processing

Carina Fernandes - Faculty of Medicine, University of Porto; Rita Pasion - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto; Ana R. Gonçalves - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto; Fernando Serreira-Santos - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto; Fernando Ferreira-Santos - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto; Fernando Barbosa - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education, Institute of Molecular Medicine, University of Lisbon; João Marques-Teixeira - Laboratory of Neuropsychophysiology, Faculty of Psychology and Education Sciences, University of Porto

The neural mechanisms underlying age-related differences in decision-making are still slightly known. Moreover, the research in this field is hampered by the evidence that older adults' risk preferences vary substantially within tasks. In two experiments, we examined age-related differences in behavioral and neural responses to risky and social economic decisions. Firstly, to assess decision-making under risk, younger, middle-aged and older adults were asked to decide between two risky options, in the gain and loss domains. In the second task, the same participants performed the Ultimatum Game in the proposer and respondent roles. Both experiments were performed during EEG recordings. In the risky task, results evidenced group-related differences in a alier stages of feedback processing, indexed by differences in the Feedback-related Negativity (FRN) and feedback-P3 amplitudes. Behaviorally, older adults had higher rates of risky decisions than younger adults in the loss domain. In the social task, older adults had the best economic strategy by accepting more unfair offers than younger adults. Regarding electrophysiological results, while younger adults showed higher medial frontal negativity (MFN) after unfair than after fair offers, middle-aged and older adults had similar amplitudes after both.

Overall, our results are consistent with an insensitivity of the Anterior Cingulate Cortex to the fairness of the offers and to the valence of the feedbacks, since this region appears to be the neural source of both FRN and MFN. 8-41
2019 SANS Poster Award Winner

A tripartite map of the ventromedial prefrontal cortex

Haroon Popal - Department of Psychology, Temple University; Yin Wang - Department of Psychology, Temple University; Athanasia Metoki - Department of Psychology, Temple University; Sheng Zhang - College of Science of Technology, Temple University; Ingrid Olson - Department of Psychology, Temple University;

The ventromedial prefrontal cortex (vmPFC) has been implicated in a far-flung assortment of social, cognitive, and affective behaviors. Case studies of individuals with lesions to the vmPFC report problems in decision making and learning from mistakes, as well as problems in detecting irony and sarcasm and affective regulation. In the present study, we asked whether this heterogeneity can be explained by the presence of different functional regions within the vmPFC. We leveraged a large-scale multimodal dataset (e.g. the Human Connectome Project Consortium) to parcellate the vmPFC at a high level of granularity based on gray matter activations (Exp. 1) and white matter connectivity (Exp. 2). Our results show that the vmPFC can be segmented into three functional regions - theory of mind, valuation, and emotion processing - along the rostral-caudal axis. We hypothesized that the separability of each functional segment was due to distinct patterns of white matter inputs and outputs, which we also delineated, showing for instance, that the theory of mind-sensitive region of the vmPFC received projections from nodes in the mentalizing network. In sum, our findings define a tripartite functional boundaries.

B-42

Domain-specific effects of cognitive load on interpretations of emotional ambiguity

Nicholas R. Harp - University of Nebraska-Lincoln; Maital Neta - University of Nebraska-Lincoln

Many facial expressions convey a relatively clear emotional valence (e.g., happy is positive, angry is negative). However, some expressions (surprised) are more ambiguous, resulting in individual differences in the tendency to interpret these expressions as positive or negative. Increasing cognitive load is known to affect emotional responses in a variety of ways; when resources are limited, responses may be inhibited or amplified. Critically, positive interpretations of surprised faces are slower and likely require a top-down regulatory process. Here, we investigated the effects of varying cognitive load is motional and neutral domains on evaluations of face stimuli. The task required participants to hold either two (low-load) or six (high-load) neutral or emotional (positive and negative) images in memory while rating the valence of angry, happy, or surprised faces. After each face presentation, participants judged a probe as either old or new. We predicted that ratings of surprised faces would be more negative for emotional compared to neutral load and for high- compared to low-load trials. A load (low, high) x type (neutral, emotional) x expression (angry, happy, surprised) repeated-measures ANOVA revealed an interaction of load x valence, F(2,38)=10.714, p<.001, such that surprised faces (p<.001) than neutral load. These results suggest that a higher cognitive load, specifically in an emotional domain, may deplete the regulatory resources for positive interpretations of surprised faces (p<.001) than neutral load. These results suggest that a higher cognitive load, specifically in an emotional domain, may deplete the regulatory resources for positive interpretations of surprised faces (p<.001) than neutral load. These results suggest that a higher cognitive load, specifically in an emotional

B-43

Using continuous mobile sensing to uncover correlates of student stress

Alex W. daSilva – Department of Psychological and Brain Sciences, Dartmouth College; Jeremy F. Huckins – Department of Psychological and Brain Sciences, Dartmouth College; Rui Wang – Department of Computer Science, Dartmouth College; Dylan D. Wagner – Department of Psychology, Ohio State University; Andrew T. Campbell - Department of Computer Science, Dartmouth College; Dylan D. Wagner – Department of Psychology, Ohio State University; Andrew T. Campbell - Department of Computer Science, Dartmouth College

Stress levels among college students have been on the rise and continue to climb as over half of students report experiencing "more than average stress". Many potential stressors exist in the lives of students, and it remains unclear how these may collectively contribute to global levels of stress. Until recently, the dominant method for sampling information about students' lives came by way of diaries where details about students' thoughts, experiences, and behaviors could be recorded over a specified temporal range. However, diary methods can be time intensive for participants and typically rely on retrospective self-report of activities, a task that is known to be susceptible to cognitive biases. To overcome these limitations, we conducted a study using the StudentLife app (N= 72), an app that can administer EMAs (ecological momentary assessments) and collect continuous mobile photographic stress meter), a picture-based stress measure, was used as a daily measure of stress. Location (e.g., distance traveled, time spent in buildings on camps), audio (e.g., conversations, ambient noise), phone-based (e.g., screen unlocks), and sleep (e.g., sleep duration) features were derived from the continuous sampling of smartphone sensors. From these main feature types, 60 additional features were created to comprehensively sample the daily life of a college student. By using recently developed methods for feature selection and estimation on high-dimensional longitudinal data, we were able to identify a set of features across the domains of social activity, location, and ambient noise that were related to stude velose.

B-44

Uncovering a latent factor structure underlying pre-adolescent self-regulation and its neural substrates

Katherine L. Bottenhorn - Department of Psychology, Florida International University; Michael C. Riedel - Department of Physics, Florida International University; Erica D. Musser - Department of Psychology, Florida International University; Raul Gonzalez - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Physics, Florida International University

Self-regulation is a domain that remains poorly characterized, especially with respect to its myriad definitions, reliability, and validity of related constructs. Reflecting the uncertainty of the domain itself, the neural substrates of self-regulation are similarly unclear; however, it is clear that these neural substrates follow a protracted development into early adulthood.

Here, we assess juvenile self-regulation and its comprising constructs in a sample of 2,482 children, aged 9-10 years, from the ABCD Study. First, we explore relationships between measures describing self-regulation and model their concatenation in regulating behavior. Then, we assess the neural substrates of regulation and impulsivity in fMRI data acquired while participants performed a Stop-Signal Task (SST).

Exploratory factor analysis revealed that constructs concatenating self-regulation coalesce into five factors: "impulsivity", "neward responsivity", "motor control", "cognitive control", and "avoidance". Brain regions more engaged during incorrect stop trials than correct (i.e., during motor impulsivity) included the frontal pole, postcentral gyrus, and cuneus. Conversely, regions more engaged during correct stops than incorrect (i.e., during motor inhibition) include the putamen, nucleus accumbens, parahippocampal gyrus, amygdala, and mediolateral orbitofrontal cortex. No significant sex- or age-related differences in stop-related brain activation were identified. Of the five factors, only individual differences in stop-related to activation during stop trials, in the anterior cingulate cortex and nucleus.

In summary, we identified a latent factor structure underlying self-regulation, parsed regions engaged during motor impulsivity and inhibition, and, interestingly, uncovered neural correlates underlying individual differences in impulsivity, but no other factors, during motor inhibition.

B-45

Intrinsic connectivity of the human habenula and its relation to negative affect

Katherine L. Bottenhorn - Department of Psychology, Florida International University; Jennifer L. Robinson - Department of Psychology, Auburn University; Julio A. Yanes - Department of Psychology, Auburn University; Jessica S. Flannery - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Angela R. Laird - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sutherland - Department of Psychology, Florida International University; Matthew T. Sut

The human habenula is a small, bilateral, epithalamic nucleus involved in reward processing, providing top-down modulation of dopaminergic and serotonergic midbrain structures. Convergent animal and human research has demonstrated the habenula's role in learned helplessness and depression, implicating the habenula in the characteristic reward processing dysfunction of depression. However, there is a lack of research supporting this relationship.

Here, we replicate recent findings from Torrisi et al. (2017) to clarify the resting-state functional connectivity of the healthy habenula in two independent, ultra-high field MR datasets, including 7T Human Connectome Project (HCP) data. We extend these findings with the HCP dataset, leveraging behavioral and neurocognitive data to assess differences in habenula connectivity related to individual variability in measures of negative affect, a robust predictor of depression, including NIH Toolbox instruments for Psychological Well-Being, Social Relationships, Stress and Self-Efficacy, the Penn Emotion Recognition Test, and Five-Factor Model of Personality (NEO-FFI).

Our results support Torrisi and colleagues' (2017) findings of intrinsic habenula connectivity with the anterior cingulate cortex, caudate, retrosplenial cortex, and midbrain structures, while extending these results to include the precuneus, insula, and frontoparietal regions. Habenula connectivity with portions of each the medial frontal gyrus and right hippocampus was negatively associated with differences in an individual's sense of meaning and purpose in life, while connectivity with a portion of the cerebellum was negatively associated with conscientiousness.

In summary, we replicate and extend previous findings, uncovering potential biomarkers pointing to a neural architecture that supports protective effects of meaning in life and conscientiousness.

B-46

Nicotinic modulation of habenula responsivity to positive feedback among abstinent cigarette smokers

Jessica S. Flannery - Florida International University; Michael C. Riedel - Florida International University; Ranjita Poudel - Florida International University; Angela R. Laird - Florida International University; Thomas J. Ross - National Institute on Drug Abuse; Betty Jo Salmeron - National Institute on Drug Abuse; Elliot A. Stein - National Institute on Drug Abuse; Matthew T. Sutherland – Florida International University Preclinical evidence links the habenula (Hb), a small epithalamic nucleus, to nicotine self-administration, aversion, and withdrawal symptoms. Given the Hb inhibits dopamine release following the absence of expected rewards and possesses a high density of nicotinic acetylcholine receptors, we had overnight-abstinent smokers (n=22) and nonsmokers (n=19) perform a positive and negative performance feedback task, previously shown to differentially activate the Hb and ventral striatum (VS). Participants completed 6 fMRI sessions, at different points in a nicotine and varenicline, placebo-controlled, double-blind, crossover drug administration study. Regarding task effects, across all participants, we observed increased activity following positive feedback in the bilateral VS (pcorrected B-47

Distressed (Type D) Individuals with Social Inhibition and Negative Affectivity Treat Novel Stimuli like Negative Stimuli: Generalization Biases Support a Learning Diathesis Model of PTSD Todd Allen - University of Northern Colorado; Michelle M. Garcia

Distressed (Type D) personality involves social inhibition and negative affectivity and is associated with PTSD as well as enhanced associative learning (Allen et al., 2018). Studies have reported biased generalization following associative learning in PTSD including a selective deficit in generalization to novel situations and overgeneralization with negative contexts. Recently, Radell et al. (2017) found that more severe PTSD symptoms were associated with a lack of sensitivity to background context. It is unclear whether these biases in generalization result from trauma and subsequent PTSD or are evident in personality temperaments like Type D. Undergraduates (n = 102) campleted the DS-14 Type D inventory and the Radell et al. (2017) task where they picked or skipped stimuli that consisted of a foreground (shape) and a background (color) that were either positive or negative (i.e., resulted in either a gain or loss of points). A subsequent generalization phase included trained as well as novel stimuli. Participants learned the associative task as indicated by increased correct responding and decreased picking of negative stimuli. In the generalization phase, participants tended to pick positive stimuli but skip novel stimuli at the same rate as negative ones. Type D individuals also skipped novel backgrounds significantly more than non-Type D individuals. These findings indicate that a learning diathesis model of PTSD. This work continues to support a learning diathesis model of PTSD.

B-48

BDNF DNA Methylation Status and Blood Plasma Levels in Puerto Rican Outpatients With Mood Disorders: A Prospective Study

Robmarie Lopez-Soto - Ponce Health Sciences University; Fabian Vazquez-Santiago - Ponce Health Sciences University; Efrain Rios-Ruiz - Ponce Health Sciences University

Introduction: It takes ~10 years to reach an accurate Bipolar Disorder (BD) diagnosis in primary care settings (PCS), increasing mortality risk and illness neuroprogression. Biomarkers can increase diagnostic accuracy of MD in PCS. Significantly decreased blood serum and plasma levels of Brain-Derived Neurotrophic Factor (BDNF) have been consistently associated to acute mood episodes, and differences in BDNF methylation status have emerged between MDD and BD. However, not much is known about BDNF-MD status in Hispanic populations. Thus, we aim to assess BDNF blood plasma levels and BDNF methylation status in a sample of Puerto Rican outpatients with MD.Method: This ongoing study uses a cross-sectional design with a recruitment-by-referral strategy to collect biopsychosocial data from Puerto Rican adult PCS outpatients (n=40) with an ICD-10 diagnosis of MDD or BD (I or II). Clinical Assessments: PHQ-9, BDI-II, YMRS, HCL-32 and FAST. Biomarkers: Blood plasma BDNF from PBMCs will be quantified via ELISA. bdnf gene will be PCR-amplified and sequenced. Position-specific of 5'-methylated cytosines will be identified in silico, quantified, and statistically tested using non-parametric two-tailed ANOVA with pos-hoc multiple correction (p ≤ 05).

Results: Clinical scores will be used for intra- and inter- group comparisons (t-test, odd ratio), compared with quantified molecular data and statistically analyzed using non-parametric two-tailed ANOVA with post-hoc multiple correction (p ≤ 05). Results will be stratified by medication type. Hypothesis: Clinical status will correlate with neurotrophic markers.

Conclusion: Data obtained from this study can contribute to precision-based mood disorder diagnosis within PCS in an understudied population.

B-49

A cognitive map of social network space

Seongmin Park - University of California, Davis; Douglas Miller - University of California, Davis; Hamed Nili - FMRIB, University of Oxford; Erie Boorman - University of California, Davis

Recent findings suggest the hppocampal-entorhinal (HPC-ERC) system may serve a general mechanism for navigating cognitive maps of non-spatial tasks. These demonstrations have used continuous task dimensions, whereas many everyday tasks involve decisions between abstract and discrete entities. Here, we test whether the human brain uses the same principles when making binary decisions about the rank of individuals in a social hierarchy. Participants learned the rank of people on two dimensions, popularity and competence, in two separate groups. Next, they learned the relative rank of select individuals ("hubs") in each group with the other group, creating a nuique associative path between groups. Finally, they made inferences about the rank of novel pairs between the two groups. Behaviorally, reaction times for inferences depended on the within-group Euclidean distance from the hub in the 2-D social space. Neurally, during inferences, ERC and medial prefrontal cortex (mPFC) encode the within-group Euclidean distance between individuals and the latent hub. Our findings adopting the trial-by-trial fMRI suppression showed that the hippocampal activity was suppressed when the novel pair was followed by their relevant hub compared to other matched hubs, suggesting a neural representation of the retrieved hub. Finally, we demonstrate that a robust linear relationship with the representational distance to other matched hubs, suggesting a neural representation of the retrieved hub. Finally, we demonstrate that a robust linear combined in the 4-D social space. These results shed light on how abstract and discrete structures are represented, navigated, and combined in the human brain, suggesting that general mechanisms in the HPC-ERC system are leveraged to navigate social networks.

B-50

Endogenous variation in ventromedial prefrontal cortex state dynamics during naturalistic viewing reflects affective experience

Luke J. Chang – Dartmouth College; Eshin Jolly – Dartmouth College; Jin H. Cheong – Dartmouth College; Kristina Rapuano – Yale University; Nathan Greenstein – Dartmouth College; Pin-Hao A. Chen – Dartmouth College; Jeremy R. Manning – Dartmouth College

How we process ongoing experiences is shaped by our personal history, current needs, and future goals. Consequently, brain regions involved in generating these subjective appraisals, such as the vmPFC, often appear to be heterogeneous across individuals even in response to the same external information. Across four studies, we develop a computational framework to characterize the spatiotemporal dynamics of the vmPFC in individual participants while viewing a 45-minute television drama. We find evidence that the spatiotemporal response profiles of the vmPFC were heterogeneous across individuals (N=13), even after performing hyperalignment. Individual ymPFC spatial patterns appeared to persist for long periods of time and recurred periodically over the course of the episode. We used hidden markov models to segment patterns of vmPFC activity into discrete latent states and found that a subset of these states appeared to be shared across individuals. Although these states were most often expressed at different moments in time across individuals, scenes that evoked strong affective responses appeared to a synchronize these states across participants, which replicated in an independent sample collected on a different scanner (N=35). Finally, we ran two additional behavioral studies to provide further support that these state scanes goal are linked to affective experiences. We observed converging evidence that these states sprovide compelling support for the notion that the vmPFC is involved in ascribing affective meaning to our ongoing experiences that arise from unfolding events.

B-51

A common polymorphism in the oxytocin receptor gene (OXTR) influences perception of spontaneous facial micro-expressions

Minwoo Lee - Department of Anthropology, Emory University; Adriana Lori - Department of Psychiatry and Behavioral Science , Emory University; Nicole Langford - Department of Psychiatry and Behavioral Science , Emory University; Jame K. Rilling - Department of Anthropology, Emory University

Oxytocin is a neuropeptide that influences a wide range of social cognition in humans. Recent studies have suggested that individual variation in the oxytocin receptor gene (OXTR) could regulate the sensitivity towards normative social feedback which, in turn, gives rise to culture-specific behaviors and values. However, the specific cognitive mechanisms through which OXTR mediates cultural norm acquisition remains unclear. The present study investigated the impact of OXTR rs53576 on people's ability to perceive micro-expressions (i.e., CASME2) that convey subte, rapid evaluative signals. A total of 100 healthy adults performed a facial affect recognition task in which they viewed 24 video clips depicting either positive (i.e., happiness) or negative (i.e., happiness) or negative (i.e., disgust and anger) emotional expressions varying in duration (Micro- vs. Macro- vs. No-expression). On each trial, participants were asked to judge the valence and specific identity of the facial emotions being expressed. Preliminary analysis (N=42) showed that GG homozygotes, compared to AA/AG carriers, were significantly more accurate in detecting the valence of the micro-expressions, F(2, 70) = 3.029, p = .096. The effect of 0XTR genotype was particularly pronounced among male participants. GG homozygotes also demonstrated a better ability to recognize the specific identity of facial macro-expressions. The observed pattern of results persisted after controlling for participants' age, ethnicity, and levels of trait empathy. These findings suggest that 0XTR could promote social learning of culturally dominant norms and values by enhancing perception of social expressions of emotion in response to an individual's social behavior

B-52

Can we have a second serving? A replication study on the neurobiological mechanisms underlying self-control

Nynke L. van der Laan - Tilburg University, The Netherlands; Christin Scholz - University of Amsterdam, The Netherlands; Denise T. De Ridder - Utrecht University, The Netherlands; Ale Smidts - Erasmus University, The Netherlands

Self-control, the ability to overrule immediate urges to attain long-term goals, is of vital importance for human wellbeing. We will present a preregistered replication attempt of the seminal study of Hare and colleagues (Science, 2009) which was the first to elucidate neural underpinnings of successful self-control. Their primary findings were (1) that decisions are based on a value signal integrating relevant choice attributes encoded in the ventromedial prefrontal cortex (vmPFC) and (2) that successful self-control involves modulation of this value by the dorsolateral prefrontal cortex (dlPFC).

This study had a strong impact on theorizing about the psychology and neurobiology of decision-making. Although replication projects in psychology are mounting, direct replications are uncommon in neuroscience. Power calculations for neuroimaging studies are challenging and the generally low sample sizes have raised concerns about replicability. Given the importance of replication for the neuroimaging field in general and the far-reaching impact of the vmPFC-dlPFC self-control system for science and education, we deem a replication of these results crucial.

Pre-registered methods and materials (https://osf.io/qnpjm/) are largely identical to the original study. Participants (n=80) rated 50 foods on health and taste and made incentive-compatible food choices while undergoing fMRI. In addition to the measurements of the original study we measured responses to food temptations in the week after the session to investigate to what extent the findings extrapolate to self-control success in daily life. Data collection is completed. At the conference, we will present findings as well as key considerations and experiences while executing the replication.

B-53

It depends on whom you talk to: a hyperscanning EEG study investigating parent-child vs. clinician-child mutual gaze in autism spectrum disorder

Suzanne Dikker - New York University; Elysha Clark-Whitney - Sackler Institute for Developmental Psychobiology; Dana Bevilacqua – New York University; Eliana Ajodan - Sackler Institute for Developmental Psychobiology; Anna Kasdan – Vanderbilt University; Guillaume Dumas - Institut Pasteur; Rebecca M. Jones - Sackler Institute for Developmental Psychobiology

While Autism Spectrum Disorder (ASD) is characterized by impairments in social communication, its neurobiology is typically not investigated during face-to-face exchanges. In addition, how the interaction partner affects ASD symptoms—like gaze behavior—has not been systematically investigated. To overcome these limitations, we collected electroencephalography (EEG hyperscanning) from parent-child and clinician-child pairs as they engaged in the Brief Observation of Social Communication Change (BOSCC), a novel ASD assessment tool that emphasizes spontaneous play and dyadic social interaction. We first tested whether gaze behavior differed during interactions with a caregiver versus a clinician in ASD children across two age groups (mean age Study1: 41.7 months, Study2: 9.3 years; 30 children total). Second, we optimized EEG hyperscanning procedures (e.g., dry vs. gel-based electrodes) and tested whether child-adult neural synchrony differed in children with autism versus controls during interactions with a caregiver versus a clinician. Across both studies, children exhibited more mutual gaze with their caregiver than with the clinician. For the younger group, this difference was most pronounced during dialogue. For the older children, we observed more mutual gaze with caregivers than clinicians during play with toys. These results suggest that mutual gaze behavior in autism varies by task and interaction partner. While EEG-synchrony analyses are ongoing, we further demonstrate that EEG hyperscanning is feasible during a play-based interaction in autism. Taken together, the BOSCC, combined with simultaneous EEG and gaze-tracking can provide critical insight into the brain basis of real-time child-adult interactions and increase our understanding of core social communication abnormalities in autism.

B-54

B-55

The Connectome Basis of Theory of Mind

Yin Wang - Temple University; Athanasia Metoki - Temple University; Ingrid Olson - Temple University

Theory of mind (ToM) refers to the capacity to make accurate inferences about the mental states of other people (e.g. their thoughts, needs, desires, and beliefs). Over the past twenty years, social neuroscience has delineated an extensive brain network for ToM abilities, including the dorsal and ventral medial prefrontal cortex, the temporo-parietal junction, the posterior cingulate cortex/precuneus, and the temporal pole. While much work has addressed the functional specialization of single ToM regions, the connectome-level organization and brain-wide mechanisms for functional integration of ToM processing remains poorly understood. Here, we leveraged large-scale multimodal neuroimaging data from the Human Connectome Project Consortium (n=673) to delineate the anatomical and functional connectome of the ToM network. Our results revealed several novel findings. First, the ToM network can be divided into two subsystems (lateral vs medial nodes), possibly for different social inferences (low-level vs high-level). Second, functional connectivity analyses discovered a unique information processing pattern between these two subsystems. Third, our analysis of white matter fiber composition revealed that the anatomical connectome is primarily constructed of short-range U-shape fibers rather than major white matter bundles. In addition, we found the structural and functional connectivity are highly associated in the ToM network. In summary, we discovered a wide range of important features of the 'ToM connectome', such as the network topology, core pathways, fiber composition, anatomy-function relations, and brain-behavior associations.

2019 SANS Poster Award Winner

Neural phenotype of obesity: a population-based predictive modeling approach

Samantha J. Chavez - University of Oregon; Robert S. Chavez - University of Oregon; Dylan D. Wagner - The Ohio State University; Sarah E. Anderson - The Ohio State University

Health status is determined by multiple factors within individuals and their environments. Although there is broad interest in uncovering biomarkers that predict health outcomes, these efforts are often limited by the use of small convenience samples with little power to construct finely tuned models and independently test their accuracy. To address this, the current study combines population-based sampling methods with out-of-sample prediction testing to investigate how the structural connectivity of reward and inhibition systems predicts obesity status in a representative sample of 275 U.S. adults aged 18-85yrs. Probabilistic tractography was applied to diffusion data to delineate putative reward and inhibitory pathways. Next, we used a training dataset (n=193) to model predicted obesity status as a logistic function of proxy-measures (i.e., fractional anisotropy) for the structural integrity of these pathways. Then, we tuned this model with measures of sociodemographic status using bidirectional stepwise regression. Following model tuning, we defined a probability threshold for predicted obesity that maximized sensitivity and specificity and applied this model to an independent holdout sample (n=82). Classification accuracy in the holdout sample was 63.5% (sensitivity=72%; specificity=58%). Importantly, classification accuracy increased substantially (11.1%) when sociodemographic predictors were included, suggesting that they play a nontrivial role in brain-health relationships. Our results provide evidence for a neural phenotype of obesity, represented by the microstructural integrity of reward and including sociodemographic predictors, we demonstrate the predictive utility that an epidemiological perspective may lend to translational goals in the social neuroscience of health behaviors.

B-56

Opioidergic mediators of neural self-other overlap in partners and strangers

Sara Medina-DeVilliers - University of Virginia; Finn Roberts - University of Virginia; Lane Beckes – Bradley University; James Coan – University of Virginia Prior research indicates that the opioidergic system plays an important role in empathy for another's pain and pain empathy is grounded in neural activity related to first-hand pain. Fifty participants and their partners were recruited for a double-blind control study in which they received 50 mg of Naltrexone, an opioid antagonist, or a placebo. Participants underwent functional magnetic resonance imaging while alone, or while holding a partner's or stranger's hand. During the scan, randomized threat (20% chance of shock) and safety cues were displayed to the participant indicating threat to the participant (threat-to-self), or threat to the partner or stranger (threat-to-other).

We monitored statistical associations between brain activations during threat-to-self threat-to-other. We observed an increase in association between neural activation in threat to self and threat to stranger in brain regions associated with empathy (dACC, PCC, INF, precuneus, IFG, and MTG), but only in the placebo group. No associations in neural overlap were observed between threat-to-self and threat-to-partner, nor in the Naltrexone group. There was no significant difference in reported pain between threat-to-other conditions in the Naltrexone condition.

Results indicate that when opioidergic system is blocked, participants self-report of pain increases when experiencing a stranger's distress but decreases when experiencing a partner's distress, compared to the placebo group. This is partially consistent with our observed increase in neural activity during threat to stranger in the placebo condition. The relationship between participant and target (i.e., stranger vs familiar partner) may impact both empathic and pain response in regard to neural mechanisms.

B-57

Feeling in Seeing : Embodiment, Affect & Visual Politics (when News are Fake)

Manos Tsakiris - The Warburg Institute & Royal Holloway, University of London; Ruben Azevedo - The Warburg Institute, School of Advanced Study, University of London; Sophie De Beukelaer - The Warburg Institute. School of Advanced Study. University of London

Photography mediates our experience of the world, especially in a culture powered by images at an unprecedented level. Social media, alternative facts, debates about post-truth and fake news make our negotiation between what is real or fake challenging. Beyond our cognitive judgments, we respond and relate to visual culture in visceral, embodied ways.

We ran a series of experiments to understand how our visceral responses, as the basis of subjective feelings, influences our relation and response to aversive photojournalistic images. First, participants saw a series of aversive photojournalistic images, while we measured their neurophysiological (heartrate acceleration and heartbeat-evoked potentials) and affective arousal. Next, participants were informed that they would see the same images again and judge whether the images were real (i.e. photos capturing an event as it happened depicting genuine emotions) or fake. Thereby we were able to assess if levels of neurophysiological and affective arousal would predict their realness judgements.

Higher neurophysiological and affective arousal for an image during the first session predicted the probability with which participants would judge that image as 'real'. This tight link between arousal and realness judgments was stronger in older ('digital immigrants') rather than younger participants ('digital natives'), who were more likely to judge images as 'real' but also reported less arousal.

These findings highlight the crucial role that physiology plays in engaging us with imagery, beyond cognitive processing. 'Feeling in seeing' seems to be a salient signal that at least partly determines our beliefs in a culture powered by images.

B-58

Is socioeconomic status associated with neural responses to health messages?

Mia Jovanova - Annenberg School for Communication, University of Pennsylvania; Yoona Kang - Annenberg School for Communication, University of Pennsylvania; Matthew Brook O'Donnell - Annenberg School for Communication, University of Pennsylvania; Prateekshit Pandey - Annenberg School for Communication, University of Pennsylvania; Emily Falk - Annenberg School for Communication, University of

Pennsvlvania

Socioeconomic status (SES) can influence how individuals perceive health messages and contribute to subsequent inequalities in behavioral health outcomes. However, little is known about how level of education (a measure of SES) relates to neural activity in brain regions tracking message receptivity. We examined how years of education correlates with activity in VMPFC, previously associated with positive valuation and behavior change following health message exposure. Sedentary and overweight/obese adults (n=200) reported on their level of education and viewed messages promoting physical activity in an fMRI scanner. We found that more years of education was related to greater activation within a functionally defined map of the VMPFC. In addition, a full brain analysis revealed greater activity in temporal poles for higher SES participants. The results suggest that those from higher and lower SES backgrounds recruit different neural pathways to process health messages. Thus, the findings extend our understanding of SES differences in neural receptivity linked to behavior change, and may help inform health messaging efforts to address disparities.

B-59

Association between dispositional mindfulness and emotion regulation in women entering substance use disorder (SUD) treatment

Vita Droutman - Department of Psychology, University of Southern California; Natalie Poppa - Department of Psychology, University of Southern California; Hortensia Amaro - Herbert Wertheim College of Medicine and Robert Stempel Colleae of Public Health and Social Work. Florida International University: David Black - Department of Preventive Medicine. Keck School of Medicine. University of Southern California: Inna Arnaudova - University of California. Los Anaeles: John Monterosso - Department of Psychology. University of Southern California

Dispositional mindfulness, defined as non-judgmental present moment awareness, has been associated with emotion regulation in healthy populations. It is unclear if this relationship exists in individuals with substance use disorder (SUD), who have marked emotion regulation deficits. This study examines how dispositional mindfulness relates to clinical characteristics, and both performance and brain activity during a Go-Nogo task with emotional faces (fearful, happy, calm) in 256 female SUD patients (40 included in the imaging pilot). This task is sensitive to emotion reactivity and rapid regulation of approach/withdrawal response tendencies primed by emotionally evocative stimuli. In the present sample of women entering SUD treatment, higher dispositional mindfulness was related to better emotion regulation (as has been evident in healthy populations), as well as to less severe drug use, stress, depression and anxiety (all at p<.0001, correcting for multiple comparisons requires p<.008). Neural analyses showed that inhibition of natural avoidance response necessary to approach a fearful stimulus recruited activity in the inferior frontal gyrus and insular cortex (IC). Activation in the identified IC cluster was positively correlated with higher dispositional mindfulness and better behavioral performance. During emotion perception dispositional mindfulness was positively correlated with activation in the vmPFC and striatum across emotions, moreover, during positive and negative emotional processing it also positively correlated with IC. These findings suggest that SUD patients higher on dispositional mindfulness have stronger recruitment in brain regions critical to emotion regulation.

B-60

Angiotensin regulation of fear extinction acceleration in humans is mediated by the vmPFC and its connections with the basolateral amygdala

Fena Zhou - Clinical Hospital of Chenadu Brain Science Institute. MOE Key Laboratory for Neuroinformation. University of Electronic Science and Technology of China: Yayuan Gena - Clinical Hospital of Chenadu Brain Science Institute, MOE Key Laboratory for Neuroinformation, University of Electronic Science and Technology of China; Jialin Li - Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for Neuroinformation, University of Electronic Science and Technology of China; Pan Feng - Faculty of Psychology, Southwest University; Congcong Liu - Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for Neuroinformation, University of Electronic Science and Technology of China; Weihua Zhao - Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for Neuroinformation, University of Electronic Science and Technology of China; Tingyong Feng - Faculty of Psychology, Southwest University; Adan Guastella - Autism Clinic for Translational Research, Brain and Mind Centre, Central Clinical School, Faculty of Medicine, University of Sydney; Keith M. Kendrick - Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for Neuroinformation, University of Electronic Science and Technoloay of China: Benjamin Becker - Clinical Hospital of Chenadu Brain Science Institute. MOE Key Laboratory for Neuroinformation. University of Electronic Science and Technoloay of China Background: Pavlovian threat extinction is highly conserved across species and recent animal models suggest a regulatory role of the renin-angiotensin system in extinction-related synaptic plasticity. The effects of the angiotensin II type 1 receptor antagonist losartan (LT) on fear extinction and the neural mechanisms by which LT exert its effect in humans are unknown. Using a translational pharmacological fMRI design we examined whether and via which neural

circuits losartan can facilitate fear extinction in humans. Methods : 70 male participants underwent a validated threat acquisition and extinction paradigm. Participants were randomized losartan (50mg) or placebo before extinction learning. Primary outcome measures were physiological threat response (skin conductance). fMRI activity and connectivity.

Results: Losartan enhanced fear extinction learning as reflected by accelerated attenuation of physiological threat responses during early extinction (t(57) = -2.179, P = 0.034). On the neural level accelerated extinction was accompanied by regionally specific enhanced ventromedial prefrontal cortex (vmPFC) activation (MNIxyz = [6, 48, -3], PclusterFWE = 0.013) and coupling of the vmPFC with the basolateral amygdala (MNIxyz = [24, -3, -24], PsvcFDR < 0.05). Mediation

analyses further demonstrated that accelerated extinction critically involved vmPFC processing (MNIxyz = [-3, 45, -15], PsvcFDR < 0.05). Moreover, multi-voxel pattern analysis revealed that LT-treatment reduces whole-brain, particularly vmPFC, threat expression to conditioned stimuli during early extinction.

Conclusions: Overall the results provide compelling evidence for a critical role of the renin-angiotensin system in fear extinction in humans and suggest that adjunct losartan administration may facilitate the efficacy of extinction-based therapies.

B-61

Separable prefrontal-amygdala circuit interactions underlie social cognition and decision making in rhesus macaques

Maia S. Pujara - Section on the Neurobiology of Learning and Memory, Laboratory of Neuropsychology, National Institute of Mental Health, National Institutes of Health; Nicole K. Ciesinski - Section on the Neurobiology of Learning and Memory, Laboratory of Neuropsychology, National Institutes of Health, National Institutes of Health; Nicole K. Ciesinski - Section on the Neurobiology of Learning and Memory, Laboratory of Neuropsychology, National Institutes of Mental Health, National Institutes of Health; Sarah E. V. Rhodes - Section on the Neurobiology of Learning and Memory, Laboratory of Neuropsychology, National Institutes of Health; Elisabeth A. Murray - Section on the Neurobiology of Learning and Memory, Laboratory of Neuropsychology, National Institutes of Health

Lesion studies in macaques suggest dissociable functions of medial frontal cortex (MFC) and orbitofrontal cortex (OFC), with MFC being essential for social cognition and OFC being essential for value-based decision making. Although bilateral amygdala damage also results in impairments in these domains in macaques, it is not known whether the dissociable functional roles of MFC and OFC critically depend on interactions with the amygdala. To test this possibility, we compared the performance of rhesus macaques (Macaca mulatta) with crossed surgical disconnection of the prelimbic cortex, a subregion of MFC, and amygdala (DFC x AMY, n=4) and monkeys with surgical disconnection of the OFC and amygdala (OFC x AMY, n=4) to a group of unoperated controls (CON, n=5). All monkeys were assessed for food-retrieval latency while viewing videos of social stimuli (a test of social interest) and object choices based on current food value (devaluation task, a test of value-based decision making). Compared to the CON group, group PL x AMY, but not group OFC x AMY, showed significantly reduced latencies to reach for a food reward in the presence of videos of conspecifics, indicating reduced social valuation and/or reduced social interest. In the devaluation task, however, the opposite pattern was observed – group OFC x AMY, but not group PL x AMY, displayed severe deficits on object choice following selective satiation. These data indicate that MFC and OFC interact with the amygdala to subserve distinct behavioral contributions in the domains of social cognition and decision making, respectively.

The lov of Punishment: Early Emotional Reactions Predict Decisions to Restore Justice

Joseph Heffner - Brown University; Jae-Young Son - Brown University; Haoxue Fan - Peking University; Oriel FeldmanHall - Brown University

What aspects of a victim's emotional experiences motivate decisions to punish? Prominent theories of punishment propose that punitive decisions are driven by negative emotions such as anger and frustration. However, it remains unknown the extent to which expectation violations ("I expected to feel happy but don't") play a role in these decisions and how the temporal dynamics of emotions influence choice. To address this, we developed a novel method for measuring valence and arousal in real time, allowing us to examine punishment in two different economic games. Results reveal that valence experienced at the time of unfair treatment robustly predicts future punishment, while arousal does not. Moreover, we found that valence prediction errors (i.e., violations of an individual's expectations about how positive or negative they would feel) govern decisions to punish, even after controlling for offer unfairness. Finally, a time-course analysis finds that punishment decisions can be predicted by an individual's experience of negative valence as early as 750ms after receiving an offer. Indeed, people who rapidly experience catharsis after punishment"). One possibility is that emotionally-sensitive people may use punishment as an easily available emotion regulation technique. In summary, our results demonstrate that emotion prediction errors are critical for decisions to punish and that emotions quickly exert influence over the decision-making process.

B-63

Longitudinally Mapping Childhood Socioeconomic Status Associations with Cortical and Subcortical Morphology

Cassidy L. McDermott - Developmental Neurogenomics Unit, National Institute of Mental Health; Jakob Seidlitz - Developmental Neurogenomics Unit, National Institute of Mental Health; Ajay Nadig -Developmental Neurogenomics Unit, National Institute of Mental Health; Siyuan Liu - Developmental Neurogenomics Unit, National Institute of Mental Health; Liv S. Clasen - Developmental Neurogenomics Unit, National Institute of Mental Health; Jonathan B. Blumenthal - Developmental Neurogenomics Unit, National Institute of Mental Health; Jonathan B. Blumenthal - Developmental Neurogenomics Unit, National Institute of Mental Health; F. K. Reardon - Developmental Neurogenomics Unit, National Institute of Mental Health; Francois Lalonde - Developmental Neurogenomics Unit, National Institute of Mental Health; Francois Lalonde - Developmental Neurogenomics Unit, National Institute of Mental Health; Raihaan Patel - Douglas Mental Health University Institute, McGill University

Childhood socioeconomic status (SES) impacts cognitive development and mental health, but its association with human structural brain development is not yet well-characterized. Here, we analyzed 1243 longitudinally-acquired structural MRI scans from 623 youth (299 female/324 male) to investigate the relationship between SES and cortical and subcortical morphology between ages 5 and 25 years. We found positive associations between SES and total volumes of the brain, cortical sheet, and four separate subcortical structures. These associations were stable between ages 5 and 25. Surface-based shape analysis revealed that higher SES is associated with areal expansion of (i) lateral prefrontal, anterior cingulate, lateral temporal, and superior parietal cortices and (ii) ventrolateral thalamic, and medial amygdalo-hippocampal sub-regions. Meta-analyses of functional imaging data indicate that cortical correlates of SES are centered on brain systems subserving sensorimotor functions, language, memory, and emotional processing. We further show that anatomical variation within a subset of these cortical regions partially mediates the positive association between SES and IQ. Finally, we identify neuroanatomical correlates of SES that exist above and beyond accompanying variation in IQ. While SES is clearly a complex construct which likely relates to development through diverse, non-deterministic processes, our findings elucidate potential neuroanatomical mediators of the association between SES and cognitive outcomes.

B-64

Margin of safety decisions in the face of volatile threats

Song Qi - Division of Humanities and Social Sciences, California Institute of Technology; Logan Cross - Division of Humanities and Social Sciences, California Institute of Technology; Bowen Fung - Division of Humanities and Social Sciences, California Institute of Technology; Sui Xin - Division of Humanities and Social Sciences, California Institute of Technology; John O'Doherty - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology; Dean Mobbs - Division of Humanities and Social Sciences, California Institute of Technology

Prey preempt danger by adopting choices that maximize the success of avoiding or escaping from predators. One decision important to survival, is choosing the optimal foraging radius from a safe refuge in the wake of potential predatory danger. Research from the field of ethology supports the idea that animals maintain a margin of safety from predators, which is the difference in time to reach a safety cover by prey versus predator. Through a behavioral paradigm inspired by this notion, here we test the idea that explicit margin of safety (MOS) decisions, a form of preemptive avoidance, are increased under volatile attacks. Volatility was manipulated by altering the statistical structure of the distributions of threats. Results showed that participants made more conservative avoidance choices and had a larger MOS when facing more volatile attacks. Using MVPA searchlight analysis of our fMRI data, we show that regions including the insula is critically involved in the process where participants classify different threat types, while the hippocampus and the amygdala are implicated in their decision regarding safe/risky MOS choices. Searchlight analysis within theoretically predicted ROIs also revealed vmPFC's role in the same process. These findings demonstrate an unexplored ecological marker in adaptive escape decisions and their underlying neural circuits.

B-65

Differential optimization of facial expression selection as a function of facial dominance in interactive dyads

Jonathan Yi - Karolinska Institute; Philip Pärnamets - Karolinska Institute; Andreas Olsson - Karolinska Institute

Responding appropriately to others' facial expressions is key to social functioning, and depending on the identity of your interactive partner, it may save you from harm. Despite much research on how stable (e.g. facial dominance) and transient (emotional expressions) facial features affect perception and spontaneous responses, no studies have investigated how online facial responses to dynamic faces are influenced by learning during dyadic interactions. To study this, we used a novel method based on online integration of electromyography (EMG) signals from the participants' face developed by Yi et al (in prep.). In three experiments, participants' EMG signals were recorded during interactions with frowning and smiling dynamic target faces. The participants learned by trial-and-error to form correct expressions by forming the same (congruent) or different (incongruent) facial expression. In Experiment 1, high and low dominant faces were shown and incorrect facial expression were punished by a mild electric shock. Participants showed a decreased accuracy in responding to high vs. low dominant faces that could be explained by a speed-accuracy trade off. Experiment 2 replicated these findings in a non-threatening context where correct responses were rewarded. To examine if our results were specific to facial dominance, Experiment 3 examined learning relative dominance between the target faces trough staged confrontation but no effects were shown through this manipulation. Our results introduce a new method to study facial decision-making in dynamic interactive social situations, and showed that facial provide the gradual adaptation of facial responses in interactive settings.

B-66

Atypical Salience Network Connectivity in Children with Autism Relates to Deficits in Social Processing

Turel O. Turan - University of Miami; S. Shankar - University of Miami; Jason S. Nomi - University of Miami; W. Voorhies - University of Miami; Melissa Huberman - University of Miami; Shruti G. Vij - University of Miami: Lucina O. Uddin - University of Miami

The salience network, with nodes in the anterior cingulate cortex (ACC) and anterior insular cortex, plays a role in the detection and appraisal of social processes, social decision-making, and emotional processing. Although atypical functional connectivity (FC) of the salience network has previously been associated with social and emotional deficits in adults with autism spectrum disorder (ASD), this relationship in children with ASD has not been characterized. We hypothesized that children with ASD would have atypical FC compared with TD children, and that these differences would be related to social responsiveness scale (SRS) scores regardless of diagnosis. ACC and anterior insula ROIs were used to calculate ROI-whole brain voxel-wise FC estimates in 117 ASD and 117 TD participants (7-18 years old, ABIDE I and II: http://con_1000.projects.nitrc.org/indi/abide/abide_l.html).

A categorical voxel-wise regression analysis showed hyperconnectivity between the ACC and the left middle frontal gyrus and between the ACC and cerebellum in ASD. FC was positively correlated with SRS scores across both groups. Additionally, hypoconnectivity between the ACC and the right putamen was negatively correlated with SRS scores across both groups.

A voxel-wise regression analysis comparing FC developmental trajectories between ASD and TD groups showed that connectivity between the ACC and middle cingulate decreased in the TD group, while increasing across age for ASD. Furthermore, FC between the ACC and the right frontal pole increased across age for TD individuals, while decreasing across age for ASD. This study demonstrates the importance of salience network FC in social behavior in children with and without ASD.

B-67

2019 SANS Poster Award Winner

Social identity threat influences representations of monetary incentives in the nucleus accumbens

Kyle G. Ratner - University of California, Santa Barbara; B. Locke Welborn - University of California, Santa Barbara; Youngki Hong - University of California, Santa Barbara

Life stressors influence incentive processing in dopamine-rich brain regions, such as the nucleus accumbens (NAcc). This effect has been demonstrated in rodents that have suffered social defeat as well as humans who have been maltreated by others. Although much of the stress people endure is a result of directly experiencing life difficulties, we can also experience stress when social groups to which we belong are portrayed negatively. Current political and social identity threats on the neural processing of incentives? To address this question, we conducted fMRI research with Mexican American participants, in which we examined the effects of social identity threat on subsequent neural activity during processing of monetary gains and losses (the Monetary Incentive Polaty Task). Conventional univariate analytic methods do not indicate that the NAcc responds more or less to monetary incentives when the social identity threat and those who were nultivariate methods suggest that incentive-related patterns of hemodynamic response within the NAcc differ between Mexican Americans who were subjected to social identity threat and those who were nultivariate methods suggest on route through which the recent rise in negative political rhetoric toward Latinos may affect their well-being. More generally, this work has theoretical implications for the relationship between social identity threat and incentive processing in the brain.

B-68

Different neural substrates of first impression of same-sex and opposite-sex faces in women

Hesun Erin Kim - Brain Korea 21 PLUS Project for Medical Science, Yonsei University College of Medicine; Yeon-Ju Hong - Institute of Behavioral Science in Medicine, Yonsei University College of Medicine; Sunghyon Kyeong - Institute of Behavioral Science in Medicine, Yonsei University College of Medicine; Jae-Jin Kim - Department of Psychiatry, Yonsei University College of Medicine

First impression follows a complex process that is greatly influenced by the facial attributes and the sex of the displayer. Women have been known to evaluate these differently and form stronger initial bonds with others than men. Here, the different neural substrates of impression formation between male and female faces was investigated, then parametric relationships of specific facial components with the sex of the target specific to women were identified. Twenty-four healthy female volunteers were recruited to participate in an fMRI experiment, in which they appraised a given face and decided whether to befriend the target. Then, post-scan subjective ratings were collected the diPFC and dmPFC, ACC, and pSTS, were more engaged when viewing male faces. Parametric analyses of the components revealed that bilateral lingual gyrus activities showed negative parametric effects with cheerfulness for male targets, whereas the left IPL activity showed positive parametric effects with good-looks for female targets. During the formation of the first impression, diffuse areas related to emotion processing and conflict-monitoring were utilized when a person of the opposite sex was encountered compared to encounters with the same sex. The perceived cheerfulness of a male face also showed a negative relationship with the identification of facial emotion in the male face; the more a female face was considered good-looking, greater feeling of uneasiness appeared to be elicited. In summary, the study provides further evidence of sex bias in women during friendship encounters.

B-69

Efficacy of different emotion regulation strategies in aging

Anna Fischer - Department of Psychology, Pontifical Catholic University of Rio de Janeiro; Isabela Lobo - Center for Ecology and Socio-Environmental Development of Macaé, Federal University of Rio de Janeiro; Jesus Landeira-Fernandez - Department of Psychology, Pontifical Catholic University of Rio de Janeiro; Jerson Laks - Center for Alzheimer's Disease, Institute of Psychology, Pontifical Catholic University of Rio de Janeiro; Andrea Camaz - Center for Alzheimer's Disease, Institute of Psychiatry, Federal University of Rio de Janeiro; Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King's College London

Emotions influence our behavior, experience and physiological responses. Emotion regulation is a key element for successful social cognition and is known to change with aging. The current study investigates how distraction and reappraisal influence the emotional response on the behavioral, subjective and neurophysiological levels, and how these effects are moderated by aging.

A multi-method approach is used combining event-related potentials, recordings of facial expressions and self-report ratings. Thirty young and twenty-five older adults completed the experiment in which they had to either passively view neutral and negative pictures, or implicitly down-regulate their affective response solving a concurrently presented mathematical equation (distraction) or listening to a neutral descriptive phrase before the presentation of the picture (reappraisal). Preliminary results show that distraction as well as reappraisal are effective in the subjective control of negative emotion in both groups, indicated by reduced reported arousal and more neutral valence, and a reduced amplitude of the late positive potential. Whereas there is no difference between the groups regarding emotional reactivity, younger adults seem to benefit more from reappraisal than from distraction, with older adults showing the opposite pattern. These results are discussed in relation to previous empirical findings about changes in emotional regulation during the aging process.

B-70

"Being moved" as a phasic physiological relaxation during physiological arousal

Kazuma Mori - National Institute of Information and Communications Technology; Makoto Iwanaga - Hiroshima University

People sometimes experience "being moved," a strong emotion accompanied by tears, chills, and a warm feeling. Past studies indicate that when one is moved, chills (goosebumps and shivers) are experienced along with strong physiological arousal. The psychophysiological response of tears (weeping or a lump in the throat) may also be important because a recent study suggested that tears and chills induce different physiological responses. The current study examined the psychophysiological responses of chills and tears when being moved and assesses their relationship. We conducted two music listening experiments to induce chills and tears, in which participants listened to their favorite music in an experimental room. In Experiment 1, participants exhibited physiological effects were concomitant when chills and tears were induced separately, chills were temporarily accompanied by increased electrodermal activity, while tears were accompanied by a momentary decrease in hear trate. These physiological state is an important factor determining the physiological response of tears, suggesting that the psychological state is an important factor determining the physiological response of tears. Furthermore, the experience of being moved was robustly associated with tears, but not chills. Thus, the physiological response of tears, a form of phasic physiological relaxation (parasympathetic activation) during physiological arousal (sympathetic activation), may be a key factor for experiencing being moved. It is possible that the term "being moved" may have emerged from the moving state of the autonomic nervous system.

B-71

Aberrant association between brain metastability and activity in dorsal raphe nucleus and ventral tegmental area in major depression: a resting state fMRI study

Matthew Hollander - Department of Neuroradiology at TUM-NIC, Technical University of Munich; Ludwig-Maximilians-Universitat; Anja Reis - Department of Neuroradiology at TUM-NIC, Technical University of Munich; GSN, LMU Munich; Sarah Glim - Department of Neuroradiology at TUM-NIC, Technical University of Munich; GSN, LMU Munich; Sarah Glim - Department of Neuroradiology at TUM-NIC, Technical University of Munich; GSN, LMU Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Psychiatry, TUM; Afra Wohlschläger - Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Psychiatry, TUM; Afra Wohlschläger - Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich; Department of Neuroradiology at TUM-NIC, Technical University of Munich

Major depressive disorder (MDD) has increasingly been understood as a disorder involving distributed effects of abnormal ongoing brain activity. The measure of metastability has been implicated as a novel characterization of altered brain states in psychiatric disorders. Both animal and fMRI studies of humans have shown altered activity in the ventral tegmental area (VTA) and dorsal raphe nuclei (DRN), which are primary producers of dopamine and serotonin respectively. The present study views resting state fMRI performed on 25 healthy controls (HC), 24 age matched HC (HCa), and 24 MDD patients. 20 intrinsic connectivity networks (ICNs) were derived via ICA, and VTA and DRN timecourses were extracted. Timecourses were band-passed to 9 frequency bins between 0.01 to 0.225 Hz. Activity from VTA and DRN was operationalized as percent signal change (PSC) across time. A significant increase of metastability in 1 (0.01-0.025 Hz) and a decrease in bin 3 (0.05-0.075) was found in patients. Metastability at 0.01-0.025 Hz also was dependent on DRN-PSC and pathology, while metastability at 0.05-0.075 Hz was dependent on VTA activity, pathology and the interaction between the factors. Results indicate that metastability is an informative method toward explaining abnormal brain activity in MDD, and that there is a relationship between metastability, VTA and DRN

B-72

From trust in groups to trust in individuals

Philip Parnamets - New York University; Tobias Granwald - Karolinska Institutet; Andreas Olsson - Karolinska Institutet

Trust is ubiquitous in social interaction. Here we investigated how we learn to trust and to distrust individuals based on their group membership and through interaction. We conducted a two-part experiment consisting of incentivized trust games. Participants first played multiple games with partners drawn from two novel social groups, learning the characteristics of the groups as they played. In the second part, participants played repeated trust games with four novel partners, two from each group. Two of the partners behaved as expected, given their group membership, and two behaved as a member of the opposite group. Our results showed that participants were remarkably fast to adjust to partners' actual behavior irrespective of learned group characteristics. Participants also exhibited higher than expected trust to partners from both groups in their initial interactions. To give a computational account of participants learning we fit reinforcement learning models to participants' data. The model accounted for trial-by-trial choices and explained participants' behavior through a discount parameter on prior learning combined with loss sensitivity in learning rates. We next attempted to understand the sources of trial-by-trial variations in choices and response time by examining arousal levels (pupil dilation) and attention (eye gaze). Using a drift-diffusion model we showed how variations in addition to learned values. In sum, we provide a computational account for learning and deciding to trust and how group information can be overcome when individuating information is available.

B-73

Meghan H. Puglia - University of Virginia; Jessica J. Connelly - University of Virginia; James P. Morris - University of Virginia; Tobias Grossmann - University of Virginia

Brain signal entropy during social perception in infancy is associated with optimal behavioral outcomes

Multiscale entropy is a measure of neural variability that captures the inherently fluctuating nature of the brain and is positively associated with cognitive development and behavioral performance. In a series of studies, we show that brain signal entropy during social perception is significantly influenced by an epigenetic modification to the oxytocin receptor gene (OXTR), and accounts for significant variance in infant behavior in the first year of life. Using a multivariate, prediction-based model, we find that infants (n=55) with decreased OXTR methylation at 5-months show increased brain signal entropy during social auditory perception at 8-months and receive higher social behavioral ratings (Puglia et al., under review).

Data collection is ongoing for a longitudinal infant brain development study that examines the effect of context (social, non-social) and modality (visual, auditory) on this epigenetic-neural-behavioral relationship. Preliminary results (n=22) demonstrate modality-specific relationships between entropy and infant behavior. Within the auditory modality, we find that infants that show increased entropy to social vs. non-social stimuli at 4-months vocalize more frequently, as reported on the parent-completed Infant Behavior Questionnaire (IBQ). Within the visual modality, infants that show increased entropy to social vs. non-social stimuli show diminished pleasure for high intensity stimuli, specifically, as reported on the IBQ.

Together, these results suggest that, from early in ontogeny, the oxytocinergic system impacts social behaviors by regulating brain signal complexity during social perception. These findings have important implications for our understanding of neurodevelopmental disorders such as autism, and offer a unifying, mechanistic account of social neurodevelopment.

B-74

Moans and screams - a newly validated corpus of affective vocalizations

Natalie Holz - Max Planck Institute for Empirical Aesthetics; Pauline Larrouy-Maestri - Max Planck Institute for Empirical Aesthetics; David Poeppel - Max Planck Institute for Empirical Aesthetics, New York University

Humans employ vocal information to sense and categorize affective states of others in everyday social interactions. The nature of this categorization process is debated, as is the informational or diagnostic acoustic content of such emotion expressions. Thorough investigation has remained difficult with existing stimulus sets, as they mainly rely on stereotypical expressions lacking ecological validity and variability, or in the case of real-life expressions do not provide the possibility to systematically manipulate emotion intensity. Notably, little is known about the perceptual properties of peak emotional states, and more generally, the effect of emotion intensity on categorical and dimensional judgements of non-speech vocal expressions. We describe and use for the first time a new corpus consisting of 480 human nonverbal vocalizations representing three positive emotions (anger, fear, and physical pain), ranging from low to peak emotion intensity, produced by 10 female speakers. Database design and selection procedure were optimized to ensure the best possible naturalness of stimuli as well as to uphold within-category variability. Perceptual validation of the corpus was completed by three groups of participants (n = 90 in total) and includes data from a forced choice categorization task, an emotion rating task, ratings on the affect dimensions underlying vocal emotions preception.

B-75

Emotionotopy: Gradients encode emotion dimensions in right temporo-parietal territories

Giada Lettieri - IMT School for Advanced Studies Lucca; Giacomo Handjaras - IMT School for Advanced Studies Lucca; Emiliano Ricciardi - IMT School for Advanced Studies Lucca; Andrea Leo - IMT School for Advanced Studies Lucca; Paolo Papale - IMT School for Advanced Studies Lucca; Betta Monica - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Luca Cecchetti - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietrini - IMT School for Advanced Studies Lucca; Pietro Pietro Pietro Pietro Pietro Pietro Pietro Pietro Pietro Pi

Humans use emotions to decipher complex cascades of internal events. However, which mechanisms link behavioral descriptions of affective states to brain activity is unclear, as evidence supports either local or distributed processing. A biologically favorable alternative is provided by the notion of gradients, which postulates the isomorphism between stimulus features and cortical distance. The gradient-like organization has been adopted to successfully relate psychophysical characteristics of stimuli to patterns of activity in sensory regions. Nonetheless, this biologically advantageous mechanism has been recently proven to lie at the basis of cortical representation of higher-level (e.g., semantic) features as well. Building upon this evidence, we tested whether different affective states could be mapped onto the cortical mantle through spatially overlapping gradients. In our study, we employed a naturalistic continuous stimulation paradigm since it fosters emotional contagion and empathic reactions, leading to complex personal emotional experiences, akin to real life. We used fMRI activity evoked by an emotionally charged movie and continuous ratings of the perceived emotion intensity during the same stimulus in an independent sample, to reveal the topographical organization of affective states. We showed that right TPJ activity is explained by orthogonal and spatially overlapping gradients encoding the polarity, complexity and intensity of emotional experiences. The peculiar arrangement of this three-dimensional functional space allows the brain to map a wide gamut of affective states. As this organization resembles the coding of psychophysical properties in sensory regions (i.e., retinotopy in V1), we propose emotionotopy as the underlying principle of emotion perception in TPJ.

B-76

Investigating the Neural Representations of Taste and Health with Representational Similarity Analysis

Allison M. Londerée - Department of Psychology, The Ohio State University; Dylan D. Wagner - Department of Psychology, The Ohio State University

Functional neuroimaging studies have shown that food-cue related activity in the brain's reward system is associated with poor dietary self-control, weight-gain and greater overall body mass. Understanding how neural responses to food cues are related to the features of food items (e.g., taste, health, liking) may offer insight into what drives neural responses in the reward system and ultimately what contributes to dietary self-control failure. Here, we investigated

2019 SANS Poster Award Winner

the neural representation of food items varying in taste and health using a combination of Representational Similarity Analysis (RSA) and linear mixed-effects modeling. In order to minimize potential confounds associated with the use of "food scenes" in prior research (e.g., variation in food size, lighting and background) we created a new stimulus set of 140 unique food images belonging to 28 food categories (e.g., cake, grapes, fries). From the average neural response to each of the 28 food categories, a neural similarity matrix was created and compared to model similarity structures derived from subjective ratings of food attributes. We then conducted a regression-based RSA analysis using linear mixed-effects modeling to account for within-subject random factors. This analysis demonstrated that neural activity patterns in the OFC were associated with subjective health ratings, even after controlling for taste. This finding shows that, in healthy non-dieters, the OFC is tracking subjective evaluations of healthiness. This suggests a baseline against which future work might compare whether the neural representations of individuals with poor dietary self-control represent different features of food (e.g., taste).

B-77

Separating sympathy from empathy: An empirical examination of a classic theoretical question

Lior Abramson - The Hebrew University of Jerusalem; Florina Uzefovsky - Ben-Gurion University of the Negev; Ariel Knafo-Noam - The Hebrew University of Jerusalem

Empathy is an emotional response similar to another's emotion (Uzefosky & Knafo-Noam, 2015). Sympathy is an emotional response of sorrow or concern stemming from cognitive apprehension of another's condition (Eisenberg, 2000). Although theoretically distinct, the attempts to empirically differentiate between empathy and sympathy have proven to be difficult, and their developmental courses have not been investigated. For that challenge, we developed a paradigm which differentiates empathy from sympathy without asking participants to explicitly describe these complex constructs. We asked 5-10-years-old children (N=161) how they feel after watching emotional stories about protagonists with a vulnerable general status (e.g., a child with a wheelchair) or a neutral general status (e.g., a child with normative lives). These protagonists were also experiencing specific neutral, sad, or happy emotional events. The rationale is that in stories where the general status elicits sadness, but the current situation elicits neutral/happy emotions, feeling sadness indicates sympathy. Not empathy. Results showed that children in all ages were also affected by the protagonists' general status, reporting more sadness in the vulnerable status compared to the neutral status, F(1,156)=8.13, p<01, hp2=.05. This experimental design enabled detecting differences between empathy and sympathy and provided initial evidence that sympathy to general vulnerability is present already in early childhood. Future studies should investigate the neuropsychological mechanisms common and unique to each construct. For example, psychophysiological studies could investigate whether emotional contagion contributes to empathy.

B-78 (Presenter unable to attend)

Moral Choices Around Animal Welfare Are Sensitive to Expected Value

Arseny Ryazanov - University of California, San Diego; Sherry Yuiyi Jiang - University of California, San Diego; Piotr Winkielman - University of California, San Diego

Moral decisions reflect the consideration of multiple factors, such as the overall net benefit (numerical consequence) of a choice. Such considerations may apply not only to decisions about humans, but also to decisions in relation to animal welfare- the decisions we explore in the current study. The present study examines whether participants are sensitive to the expected value in a novel decision-making paradigm adapted from prospect theory, where participants choose between certain and probabilistic losses of rare mammals. We held constant the value of the certain option (10 animal lives lost) and the probability option (50%), and parametrically varied the expected value of the risky option (10 to 30 animal lives lost). This allows us to examine people's sensitivity to expected value ratio (.5 to 1.5) in decisions involving animal welfare. We found participants to be sensitive to expected value when deciding whether to certainly kill a small group of rare mammals or risk a larger group of them dying, as well as evidence of risk aversion in the domain of moral losses.

B-79

Neural sensitivity to electric shock treatment correlates with trait negative urgency

Benjamin J. Smith - University of California at Los Angeles; Emily E. Barkley-Levenson - Hofstra University; Feng Xue - University of California at San Diego; Vita Droutman - University of Southern California; Lynn M. Miller - University of Southern California; Stephen J. Read - University of Southern California

The Neurologic Pain Signature (NPS) (Wager et al., 2013) describes the correlation of each voxel in the brain with the pain intensity of a heat pad on the wrist, and can be used to measure the magnitude of pain response to painful stimuli. We measured pain from an electric shock delivered to the wrist in a reversal learning task. The magnitude of shock was set to a level participants reported as unpleasant but not unbearable. In a hierarchical model of 607 runs of a reversal learning task across 161 subjects, there was a brain response to an incorrect outcome in the electric shock punishment condition but not in the reward condition, b = 0.102 (CI=[0.079, 0.124]), indicating that the pain signature captured a signal uniquely related to pain. Only physical pain through a positive punisher triggered the NPS response; negative punishment without pain (losing the opportunity for a reward after an incorrect response in the reward condition) did not yield the same result. Furthermore, trait negative urgency was positively correlated with measured sensitivity to electric shock themselves to a level that was "unpleasant, but not unbearable", participants who make rash decisions to manage negative affect (Negative urgency) showed greater responsivity to the shock. We plan to investigate further related effects, including in the Behavioral Inhibition Scale, in recently collected electric shock datasets.

B-80

The effect of shared political affiliation on socially transmitted threat information

David Johnson - City University of New York; Ava McVey - Manchester University; Gregory Miller - Manchester University

One way that individuals acquire information about their environment is by observing the experiences of others, a process known as observational learning. This is an adaptive form of learning that enables an individual to anticipate danger while avoiding the costs associated with direct exposure to it. It has been observed that social forms of fear learning are not indiscriminate, but are selectively engaged. For example, evidence shows enhanced observational fear acquisition and extinction learning for same vs different race individuals and for fans of the same vs. different sports teams. In this study, we build upon on these findings and test whether shared political affiliation can bias social fear learning.

Participants were students at a small Midwestern college. We utilized an observational fear conditioning paradigm consisting of two phases. Prior to fear conditioning, the participants read a vignette about and viewed a picture of someone (the demonstrator) who was described as either conservative (pro-Trump), liberal (anti-Trump) or politically neutral. In the observational phase, the participant viewed a video of the demonstrator undergoing fear acquisition. In the test phase, the observer took the place of the demonstrator and directly viewed these same stimuli without the demonstrator present. Preliminary data shows a small but non-significant effect of shared political beliefs on fear learning, as indexed by skin conductance response (n = 20, r = .18, p > .05). Data collection is ongoing. We hope these findings will contribute to better understanding of the interplay between group affiliation and social forms of learning. **B-81**

The Psychological and Neural Correlates of Learning "Us" and "Them"

Tatiana Lau - Harvard University; Samuel J. Gershman - Harvard University; Mina Cikara - Harvard University

Humans form social coalitions in every society on earth, yet little is known about how we learn and represent social group boundaries. We derive predictions from a computational model of latent structure learning to move beyond explicit category labels and dyadic similarity as the sole inputs to social group representations. Our behavioral results indicate that people integrate information about how other agents in the environment relate to one another in addition to oneself in order to infer social group structure. These latent structures influence participants' choices with whom they want to align and trait attributions made about these agents (i.e., accounting for similarity, agents that cluster with participants are judged more moral, warm, and competent). Additionally, using a model-based analysis of functional neuroimaging data, we find that separate areas correlate with the dyadic similarity and latent structure learning models. In line with previous work on reflecting on oneself and similar others, trial-by-trial updating regarding dyadic similarity between participants and each agent recruited medial prefrontal cortex/pregenual anterior cingulate (pgACC). Trial-by-trial latent structure updating, on the other hand, recruited right anterior insula (rAl). A comparison of our rAl cluster with an independently identified ROI of cluster structure updating revealed a 44.7 percent overlap. Additionally, variability in the brain signal from this cluster significantly improved prediction of variability in choice behavior, whereas variability from the pgACC did not. These results provide novel insights into the psychological and neural underpinnings of how people learn who is "us" and who is "them".

B-82

The Effects of Oxytocin and Vasopressin on Neural Processing of Parents Faces is Dependant on Perceived Care from Fathers but not Mothers

Adam R. Teed - Southern Methodist University; Carrianne J. Leschak - University of California, Los Angeles; Perri L. Katzman - New York University; Michael R. Irwin - University of California, Los Angeles; Naomi I. Eisenberger - University of California, Los Angeles; Naifornia, Los Angeles; Benjamin A. Tabak - Southern Methodist University

The neuropeptides oxytocin and vasopressin are crucial for parent to child bonding, but little is known of their potential effects via intranasal administration on offspring to parent bonding. Additionally, oxytocin's effects on adult social behavior can vary based on the quality of caregiver relationships. Our study sought to better understand how these neuropeptides may modulate fMRI assessed neural processing while viewing one's parents and how these effects may vary based on parental care during childhood as measured by the Parental Bonding Instrument care (PBIc) subscale for each parent. Ninety females received intranasal oxytocin (N=29), vasopressin (N=27), or placebo (N=34) in a doubled-blinded, randomized, between-subjects procedure. Whole-brain fMRI data was collected while participants viewed photos of their mother and father and images of faces similar in appearance to each parent, enabling contrasts that controlled for potential neuropeptide effects on general facial processing. When compared with placebo, both oxytocin and vasopressin treatments activated the left temporoparietal junction for parents compared to matched faces, though vasopressin enhanced a wider, bilateral mentalization network. Neuropepide modulation of correlations between PBIc and neural activity were observed only for fathers. Specifically, fronto-cingular-insular regions were inversely correlated with PBIc under vasopressin, potentially representing enhanced social pain and exclusion associated with less caring fathers. Cingulo-insular regions appeared in comparisons of PBIc correlations for oxytocin versus placebo, suggesting function for the neuropeptides. Overall, results suggest that intranasal oxytocin and vasopressin increase mentalization for parents in females and modulate mental processing related to fathers based on care received during childhood.

Poster Session C

C-1

Neural signatures of resource insecurity and overlapping child psychopathology symptoms

May I. Conley - Yale University; Alice Oh - Yale University; Richard Watts - Yale University; Monica D. Rosenberg - Yale University; BJ Casey - Yale University

Poverty has been found to be a risk factor for negative mental health outcomes, however poverty is a broad construct that has been assessed using numerous measures. This study examined neural signatures of resource security (a measure of stable access to food, medical care, home utilities, and housing) and overlapping symptoms of internalizing and externalizing disorders in childhood. Open-source questionnaire and functional MRI data (n = 3215) were acquired from the first data release of the Adolescent Brain Cognitive Development (ABCD) study, a longitudinal study of child brain development and health tracking over 10,000 U.S. children for 10 years. Although typically dissociated, internalizing and externalizing symptoms of internalizing significant increase in symptom overlap in resource-insecure relative to resource-secure children (z = 2.18, p = 0.01). Preliminary analyses of the ABCD emotional n-back task fMRI data suggest altered patterns of frontoparietal activity associated with resource insecurity and combined clinical symptoms. These results suggest that resource insecurity is sensitive for detecting risk for clinical symptoms and associated underlying neural circuitry.

C-2

A neurocognitive investigation of the impact of socialising with a robot on empathy for pain

Emily S. Cross - University of Glasgow; Katie A. Riddoch - Bangor University; Jaydan Pratts - Bangor University; Simon Titone - Bangor University; Bishakha Chaudury - University of Glasgow; Ruud Hortensius - University of Glasgow

To what extent can humans form social relationships with robots? In the present study, we combined functional neuroimaging with a robot socialising intervention to probe the flexibility of empathy, a core component of social relationships, toward robots. Twenty- six individuals underwent identical fMRI sessions before and after being issued a social robot to take home and interact with over the course of a week. While undergoing fMRI, participants observed videos of a human actor or a robot experiencing pain or pleasure in response to electrical stimulation. Repetition suppression of activity in the pain network, a collection of brain regions associated with empathy and emotional responding, was measured to test whether socialising with a social robot leads to greater overlap in neural mechanisms when observing human and robotic agents experiencing pain or pleasure. In contrast to our hypothesis, functional region-of-interest analyses revealed no change in neural overlap for agents after the socialising intervention. Similarly, no increase in activation when observing a robot experiencing pain emerged post-socialising. Whole-brain analysis showed that, before the socialising intervention, superior parietal and early visual regions are sensitive to novel agents, while after socialising, medial temporal regions show agent sensitivity. A region of the inferior parietal lobule was sensitive to novel emotions, but only during the pre-socialising scan session. Together, these findings suggest that a short socialisation intervention with a social robot does not lead to discernible differences in empathy toward the robot, as measured by behavioural or brain responses.

C-3

Neural Signatures of Empathy for Brands

Feng Sheng - Marketing Department, University of Pennsylvania; Lin Yang - Wharton Neuroscience Initiative, University of Pennsylvania; Michael Platt - Department of Neuroscience, Department of Psychology, Marketina Department, University of Pennsylvania

Marketing research and practice presumes consumers connect with brands using the same internal mechanisms they use to connect with people. However, little empirical evidence beyond self-report has been mustered to support this relationships. Here we show that neural measures of emotions that characterize social relationships distinguish consumers' relationships with brands irrespective of self-reported feelings. Specifically, we used fMRI to measure brain activity in Apple and Samsung customers while they were exposed to positive and negative news concerning the two brands. Both Apple and Samsung customers strong empathy for their preferred brand, manifested as positive and negative reported feelings in response to good and bad news. Remarkably, Apple customers showed strong activation of brain areas implicated in empathy in response to Apple news, but Samsung customers showed no neural evidence of empathy in response to Samsung news. By contrast, Samsung customers showed neural evidence of "reverse empathy", namely, envy and schadenfreude, in response to news about Apple. Moreover, Apple customers, tended to preferentially share news about Apple on social media, relative to news about Samsung, irrespective of news valence, and this was associated with activation in brain areas linked to self-related processing. Samsung customers, by contrast, tended to selectively share bad news about Apple and good news about Samsung, and this was associated with activation in brain areas linked to reward. Our study provides neurobiological evidence that consumers relate to branding.

C-4

Image emotion recognition through artificial neural networks

Alex Hernandez-Garcia - University of Osnabrück

Affective computing aims at developing computational systems that can recognize, interpret and simulate human affects and emotions. The development of such systems can in turn yield better understanding of the mechanisms of human affect. One of the specific goals of affective computing is predicting the emotions elicited by multimedia content. Although remarkable steps have been made in the field, the problem still remains open. Because emotions are conveyed by many and varied factors---from very low-level cues, such as the colors of the stimulus, to high-level aspects, such as the semantics of the scene---modern deep artificial neural networks, which excel at learning hierarchical representations, seem a promising candidate. Here we explore the suitability of deep neural architectures for affective content analysis and propose a methodology designed to overcome the challenging aspects of the task, namely the relative lack of available annotated data and the uncertainty and subjectivity of the annotations. In particular, we propose a new objective function inspired by the image invariance observed along the ventral stream in the visual cortex that enables a more efficient use of the reduced training data. We train our model on a benchmark data set of 23,000 images labeled according to 8 emotions and achieve 43 % accuracy (over a baseline of 12.5 %) with a relatively shallow, small deep neural network, which sets a promising path to follow.

C-5

How do we register a speaker's affective stance from tone of voice during indirect communication?

Jonathan A. Caballero - McGill University. School of Communication Sciences and Disorders; Maël Mauchand - McGill University. School of Communication Sciences and Disorders; Marc D. Pell - McGill University. School of Communication Sciences and Disorders Superiment of Psychology / McGill University. School of Communication Sciences and Disorders; Marc D. Pell - McGill University. School of Communication Sciences and Disorders Superiment of Psychology / McGill University. School of Communication is implied by the way they say it, the importance of vocal cues to convey the underlying intentions of the speaker (affective stance) has been emphasized. To address how listeners use this information to derive social impressions in interpersonal contexts, we designed recordings whose interpretation require integrating semantic and vocal cues to distinguish polite from rude requests and compliments from criticisms. Twenty-three participants took part in a task requiring them to rate how friendly the speaker sounds while continuously recording the EEG. Behavioral results show that while participants make use of the combined cues to derive friendliness impressions, vocal cues have a much larger effect. We computed ERPs time-locked to the beginning of the sentence and compared trials perceived by participants as conveying low friendliness. Results show a diminished amplitude for unfriendly recordings at the N1 (less negative) and P2 (less positive) components. This pattern suggests that participants' social evaluations of the stimuli are heavily influenced by early acoustic discrimination processes (to which N1 is sensitive) in light of how motivationally salient (indexed by P2) the stimuli are for the task: evaluating friendliness. Results highlight that listeners consider the speaker's affective stance to derive social impressions and that those impressions can be traced back to the early neurocognitive processing of vocal cues, before semantic information has been processed.

C-6

The Metabody: Social Cognition as the Basis of Insight in Anorexia and Anosognosia

Aikaterini Fotopoulou – University College London

Disturbed 'insight' or lack of awareness into one's illness is a well-recognised aspect of patients' resistance to treatment in many mental health disorders. Yet there is a scarcity of neuroscientific work on cognitive insight, i.e. the ability to engage in certain higher-order cognitive abilities, such as metacognition and social cognition in a way that allows one to be realistic about one's illness. Methods: We present two behavioural and neuroimaging studies focusing on the role of perspective-taking, mentalisation and prospective metacognition on how patients with anorexia nervosa (N = 30 acute and 30 chronic patients), and patients with anosognosia for hemiplegia (N = 26 AHP stroke patients and 28 HP stroke controls), respectively, form aberrant interoceptive, exteroceptive and social beliefs about their body which they cannot update based on sensory or, social feedback. Advanced voxel-based, lesion-symptom mapping analyses in anosognosia reveal the role of limbic and frontoparietal lesions and disconnections, the latter involving the posterior cingulum and the third branch of the superior longitudinal fasciculus. Together these studies point to a disconnection hypothesis for clinical insight where subjective and social perspectives on one's bodily self are no longer integrated.

C-7

Parsing heterogeneity of executive function in typically and atypically developing children: A conceptual replication and exploration of relationships with social function Adriana C. Baez - Department of Psychology, University of Miami; Dina R. Dajani - Department of Psychology, University of Miami; Willa Voorhies - Psychology Department and Helen Wills Neuroscience Institute, UC Berkeley; Maria M. Llabre - Department of Psychology, University of Miami; Lucina Q. Uddin - Department of Psychology, University of Miami / Neuroscience Program, University of Miami Miller School of Medicine;

Executive function (EF) describes cognitive processes that govern goal-directed behavior. Case-control studies of EF in clinical and typical populations report contradictory findings from overarching dysfunction to specific EF subdomain deficits, suggesting substantial heterogeneity within populations that cannot be isolated with this approach. Few studies examine EF across populations with neurodevelopmental disorders, one of the first being a study where we used a latent profile analysis (LPA) to isolate three classes of differing EF that failed to reproduce diagnostic groups (Dajani et al., 2016). We fill this gap in research by performing a conceptual replication of this study with an independent sample of typically developing (TD) children and children with autism spectrum disorder (ASD), a neurodevelopmental disorder characterized by social deficits, ages 8-12. The LPA, using 8 subscales from the Behavior Rating Inventory of Executive Function, isolated two EF classes that failed to reproduce diagnostic groups. In line with the Dajani study, the classes displayed consistent EF across subscales and the above average EF class scored similarly to the Dajani above average class. The classes differed in their total Social Responsiveness Scale scores, with the below average group exhibiting greater social impairment. These results represent a partial replication of the Dajani study, supports the existence of EF heterogeneity in these populations, and further supports previous findings that EF correlates with social capability (Dajani et al., 2016). Both a failure to reproduce diagnostic categories and consistency in scores among EF subscales demonstrate the utility of taking a dimensional approach to EF.

C-8

2019 SANS Poster Award Winner

Meta Analytic Connectivity Modelling the Neural Substrate of Social Decision Making

Ryan T. Bird – Auburn University; Julio A. Yanes; Jennifer L. Robinson

Classical economic theory provides a strong understanding of rational, self-interest motivated economic decision making. The influence of emotion and social context, however, dilutes its predictive power and leaves room for alternative, more holistic explanations. The emerging field of neuroeconomics provides a lens through which to view economic decision making at the level of the brain in a variety of contexts – namely, the social context through use of game theoretic paradigms. Seeking to better understand the neural correlates of social decision making in the human brain, we conducted quantitative activation likelihood estimation (ALE) meta-analyses of four foci thought to be heavily involved in explicate a possible functional network of the key neural hubs conceptualized to be central to social decision making in the brain. Our data are indicative of a highly interconnected and broadly distributed network of brain areas which may subserve both affective and cognitive processes related to decision making in social contexts. To our knowledge, this represents the first quantitative, big-data approach toward identifying a robust network of social decision making.

C-9

Pattern dissimilarity distinguishes proximal and distal simulation in creative experts

Milena Rmus – Princeton University; Judith Mildner – Princeton University; Meghan Meyer – Dartmouth College; Diana Tamir – Princeton University; Hal Hershfield – University of California Los Angeles; Adam Wavtz – Northwestern University

We engage in imagination every day, by picturing our weekend plans, where we will be a couple of days from now, and taking the perspective of other people. Some scenarios, particularly more distal ones, are more challenging to simulate. What are the neural mechanisms that underlie our ability to perform distal simulations? Some insight into simulation may come from individuals who engage in it regularly. Thus, we recruited creative experts and control participants to complete a simulation task while undergoing functional neuroimaging. The task required participants to imagine distal and proximal scenarios in four different domains - social, temporal, hypothetical and spatial. Behaviorally creative experts generated significantly more vivid distal simulations, compared to the control group. Using representational similarity analysis, we thus compared how experts' and controls neural activation patterns were most dissimilar between proximal and distal conditions within the core default network regions including medial prefrontal and posterior cingulate cortex. These regions have been implicated in cognitive tasks engaging episodic simulation and memory retrieval. Furthermore, we found that this dissimilarity was greater emphasized in creative experts compared to control soulity to simulate distal scenarios is subserved by distinct neural regions, and the difference in the distributed activation pattern within these regions might drive variation in imagination ability.

Sexual Trauma-Related Deficits in Verbal Learning in Older Women is Mediated by Amygdala-Hippocampal Connectivity at Rest

Nicole Carvalho - U.M. Department of Psychology; Judith Lobo - U.M. Department of Psychology; Cal Anting - U.M. Department of Psychology; Roger McIntosh - U.M. Department of Psychology Post-traumatic stress associated with sexual abuse (ST) is most prevalent in women and shown to impair verbal learning (VL) and memory. Resting state functional connectivity (rsFC) between amygdala and hippocampal nuclei facilitates learning and memory, however it is unclear whether this connectivity mediates the effect of sub-clinical ST on VL.

A seed-based connectivity analysis was undertaken comparing rsFC between the R/L centromedial amygdala (CMA) with the R/L dentate gyrus (DG) in 73 older adult women (OAW) (aged 60 – 85 years). Seed-pairs were tested for mediation of the effect for ST on VL indexed by List-A recall on the Rey Auditory Verbal Learning Test.

Path analysis revealed that ST was associated with List-A recall, controlling for age (B = -.21, p = .046). Upon adding to the model a negative path from ST to the right CMA to left DG seed pair (B = -.31, p = .003) and a positive path from that pair to List A recall (B = .23, p = .033), the path between ST and List A recall became non-significant (B = -.14, p > .05) suggesting statistical mediation with good model fit (Chi-square = .81, p = .66, RMSEA < .001, CFI > .95, SRMR < .05).

These findings suggest that in the absence of acute PTSD trauma symptoms related to past sexual abuse relates to poorer VL in OAW, after controlling for age-related deficits. Moreover, aberrant rsFC between the CMA and hippocampal structures involved in long term potentiation mediates ST-related deficits in VL.

C-11

Resting state functional connectivity of attention networks links to social responsiveness deficits in autism spectrum disorder

Sahana Shankar – University of Miami; Turel O. Turan – University of Miami; Jason S. Nomi – University of Miami; Willa Voorhies - University of California, Berkeley; Melissa Huberman – University of Miami; Vij G. Shruti – University of Miami; Lucina O. Uddin – University of Miami

Autism spectrum disorder (ASD) is a complex neurodevelopmental disorder characterized by deficits in social responsiveness that may result from atypical connectivity of attention networks in the brain. The neural underpinnings of social responsiveness deficits specific to attention across development have not yet been explored using resting state functional magnetic resonance imaging (rsfMRI). We conducted a region-of-interest (ROI) analysis to explore functional connectivity between attention areas and the rest of the brain using rsfMRI data from 117 ASD and 117 typically developing (TD) individuals (agr 7-18 years) made publicly available through a data sharing initiative (http://fcon_1000.projects.nitr.corg/indi/abide/abide_Lhtml). We hypothesized that ASD-specific differences in functional connectivity of attention areas would be uncovered between groups and across development. In addition, we explored the relationship between attention network connectivity and social responsiveness Scale (SRS) in both ASD and TD individuals. In general, we found that nodes in the attention network were hyperconnected with other brain regions in ASD compared with TD. Further, we found a positive correlation between functional connectivity of brain areas to attention network nodes compared with TD individuals. Our results suggest that individuals with ASD generally show hyperconnectivity of brain areas to attention network nodes compared with TD individuals. Additionally, we demonstrate that connectivity strength is related to social responsiveness deficits, as measured by SRS scores. These findings suggest attention network-related neural underpinnings for social deficits present in ASD.

Association of default mode network functional and structural connectivity with social responsiveness in autism

Bryce Dirks – University of Miami; Jason S. Nomi – University of Miami; Willa Voorhies - University of California, Berkeley; Dina R. Dajani – University of Miami; Lucina Q. Uddin – University of Miami Autism spectrum disorder (ASD) is characterized by deficits in social communication and interaction. Previous research suggests that aberrant functional connectivity (FC) of the default mode network (DMN) may play a significant role in these deficits, but few studies have investigated both structural connectivity (SC) and FC concurrently. We investigated associations between both FC and SC of the DMN and social responsiveness as measured by the Social Responsiveness Scale (SRS) in a group of children with ASD (n = 23) and typically developing (TD) children (n = 34). DMN regions-of-interest (ROIs) in the posterior cingulate cortex (PCC) and the medial prefrontal cortex (mPFC) were identified using group independent component analysis (ICA). FC was measured as the correlation of the BOLD signal between the PCC and mPFC while SC was measured an anisotropy (FA) of the cingulum bundle connecting the PCC and mPFC ROIs. FC and SC were not significantly different between groups and were not significantly correlated with SRS subscales across groups. The lack of significant results may be a result of the small sample size. We plan to use a subset of ABIDE-II data (http://fcon_1000.projects.nitrc.org/indi/abide/abide_II.html) to try to investigate these relationships in a larger sample. We also plan to include other nodes of the DMN such as the angular gyri in future analyses. C-13

Extra-callosal pathways supporting interhemispheric communication after complete commissurotomy

Emily K. Marshall – University of Miami; Jason S. Nomi – University of Miami; Eran Zaidel - University of California, Los Angeles; Bharat Biswal - New Jersey Institute of Technology; F. Xavier Castellanos -Hassenfeld Children's Hospital at NYU Langone; Anthony Dick - Florida International University; Eric Mooshagian - Washington University School of Medicine; Lucina Q. Uddin – University of Miami Individuals whose corpus callosum has been severed to alleviate intractable epilepsy ("split-brain" patients) present the unique opportunity to study how brain connectivity can adapt to major changes. Because most split-brain patients demonstrate "social ordinariness" and remarkably intact motor and sensory functions, we hypothesized that alternate cross-hemispheric pathways exhibit compensatory strengthening post-surgery. While it has often been speculated that there are structural alterations in these remaining interhemispheric fibers, this has never been directly shown. Here we examined diffusion weighted imaging data for a 74-year-old patient who underwent complete forebrain commissurotomy at the age of 29. Data were preprocessed with TORTOISE software to correct for motion, eddy current and EPI distortion. DSI studio was used to quantify and compare the fractional anisotropy (FA) of several inter- and intra-hemispheric pathways (+11.29 and +7.33 SD) as well as the superior and middle cerebellar endotes (+3.34 and +3.70 SD). With respect to FA values for intra-hemispheric fibers and the whole brain, the values for the split-brain patient were not significantly different from the controls. These results point to specific cerebellar anatomical substrates that could account for the spared inter-hemispheric communication and intact cognitive abilities of split-brain patients. Our results contribute to a better understanding of brain plasticity, particularly with respect to inter-hemispheric white matter pathways.

C-14

Large-scale functional co-activation patterns reflect the structural connectivity of the medial prefrontal cortex

Dale Tover - University of Oregon; Robert Chavez - University of Oregon

The medial prefrontal cortex (MPFC) is among the most consistently implicated brain regions in social and affective neuroscience, yet it is also highly functionally heterogeneous with diverse patterns of connectivity. The extent to which the communication of functional networks in this area is facilitated by its underlying structural connectivity fingerprint is a critical, yet largely overlooked question. In the current study, we combined diffusion MRI probabilistic tractography with large-scale meta-analysis in Neurosynth core tools to investigate the degree to which functional co-activation patterns of the MPFC are reflected in their underlying structural connectivity. Using cross-modality unsupervised machine learning methods, we found consistent evidence of congruence between structural connectivity and functional co-activation across multiple clustering solutions. Using meta-analytic topic modeling, we also found that within independent clusters there was a high degree of functional correspondence between each modality, reflecting common functionally relevant sub-regions of the MPFC. These results provide evidence that functional co-activation patterns are constrained by their underlying neuroanatomical connectivity and provide convergent evidence of distinct sub-regions within the MPFC involved in affective processing and social cognition.

C-15

Mathematics anxiety is linked to aberrant functional connectivity patterns during basic number processing

Kenny Skagerlund - Linköping University; Mikael Skagenholt - Linköping University; Daniel Västfjäll - Linköping University; Ulf Träff - Linköping University

Mathematics anxiety is a negative emotional response to situations that require solving of mathematical problems, which in turn hampers math performance. Research suggests that this emotional response undermines working memory processes as well as basic number processing. The neural correlates of math anxiety during arithmetic processing have been established in previous research, but it remains unclear whether there are neural signatures of math anxiety during more basic number processing, which behavioral studies would suggest be the case. The current study investigated the relationship between math anxiety and basic number processing using task-related fMRI in a sample of adults (N = 51). We hypothesized that a seed-to-voxel functional connectivity analysis of candidate neural nodes in both the central executive network and the default mode network would be linked to math anxiety. Utilizing task design involving the processing of Arabic digits and a control task, we found that math anxiety during processing of numbers specifically was linked to functional connectivity patterns of the dorsolateral prefrontal cortex, cerebellum, and the angular gyrus. Importantly, these connectivity patterns remained while controlling for math ability. The dorsolateral prefrontal cortex is a central node of the central executive network while the angular gyrus is part of the default mode network. We extend previous research suggesting that math anxiety may hamper math problem solving by a dysregulation of the default mode network. We extend previous findings by showing that the mere exposure to supposedly aversive numerical stimuli elicits aberrant neural signatures in individuals with math anxiety.

C-16

Finding positive meaning in past negative events adaptively updates memory

Megan E. Speer – Rutgers University; Shawn E. Fagan – City University of New York; Sandra Ibrahim – Rutgers University; Fernanda M. Bonda – Rutgers University; Vivien Garcia – Rutgers University; Bernadette Garcia – Rutgers University; Luke J. Chang – Dartmouth College; Jamil P. Bhanji – Rutgers University; Daniela Schiller – Icahn School of Medicine at Mount Sinai; Mauricio R. Delgado – Rutgers University Finding positive meaning in past negative events is central to therapeutic techniques and associated with enhanced mental health. It is unclear, however, whether it leads to long-lasting updates in the memory representation itself. Since memory enters a labile period during retrieval, there is a potential for modification each time it reopens. Here we test whether positively reinterpreting negative memories can adaptively update them, leading to the re-emergence of

positivity at future retrieval. In fMRI scan1, participants (N=33) mentally recalled 32 negative memories and made emotion ratings. Afterwards, they elaborated on half of the memories in a positive way (i.e., focused on positive aspects) and naturally recalled the other half (control). To test for future changes, they recalled the same 32 memories again 24hr later (fMRI scan2). In contrast to natural recall, positive meaning finding led to enhanced positivity at future retrieval. We replicated this finding in 4 additional independent samples (N=320), demonstrating changes in both emotion and memory content across 24hr, 1-week, and 2-month delays, highlighting its durability and longevity. Notably, neural circuits previously implicated in reward processing (striatum, VMPFC) and emotion regulation (DLPFC, VLPFC) tracked the degree of positivity change at future retrieval. We then tested the critical question of whether updates to the memory itself occurred. Using representational similarity analysis, positively reinterpreted memories had greater NAcc and hippocampal pattern dissimilarity across retrievals than naturally recalled memories. These findings highlight an efficacious strategy for coping with persistent maladaptive memories via positivity, which promotes wellbeing and resilience to adversity.

C-17

Confirming expectations about familiar and unfamiliar individuals triggers reward-related neural activity

Niv Reggev - Harvard University; Jason P. Mitchell - Harvard University

Expectations shape many of our social interactions. We seek and interpret information about other individuals in a way that conforms to our expectations of them. But what happens when these expectations are confirmed? Our previous findings suggest that confirmation of stereotype-based predictions is rewarding. Here we examine whether confirmation of expectations about famous individuals is associated with similar effects. In a pre-registered fMRI study, participants were presented with 240 verbal statements, half of which described various characteristics which were pre-tested to be either consistent with gender stereotypes, and the other half include characteristics pre-tested to be either consistent with gender stereotypes, and the other half include characteristics and leaders related statements were followed by pictures of Mr. Trump or Mr. Obama. Participants judged how likely the presented person was to be characterized by the description. Subsequently, participants completed the anotetary incentive delay task to functionally localize reward-sensitive neural regions. Results indicated that viewing expectation-consistent information of expectations about famous individuals and confirmation of stereotype-derived expectations was associated with differential activity in lateral prefrontal cortex but not in reward-related regions. Overall, these findings suggest that while different mechanisms may be involved in processing different sources of expectations about

C-18

Dynamic Casual Modeling of holistic and analytic processing of dynamic facial expressions

Rafal M. Skiba - Laboratory for Behavioral Neurology and Imaging of Cognition, Department of Neuroscience, University of Geneva, Switzerland; Patrik Vuilleumier - Laboratory for Behavioral Neurology and Imaging of Cognition, Department of Neuroscience, University of Geneva, Switzerland

It has been proposed that two distinct processes may contribute to the recognition of face identity and emotion expression: one based on the features of the face, and the other implicated in grouping those features into a holistic representation. Most research has examined these processes using static pictures of faces. In our current fMRI investigation we explored the role of local and global visual information with novel dynamic facial stimuli expressing four different emotions (Anger, Happiness, Joy, Sadness), displayed synchronously or asynchronously across face features. Dynamic expressions were presented with the bottom face part moving before, together with, or after the face top part or vice versa, therefore favoring featural/analytic or global/holistic processing to different degrees. Our GLM results showed that synchronous facial expressions (holistic mechanism) distinctively engaged the Anterior Cingulate Cortex, medial premotor areas and bilateral Superior Frontal Gyrus. In contrast, asynchronous expressions in which one part of the face unfolded before the other (e.g., eye then mouth) activated the right Superior Temporal Sulcus (STS) and right Inferior Frontal Gyrus. Dynamic Casual Modeling (DCM) revealed a divergence of analytic and holistic processing of dynamic facial movements is performed in Medial Prefrontal Cortex rather than Occipital and FUS Stor asynchronous expressions. Overall, our results suggest that holistic processing of dynamic facial movements is performed in Medial Prefrontal Cortex rather than Occipital and Temporal parts of human brain, and proceeds along a hierarchical pathway.

C-19

Social Anxiety and Emotional and Neural Responses to Real vs. Computer Partners in an Interactive Game

Khalil Thompson - Georgia State University; Eddy Nahmias - Georgia State University; Negar Fani – Emory University; Trevor Kvaran - Georgia State University; Jessica A. Turner - Georgia State University; Erin B. Tone - Georgia State University

Introduction: During interpersonal interactions, many people vulnerable to social anxiety are especially prone to mentalize, or make excessive efforts to infer others' intentions, desires and feelings. Research using the iterated Prisoner's Dilemma task as a model of social interaction in adults from the general population has shown that although participants tend to attribute human characteristics to computer partners, brain activations patterns differ according to whether the co-player is human or computer. In this study, we examined whether this finding varies as a function of self-reported social anxiety.

Method: College students (n=31; Ages 18-28), categorized as having high or low social anxiety using Liebowitz Social Anxiety Scale-Self Report (LSAS-SR) scores, were scanned while playing three iterated Prisoner's Dilemma games (once with a computer, twice with putative humans). In reality, all co-players were preconfigured computer algorithms.

Results: A cluster-thresholded FDR-corrected analysis revealed significantly more activity in the left anterior insula (AI) (t(1,29)=3.39, p<.001, p<.05 FDR, k=58) in all participants when they processed feedback regarding human coplayer defection than when they processed feedback about computer co-player defection. Anxiety groups did not differ significantly (p > .05).

Conclusion: Regardless of social anxiety levels, all participants showed elevated left anterior insula activity in response to negative co-player behavior when they believed their co-player was human rather than a computer. These results reinforce research implicating the AI in processing aversive outcomes and furthermore suggest that the region is differentially sensitive to personal acts of betrayal that originate from a human conspecific.

C-20

Implicit Emotional Responses in the Judgement of Facial Attractiveness in Faces with Differing Levels of Make-up

William E. Comfort - Mackenzie Presbyterian University; Bianca N. Andrade - Mackenzie Presbyterian University; Giovanna L. Sousa - Mackenzie Presbyterian University; Tanja Wingenbach - Mackenzie Presbyterian University; Paulo S. Boggio - Mackenzie Presbyterian University

Makeup has long been used to enhance female facial attractiveness and to accentuate sexually-dimorphic cues signaling femininity. Daily use of makeup products may vary from the more common use of foundation and lipstick to the enhancement of eye regions using pencil, mascara, eyeliner and eye shadow. This study examined how cumulative levels of facial makeup influenced performance on an implicit approach-avoidance task and on recordings obtained through facial electromyography (EMG) in a passive viewing task. Experiment 1 employed the joystick variant of the approach-avoidance task, where 30 subjects categorized female faces by visual orientation (pertrait/landscape) in 7 cumulative makeup levels (1: no makeup, 2: foundation added, 3: lipstick added, 4: pencil added, 5: mascara added, 6: eyeliner added, 7: eye shadow added). In Experiment 2, facial EMG was recorded from 30 subjects in the passive viewing of the same images. Results showed a lower reaction time (RT) for avoidance responses to no makeup (1) and heavy (7) makeup images, with corresponding higher RTs for avoidance responses to light and medium (2-6) makeup images. Facial EMG recordings revealed an increase in corrugator activity for no makeup and heavy makeup images, and an increase in zygomatic activity for light and medium makeup images, reflecting negative and positive affective response, respectively. The present study shows that makeup application modulates implicit emotional responses and reveals an implicit preference for facial cues which facilitate visual processing, consistent with the conception that visual fluency is a key determinant in many aesthetic judgments.

C-21

2019 SANS Poster Award Winner

Contextual goals shape the neural representation of social networks

Miriam E. Weaverdyck - University of California, Los Angeles; Meng Du - University of California, Los Angeles; Pratishta Natarajan - University of California, Los Angeles; John Andrew Chwe – New York University; Carolyn Parkinson - University of California, Los Angeles

Knowing whom someone is connected to can significantly affect how you interact with that person. Recent work suggests that information about others' social network positions, like how well-connected they are (centrality) and how many 'degrees of separation' they are from others (relative social distance), is encoded in distributed neural responses when seeing their faces. Different facets of social relationship information are more relevant in some contexts than others, yet it is unknown how contextual goals shape these neural representations. To address this, we conducted an fMRI study where participants first learned the pattern of friendships (the social network) connecting members of a community, then viewed those individuals' faces during scanning. Across runs, participants were intermittently asked questions requiring them to attend to either the number (centrality) or configuration (relative social distance) of community members' friendships. Using representational similarity analysis, we tested if and where contextual goals shape the neural encoding of social knowledge. Preliminary results suggest that information about others' social

network positions is encoded in brain areas associated with social cognition; in a subset of these regions, contextual goals modulated the extent to which relevant social network information predicted neural response patterns. That is, response patterns associated with one facet of social network information became more distinct when that facet was contextually relevant. Accentuating the distinctness of contextually relevant information at this stage may shape downstream processing and behavior. These findings suggest that context shapes how the brain encodes and processes information about the structure of our social world.

C-22

Altered Neural Responses to Own Baby-Cry in Women with PTSD Following a Traumatic Childbirth

Zohar Berman - Massachusetts General Hospital and Harvard Medical School; Arielle Kaim - Boston University, Massachusetts General Hospital; Lisa Shin - Tufts University, Massachusetts General Hospital and Harvard Medical School; Sharon Dekel - Massachusetts General Hospital and Harvard Medical School

Childbirth is considered a uniformly happy event. Nevertheless, as many as one third of women experience their delivery as psychologically traumatic, and a minority of these women also proceed to develop childbirth-related posttraumatic stress disorder (CB-PTSD). Notably, in addition to maternal suffering put forth by PTSD symptoms, CB-PTSD may interfere with the formation of maternal attachment and mother-infant bonding, which pose a developmental risk for the infant. Nonetheless, knowledge regarding the neural alterations underlying maternal bonding impairments in CB-PTSD is completely lacking. Here, we use fMRI to investigate neural responses to own-versus unknown-baby-cry sounds in women up to one year postpartum who experienced a highly stressful childbirth, with and without CB-PTSD. We also explore the associations between mothers' neural responses and assessments of modifications in BOLD own-baby-cry-related responses in women with CB-PTSD compared with non-CB-PTSD controls. Furthermore, we observe correlations between maternal bonding and infant behavior scores, as well as mothers' perceived social support levels, and their neural alterations underpinning maternal bonding impairments in CB-PTSD, as well as elucidating their behavioral and psychosocial correlates, is important for a better understanding of the disruptions in maternal behavior evident in this condition and for developing targeted therapeutic strategies to facilitate maternal responses, to the consequential benefit of both the mother and the infant.

C-23

Real-world goal-relevance organizes neural responses to naturalistic alcohol cues

Kristina M. Rapuano - Yale University; Andrea L. Courtney - Stanford University; James D. Sargent - Dartmouth Hitchcock Medical Center; Luke J. Chang - Dartmouth College

Neural responses to cues that predict rewards have been previously associated with risky behaviors and outcomes. These responses are likely to vary depending on momentary value appraisals such as the relevance of a particular behavior or goal. Prior work has manipulated value using highly-controlled experimental paradigms; however, this work may have limited generalizability to real-world behaviors. By manipulating the real-world relevance of drinking alcohol, we examined the influence of shared goal states on neural responses to naturalistic alcohol advertisements in underage drinkers. Participants (n=52) viewed alcohol (e.g., Bacardi) and control commercials (e.g., Microsoft) embedded in a TV show during two counterbalanced fMRI sessions: one on a weekend evening (goal-relevant) and one on a weekday morning (goal-irrelevant). Neural responses to individual commercials were characterized for each participant by correlating spatial patterns across time within 50 non-overlapping parcels. Responses were compared across subjects to evaluate differences in commercial-wise synchrony as a function of goal relevance. Shared goal relevance increased intersubject synchrony of responses to alcohol ads in regions associated with valuation (e.g., medial OFC, ventral striatum). This difference in synchrony was driven by the persistence of spatial activation patterns over time, suggesting that brain regions associated with value computation integrate goal-relevant information over longer timescales. Intersubject synchrony did not differ between sessions for control commercials. These findings suggest that real-world goal states organize neural responses to naturalistic cues and implicate a potential role of targeted advertising in motivating goal-directed underage drinking, which may inform policies on advertising to youth. **C-24**

Motivated impression updates vary as a function of impression dimensions

BoKyung Park - Boston College; Mauricio Delgado - Rutgers University; Liane Young - Boston College

People perceive close others more favorably than they do strangers. Using fMRI, we investigated whether these effects vary as a function of the impression dimensions: comparing judgments about others' character ("trustworthiness") and judgments of relation to oneself ("closeness"). Twenty-four participants played a game with their same-sex close friend and a confederate. On each trial, a target (either friend or stranger) gave to or took some money from the participants. Then participants rated to what extent the target was trustworthy, or how close they and the targets were. We found that participants showed less right temporo-parietal junction (rTPJ) activity when their friend took money than when a stranger took money, especially when they were about to make a closeness rating. Moreover, in the taking-closeness condition, the greater the rTPJ activity participants showed in response to the friend vs. stranger, the less that the participants would positively update the closeness rating for the friend outside of the scanner. These results suggest that decreased rTPJ activity could be associated with downplaying negative information about a friend to protect the close relationship.

C-25

Data Mining Reveals Discrete Neurobiological Systems That Contribute to Pain Processing Across Archived Functional Neuroimaging Studies

Julio A. Yanes – Auburn University; Katherine A. Bottenhorn – Florida International University; Taylor Salo – Florida International University; Michael C. Riedel – Florida International University; Angela R. Laird – Florida International University: Iennifer L. Robinson – Auburn University

Pain is a complex psychological phenomenon with assorted dimensions, including sensation/perception, emotion, and cognition aspects. This complexity warrants a parsimonious assessment of pain-related neural representations. Here, we leveraged a meta-analytic clustering approach to isolate discrete neurobiological systems that contribute to pain processing across archived neuroimaging studies from a data-driven, network-based perspective. Specifically, we extracted peak-activation coordinates from experiments cataloged in the Brainmap database under the Pain Monitor/Discrimination paradigm classification. Coordinates were smoothed using a three-dimensional Gaussian distribution to compute experiment-specific modeled activation maps. We assembled an experiment correlation matrix using pair-wise Pearson's correlation coefficients and implemented k-means clustering to dissociate experiment subsets with similar activation patterns (i.e., meta-analytic groupings). Clustered experiments were then meta-analyzed and decoded to provide enhanced neurobiological and behavioral understanding. Database mising yielded 3,803 coordinates representing 369 pain-related experiments from 114 studies. An optimal clustering solution suggested six discrete, yet complimentary, systems that were represented across pain-related functional neuroimaging experiments: (1) bilateral insula and primary motor cortex associated with motor control and somatosensation, (2) cingulate, striatum, and frontal regions associated with emotion and reward, (3) bilateral insula, striatum, frontal regions, and parietal regions associated with motor control, attention, and reward, (5) bilateral insula, cingulate, thalamus, striatum, and cerebellum associated with motor control, attention, and response inhibition, and (6) primary somatosensory cortex associated with vibrotactile discrimination. When taken together, these meta-analytic outcomes demonstrate the utility in using large-scale data mining techniques to provide nuanced understanding of complex psych

C-26

Assessing the Role of Brain Signal Entropy in Driving the Social-Perceptual Effects of Oxytocin

Diogo M. G. Fortes - Psychology Department, University of Virginia; Meghan H. Puglia - Psychology Department, University of Virginia; Jessica J. Connelly - Psychology Department, University of Virginia; James P. Morris - Psychology Department, University of Virginia

The neuropeptide oxytocin is thought to regulate social behavior by increasing the salience of social stimuli, with rodent studies correlating its behavioral effects with its ability to balance cortical signal-to-noise ratio. In humans, neural noise has been linked to behavioral and cognitive performance, but its relationship to individual variability in social perception remains unknown. Here, we investigate a role for individual variability in the endogenous oxytocinergic system in driving human social perception by regulating neural noise in response to social stimuli presentation.

Participants (n=153) underwent electroencephalography (EEG) while being presented with social and non-social stimuli, in both visual and auditory modalities. Subjects (n=86) provided blood and saliva samples for epigenetic analysis, completed self-report measures of social functioning, and were recorded while interacting with a stranger. Preliminary results (n=12) indicate an effect of modality and social context on the multiscale entropy of EEG signal when averaging across scalp electrodes and subjects. Differences in MSE were significant between social-visual and social-auditory conditions, and between social-auditory and non-social-auditory conditions. Social-visual and non-social-visual differences were very nearly significant, while the non-social conditions showed no difference across modalities.

While further analysis is still necessary to yield functional relationships between brain signal entropy and behavioral with behavior and epigenetic measures, preliminary results thus far point to a complex interaction between sensory modality and social context in the multiscale entropy of EEG signal.

C-27

Different varieties of fear engage distinct, distributed neural activation patterns

Yivu Wana - Northeastern University: Grace Boatman - Pomona Colleae: Aiav Satpute - Northeastern University

Many current models of fear assume that a core set of brain regions underlies fear across many situations in which fear is experienced. Despite the prevalence of the view, a growing body of work suggests that the neural correlates of fear may actually vary substantially depending on the situation, such that no single area or set of areas underlies fear across them.

To formally test this idea, participants (N = 22) were induced to feel fear in three distinct contexts while undergoing functional magnetic resonance imaging (fMRI). Specifically, they were shown sets of video clips that evoked fear of spiders, heights, and social situations, and rated their experienced fear, arousal, and valence after each video. Critically, each situation contained videos that were more, or less, fear evoking, allowing for parametric or dose-dependent analyses that controlled for semantic content. Contrary to predictions stemming from a core areas model, no brain areas consistently showed greater activity that tracked with increasing fear experience across situations. Instead, different varieties of fear engaged distinct and distributed cortical activation patterns. These findings suggest that neural basis of fear involves a many-to-one mapping between brain activation patterns and mental phenomenon - i.e., a distributed and degenerate neural architecture. These findings support constructionist theoretical accounts of emotion and have translational implications for fear and anxiety disorders that rely on a core areas model. C-28

Everyday Family Activities Are Associated with Mother-Child Brain Synchrony

Atigah Azhari - Psychology Program, School of Social Sciences, Nanyang Technological University, Singapore; Wan Oing Leck - Psychology Program, School of Social Sciences, Nanyang Technological University, Singapore; Jolene Ngo - Psychology Program, School of Social Sciences, Nanyang Technological University, Singapore; Sarah S. Q. Ng - Psychology Program, School of Social Sciences, Nanyang Technological University, Singapore: Gianluca Esposito - Psychology Program, School of Social Sciences, Nanyang Technological University, Singapore: Department of Psychology and Cognitive Science, University of Trento, Italv

Emotional attunement is an interpersonal emotional regulation process which serves as an essential foundation in mother-child relationships. From a young age, children are capable of "catching" emotions in their social environment, in a process known as emotional contagion. However, little is understood of how mother and child attune to each other at the brain level in response to different familial emotional conditions. Here, we tested 25 mother-child dyads of preschool age using Near-infrared Spectroscopy (NIRS) in hyperscanning mode to simultaneously measure prefrontal cortical (PFC) activities of both partners. Child participants sat on their mothers' lap and both were presented with three 1-minute long animation videos: Family Reunion (FR), Family Everyday Activity (FE) (bedtime story) and Family Conflict (FC). Synchronization of hemodynamic responses of the dyad was calculated from inter-brain activity coherence using Dynamic Time Warping (DTW). DTW generates a scalar value for the extent of synchronization of PFC activity in each emotional condition. Analysis of Variance (ANOVA) showed that there is significantly more synchrony between mother and child during FE than FR in the left middle frontal gyrus, known to be involved in inhibitory control and selection of behavioural responses. This suggests that synchrony of dyads towards positive emotions depends on situational complexity. Mothers and children display less similarity in PFC activation during presentation of more complex positive emotions, whereas they exhibit more similar responses to simpler positive everyday situations. These results bear implications as to the activities that families and parents may engage in to promote shared emotional states.

C-29

Neural Underpinning of Dynamic In-group and Out-groups based on Ethnicity and Culture in Multicultural Societies

Paola Rigo - Department of Developmental Psychology and Socialisation, University of Padova; Bindiya Lakshmi Raghunath - Divison of Psychology, Nanyang Technological University, Singapore; Amanda May Yena Choo - Division of Psycholoay, Nanavana Technological University, Singapore: Marc Bornstein - Society for Research in Child Development: Gianluca Esposito - Division of Psychology, Nanavana Technological University, Singapore

This study investigated i) neural reactivity and responsiveness to ethnic in-group and out-group faces (IF, OF) in a multicultural setting, and the modulatory effect of the environmental context: primed with either ethnic related contexts (EC) or cultural-related contexts (CC); and ii) how individuals' perception and attitudes, modulated by positive endorsement and promotion of multi-ethnic integration, can influence their cerebral responses. We posit that beyond ethnicity, identifying with a common shared culture may drive an automatic and spontaneous sense of belonging to a multi-ethnic group. Thus there would be an enlarged cultural in-group in addition to ethnic in-groups and out-groups. Forty-eight Chinese Singaporean participants underwent functional magnetic resonance imaging while viewing images of IF and OF, primed with either CC (non-ethnic, common cultural monuments) or relevant EC (ethic monuments). We found higher order processing for OF compared to IF in the EC. Activated brain regions included social cognition and self-referential regions; left superior temporal gyrus, left supramarginal gyrus, right cuneus, right visual association area, and rolandic operculum. No such significant differences in brain activations between OF and IF faces were found in the CC suggesting an enlarged in-group based on cultural identity. These findings verify that culture, more than ethnicity, drives an automatic and spontaneous sense of belonging to a multi-ethnic group when cross-cultural interaction is enhanced. It sheds light on a possible emergent phenomenon, in multicultural societies, of a new way to categorize oneself and others, in terms of membership, which stands between the classical ethnic in- and out-group categorization.

C-30

Dehumanization and embodiment of emotions

Ruth L. Romro - Mackenzie Presbyterian University; William E. Comfort - Mackenzie Presbyterian University; Lucas M. Marques - Mackenzie Presbyterian University; Enrico Glerian - University of Turku; Lauri Nummenma - University of Turku: Paulo S. Bogaio - Mackenzie Presbyterian University

Dehumanization consists in denving uniquely human or human nature characteristics to other individuals. In that sense, the non-attribution of secondary emotions to outgroup people is a way of dehumanizing them, bringing them closer to animality. Another aspect of self-perception is associated with the embodiment of emotions, which occurs when we evaluate where in the body we perceive and feel each emotion. Since the attributions of secondary emotions are a way of dehumanizing, it is possible to infer that the embodiment of emotions occurs differently when we imagine this emotion belonging to someone else from a typically dehumanized group. In this study, 91 university students between 18 and 35 years old were distributed in 3 groups - 1) him/herself, 2) a similar one (student like him) and 3) homeless one. They were instructed to respond to the Bodily Sensations Maps (BSMs) Task considering their own emotions (group 1), the peer emotions (group 2) or the homeless emotions (group 3). They were asked to respond to 18 emotions that could be basic ones (such as anger, fear, joy) and complex ones (such as awe, compassion, pride). T-tests, FDR and LDA and similarity scores were employed to discriminate between emotions and compare scores between groups, respectively. The BSMs of the homeless were more intense in emotions like hope, guilt and shame, while the BSMs of the group of students were increased for pride. We discuss these findings considering the stereotype content model as well as the role of the context on emotional attribution.

C-31

Discovering the latent structure of others' strategic social choices

Jeroen M. van Baar - Brown University; Grace Deng - Brown University; Marlon Sherman - Brown University; Oriel FeldmanHall - Brown University

Optimal social decision-making requires predicting the behavior of others. For example, by predicting how my co-worker will respond to a critical question, I can optimize how I phrase a critique to safeguard our collaborative relationship. However, since social behavior is high-dimensional, uncertain, and context-dependent, predicting others' behavior can be a daunting task. How do people navigate this complexity? One possible strategy is to try and infer the latent states (e.g. beliefs, intentions, preferences) that may give rise to another's behavior, and where appropriate, generalize these inferences across time and social contexts. This strategy requires an individual to infer how different social contexts are connected by an underlying causal structure. For example, my co-worker's response to criticism is likely similar between meetings, but may differ if the critique is offered privately. While existing studies show that people are able to infer others' latent states, it remains unknown if-and how-people generalize these inferences across social situations. We answer these questions in a series of different dyadic economic paradigms. Human choice behavior across different types of games (e.g. Prisoner's Dilemma, Stag Hunt) reveals a reliable correlation structure, since most people consistently use one of several available decision strategies across games. This provides an empirical benchmark for generalizing latent states across social contexts. We examine whether people 1) make inferences about the decision strategies of other players; 2) rely on these inferences to predict a person's future choices; 3) generalize the inferred latent states to unseen social contexts.

C-32

The effect of joint social interaction on affective movie viewing

Sarah Dziura - University of Maryland, College Park; Diana Alkire - University of Maryland, College Park; Junaid Merchant - University of Maryland, College Park; Diana Alkire - University of Maryland, College Park; Diana Alkire - University of Maryland, College Park; Junaid Merchant - University of Maryland, College Park; Diana Alkire - University of Maryland, College Park; Di Park; Deena Sharig - University of Maryland, College Park; Dustin Moraczewski - University of Maryland, College Park; Kathryn McNaughton - University of Maryland, College Park; Elizabeth Redcay - University of Marvland, Colleae Park

Social interactions are an integral part of everyday life, including sharing emotional experiences. Prior work investigating how the brain supports sharing experiences with others has relied on static or emotionally neutral stimuli. The current study aims to examine this sharing (or joint attention) in a more naturalistic setting; in particular, watching videos with a peer. We used traditional GLM contrasts to compare results to the established joint attention literature as well as inter-subject correlation (ISC) to better capture dynamic processing of naturalistic stimuli. Participants became familiar with a social partner in a behavioral session, and then completed a video viewing task in their partner's presence. Short videos were shown to participants in an MRI scanner either while they believed their partner was viewing the same video (joint condition) or viewing a different video (solo condition). Videos varied in valence from positive to negative. Participants report greater partner awareness during the joint condition compared to solo. The mentalizing network, including the temporoparietal junction and medial prefrontal cortex, shows higher average BOLD activity in the joint viewing condition compared to solo. Higher ISC is also found in similar areas of the mentalizing network during the joint viewing condition compared to solo, showing that this unconstrained analysis represents similar activity to structured model-based methods. These results demonstrate the importance of the social-cognitive neural network during socially shared tasks in a more ecologically valid scenario. Further, they validate the use of model-free naturalistic approaches to examine social cognition and social interaction.

C-33

Neural decoding of valence and category during viewing of naturalistic social interactions

Eunbin S. Kim - The Ohio State University; Dylan D. Wagner - The Ohio State University

From just a quick glance, humans are able to quickly and effortlessly infer the type of social interaction that others are participating in (e.g., a couple fighting vs. friends reminiscing). Prior research has shown that the dorsomedial prefrontal cortex (DMPFC) is spontaneously recruited when people view scenes of social interactions during natural viewing, however, evidence of further dissociation according to the type or valence of social interactions remains sparse. In the present study, we investigated whether categorical features of naturalistic social interactions could be decoded from patterns of activity within the DMPFC during natural viewing. Eighteen right-handed individuals viewed 40 naturalistic scenes segmented from popular movies (duration 25-51s). Movie scene segments where chosen such that each scene corresponded to one of the following social interaction types for positive valence (romantic, platonic) or negative valence (physical conflict, verbal conflict). Whole-brain analysis contrasting responses to social ys, non-social scenes revealed significant activation in brain regions involved in the perception of social information, including the DMPFC. Using a multivariate pattern classifier, we found that activity patterns in the DMPFC discriminated between both type and valence of naturalistic social interactions, although this effect did not obtain when decoding within each valence alone. A searchlight decoding analysis revealed that a more ventral region of the VMPFC reliably discriminated between social interaction types within negatively valenced scenes. These findings suggest that neural responses in the DMPFC during natural viewing of social interactions are, in part, associated with distinct types of interaction and their valence.

C-34

Intergroup contact reduces specificity of mentalizing regions within and across race

Grace Handley - University of Delaware: Iennifer Kubota - University of Delaware: Iasmin Cloutier - University of Delaware

Forces of globalization, political conflict, urbanization, natural disasters, and poverty have increased migration within and between countries, shaping a new social landscape affording more opportunities for intergroup contact. Despite these trends, little is known about how contact shapes mentalizing about ingroup and outgroup members. Previous neuroimaging research found that increasing childhood contact was associated with decreased recruitment of a network of brain regions implicated in social cognition, salience detection, and face processing irrespective of target race. We therefore predicted that high levels of contact would be associated with changes in the recruitment of brain regions implicated in mentalizing irrespective of target race due to generalized increases in processing efficiency. White participants (n = 61) rated 60 faces (30 Black/30 White) on two dimensions: interest in experiment (mentalizing) and facial symmetry (non-mentalizing). Consistent with our predictions, we found that regardless of target race, task (interest, symmetry) and contact significantly predicted activity in regions of interest implicated in mentalizing (right temporoparietal junction and dorsomedial prefrontal cortex) and race processing (left amygdala). In all three regions, low and average contact participants showed significantly greater activity during the mentalizing task than the nonmentalizing task, whereas high contact participants' activity did not differ significantly between the tasks. These effects did not vary across target race, suggesting that among White perceivers, contact is associated with increased mentalizing efficiency for both outgroup and ingroup targets. Increased exposure to other-race individuals may broadly shape the mechanisms by which people infer others' mental states. C-35

2019 SANS Poster Award Winner

Functional connectomes predict friendship and social network centrality

Ryan H. Hyon – University of California, Los Angeles; Yoosik Youm – Yonsei University; Jeanyung Chey – Seoul National University; Carolyn M. Parkinson – University of California, Los Angeles Functional connectomes computed from resting state fMRI data characterize patterns of spontaneous synchronization across the brain. They are stable within individuals, and can be used to predict traits and even identify individuals, suggesting a promising target of study for research on stable individual differences (traits). A growing but separate line of research suggests that aspects of the positions people occupy in their social networks (the number and configuration of their social ties) constitute stable individual differences that are relatively understudied in psychology and cannot be reduced to other facets of personality. Similarly, although people often have the intuition that they are friends with others like themselves, evidence for homophily (being friends with similar others) based on self-reported personality is inconsistent. Recent evidence suggests that fMRI data could improve our ability to predict friendship and social network proximity. Here, we tested if individuals' functional connectomes can be used to predict information about their real-world social network position, including centrality (e.g., how many social connections they have) and relative proximity to other network members ("degrees of separation"). We reconstructed the full social network of a remote village (N=835), a subset of whom (N=63) were scanned using fMRI. Individuals' functional connectomes accurately predicted social network centrality, and the similarity of individuals' functional connectomes predicted their proximity in the social network. These findings suggest that patterns of social connectivity are reflected in multivariate signatures of brain functional connectivity. More generally, they underline the promise of using functional connectomes to predict and understand social behavior.

C-36

Neural evidence that men are more sensitive to social status than women during impression formation

Denise M. Barth - University of Delaware; Bradley D. Mattan - University of Delaware; Tzipporah P. Dana - University of Delaware; Jennifer T. Kubota - University of Delaware; Jasmin Cloutier - University of Delaware

Social status can shape how we form impressions of others. Previous work has found that individuals with higher SES elicit greater activity in the VMPFC and NAcc. Activation in these regions, which have been implicated in social evaluations and reward and/or salience, respectively, may reflect the presumed positive value of high status. However, this line of work has primarily relied on male participants and male stimuli. Because gender and status may be structurally linked, it is important to consider how gender and status impact impression formation. In the present study (n=64), we explored how perceiver gender shapes impression formation for male and female faces varying in status. We observed greater activity when male perceivers formed impressions of high-status (vs. low-status) faces, irrespective of target gender, in the VMPFC and right NAcc. For female perceivers, this status effect was non-significant. These findings are consistent with work in human and non-human primates showing that status is more rewarding for men than women, and are discussed in relation to the broader literature on how status intersects with salient social categories.

C-37

Oxytocin Administration Effect on the Induction of the Rubber Hand Illusion: Analysis of Cerebral Hermodynamics by fNIRS

Carolina S. Gudin - Mackenzie Presbyterian University; Marília Lira - Mackenzie Presbyterian University; Fernanda N. Pantaleão - Mackenzie Presbyterian University; Paulo S. Boggio - Mackenzie Presbyterian Universitv

Recent studies have revealed the effect of oxytocin on the modulation of brain areas corresponding to body representation during synchronic visuo-tactile stimuli, and also in the concentration of individual salivary oxytocin as a predictor in the intensity of the rubber hand illusion. Thus, our goal was to evaluate the effect of administration of intranasal oxytocin on the perception of rubber hand illusion (RHI). Thirty-four male participants, right-handed (M = 76.82 ± 19.2 from the Edinburgh laterality inventory) and with a mean age of 21,70 (2.36) were included. The administration of oxytocin or placebo (40 U) was performed by an intranasal method on different days, 35 minutes before the RHI. The brushes interventions were performed in three different conditions: synchronically, asynchronically and without stimulus: observation of the rubber hand without the brushes (hands were similar to the participant's hand) and of the participant's hand. The results showed that there was body property in synchronous and observation stimulation, but not in asynchronous. Besides this, we found a significant difference in the synchronous and asynchronous conditions of the illusion, as well as between asynchronous and rubber hand observation, but we did not find a modulation effect on oxytocin administration. Our findings also showed that participants after the RHI had a proprioceptive displacement to the rubber hand, also with no modulation of oxytocin administration. The results of the study suggest that the intranasal administration of oxytocin modulates the onset time of the illusion, but it does not modulate the effects of intensity.

C-38

Brain bases of adaptive social functioning: Linking emotion perception and learning

Erica J. Ho – Yale University; Jenna M. Reinen - IBM Watson Health; David C. Gruskin – Yale University; Lauren M. Patrick – Yale University; Kevin M. Anderson – Yale University; Hyojung Seo – Yale School of Medicine; Ifat Levy – Yale School of Medicine; Avram J. Holmes – Yale University

Predicting the outcomes of interpersonal exchanges is essential for navigating our complex social world. This adaptive feature of social functioning relies on the dynamic coordination of processes ranging from evaluating sociallyrelevant stimuli to learning social contingencies. These processes in turn involve the integrated function of partially overlapping brain systems encompassing the medial prefrontal cortex (mPFC) and ventral striatum. Through a pair of novel tasks, we investigated how both social perception and contingency learning jointly influence the prediction of social outcomes. Forty-one participants first rated the perceived valence of morphed face photographs depicing varying degrees of anger and happiness. Next, during fMRI scanning, participants completed a reinforcement learning task in which they repeatedly encountered two targets who offered "deals" while varying in the valence and intensity of their expressed emotion. Participants worked to learn the targets' intentions, accepted or rejected each ostensible offer, and received probabilistically determined feedback. Individuals who self-reported greater lifetime social inhibition were found to perform worse in social contingency learning. Initial analyses utilized computational models to quantify learning signals, and indicated that activity in the mPFC and ventral striatum during learning tracks both stimulus morph levels and participant-specific prediction errors. Ongoing analyses aim to hone learning may provide crucial insights into not only typical social behavior, but also psychiatric illnesses marked by impairments in social functioning. Investigating the interactions between social perception and social contingency learning may provide crucial insights into not only typical social behavior, but also psychiatric illnesses marked by impairments in social

C-39

Building the self? A multimodal neuroimaging network analysis of adolescent girls

Samantha J. Chavez - University of Oregon; Jennifer H. Pfeifer - University of Oregon

In adults, self-referential processing reliably recruits cortical midline structures (CMS), including the medial prefrontal cortex and the posterior cingulate cortex. In developmental samples, the functional signature of "self" is characterized by a richer representational network. Emerging adolescents typically recruit putative social learning and valuation regions, like the temporoparietal junction and ventral striatum, in addition to CMS. It is unclear what structural changes give rise to the functional restructuring of self-representation across adolescence. To address this gap in the literature, we are conducting a large, multimodal, multi-wave neuroimaging study of adolescent girls, with a focus on the neural circuitry that gives rise to self-evaluative maturation. The current cross-sectional analysis represents the first of three waves of data collection (n=174; age range: 9.9-12.9 years). We investigate the relationship characterizing white matter structural connectivity between regions of the functional "self-reference" network. First, self-reference regions of interest (ROIs) are functionally defined via two runs of a trait judgment task. Significant clusters are used as seed regions in a probabilistic tractography analysis to generate a connectivity matrix for each subject. This matrix is then converted into a doubly-weighted network. Edge weights correspond to subject-specific estimates of mean signal recruitment within each ROI during the self/change trait judgment fMRI task. These networks represent a first step toward characterizing the structure of the neural self, and will serve as a useful tool in future analyses of maturational restructuring of the self circuitry.

C-40

Shared safety prevents the recovery of learned threat

Armita Golkar - Karolinska Institutet; Andreas Olsson - Karolinska Institutet

Humans, like other social animals, learn about threats and safety in the environment through social signals. Although much effort has been devoted to studying the transmission of threat information, an increasing number of studies indicate that humans and other animals also transmit safety signals that can modulate threat processing. For example, observing the safety behavior of another individual during threat processing can efficiently block the psychophysiological expression of learned fear associations, but the processes that contribute to this efficacy remain unknown. To isolate the contribution of social processes to the efficacy of social safety learning, we developed a dyadic model during which live pairs of participants underwent an associative threat learning and extinction procedure followed by a threat recovery test. Learning was indexed using skin conductance responses throughout all stages. In three separate groups, we manipulated whether safety information during extinction was acquired via (1) own exposure (direct transmission), (2) observation of another individual's safety behavior only (vicarious transmission), or (3) the combination of direct and vicarious information (shared transmission). We showed that whereas a vicariously transmitted safety signal stengthened safety learning compared to direct learning, vicarious transmission alone was not sufficient to prevent the recovery of conditioned threat responses. Rather, the efficacy of social safety learning was achieved by the shared experienced of safety between individuals. Our results have implications for understanding how basic social learning processes may contribute to optimizing safety learning and inform the development of more efficient exposure strategies in the treatment of threat-related disorders.

C-41

Decoding convolutional neural network representations of emotion schemas from distributed patterns of brain activity in the human visual system

Philip A. Kragel - University of Colorado Boulder; Marianne C. Reddan - University of Colorado Boulder; Kevin S. LaBar - Duke University; Tor D. Wager - University of Colorado Boulder

Emotions are thought to be canonical responses to situations ancestrally linked to survival or the well-being of an organism. Although sensory elements do not fully determine the nature of emotional responses, they should be sufficient to convey the schema or situation that an organism must respond to. However, few computationally explicit models describe how combinations of stimulus features come to evoke different types of emotional responses, and further, it is not clear that activity in sensory (e.g., visual) cortex contains distinct codes for multiple classes of emotional responding in a rich way. Here we develop a convolutional neural network that accurately decodes images into 11 distinct emotion categories. We validate the model using over 25,000 images and movies and show that image content is sufficient to predict the category, valence, and arousal of human emotion ratings. In two fMRI studies, we demonstrate that patterns of human visual cortex activity encode emotion category-related model output and can decode multiple categories of emotional experience. Comparing decoding performance across multiple brain regions, we find that redundant information about schemas is contained in other brain systems. These results indicate that rich, category-specific emotion representations are embedded within the human visual system. Further, they suggest that psychological and computational accounts of emotion should explain the sensory qualities that are naturally associated with emotional outcomes, as well as those that are reliably learned through experience and influenced by culture.

C-42

Modeling affective dynamics with a Lorenz system

Alison M. Mattek - University of Oregon

Methodological developments in social and affective science have included the use of increasingly "naturalistic" experiments, which generally contain a continuous temporal or dynamic component. A potentially promising avenue for understanding dynamics in psychological science is to refer to the palette of mathematical models that have been developed for the general modeling of dynamic systems in the natural world. The Lorenz system is an example of a dynamic system model that describes naturally occurring phenomena across a range of sciences, including atmospheric convection, laser spikes, electric motors, and forward osmosis. In general, any dynamic system is a ratiking visual appearance described as a "butterfly" structure. To apply this dynamic model to affective psychological variables of valence and arousal are framed as state variables in a dynamic system that can be geometrically illustrated with a phase portrait. Decades of work in psychometrics has demonstrated that stimulus items mapped according to values of valence and arousal form a structure that has the same iconic butterfly shape as a Lorenz attractor phase portrait. Considering these psychometric data as being generated by an underlying Lorenz system process can potentially (a) explain the various asymmetries that appear when stimulus items are plotted in this phase space (e.g., positivity offset and negativity bias), (b) make predictions about the unfolding time course of affective processes.

Interference Factors in Contextual Probabilistic Learning

Yrian Derreumaux - University of California, Riverside; Avi Ben-Zeev - San Francisco State University; Gaurav Suri - San Francisco State University

We explored how prior beliefs, specifically those encompassing stereotypes about race and crime, disrupt probability updating. We adapted the Weather Prediction Task (WPT, Knowlton et. al., 1994) so that all participants received cards that depicted a geometric pattern and were asked to predict which of two outcomes (Experimental: Crime/No Crime; Controls: Sun/Rain) would occur for a given day based on the presented card(s). The actual crime/weather outcome was determined by a probabilistic rule based on these cards. Specifically, whereas controls received the traditional version of the WPT, experimental participants were asked to predict which of two outcomes (Experimental: Crime/No Crime; Controls: Sun/Rain) would occur for a given day based on the presented card(s). The actual crime/weather outcome was determined by a probabilistic rule based on these cards. Specifically, whereas controls received the traditional version of the WPT, experimental participants were asked to predict which of two outcomes (Experimental: Crime/No Steal") would occur for a given target (Black/White male face). Based on previous research by Payne (2001), which showed that participants experienced decrements in accuracy when predicting it a tool or gun was present after primed with black faces, we hypothesized participants would display decreased accuracy in the crime condition. A Mixed-Model Repeated Measures ANOVA revealed a significant main effect of condition F(1) = 126.61, p = .001, ngC = .45, such that controls (M = .79; SD = .01) were significantly more accurate than experimental participants (M = .75, SD = .11), despite explicit instruction that targets carry zero weight in prediction accuracy. It remains unclear however, whether the evocative nature of the faces themselves had a deleterious effect, or whether decrements were due to race/crime stereotypic expectancies. Study 2 and 3 address these limitations. We discuss implications for quantifying social contextual factors' "stickiness" in the probabili

C-44

Inter-subject phase synchronization reveals neural networks underlying physical pain empathy

Lei Xu - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Taylor Bolt - Department of Biomedical Engineering, Emory University; Jason Nomi - Department of Psychology, University of Miami; Jialin Li - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Xiaoxiao Zheng - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Xiaoxiao Zheng - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Meina Fu - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Keith Kendrick - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Benjamin Becker - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Benjamin Becker - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of Electronic Science and Technology of China; Benjamin Becker - The Clinical Hospital of Chengdu Brain Science Institute, MOE Key Laboratory for NeuroInformation, University of pipe approaches adapted from network neuroscience, researchers have begun to move away from trying to pinpoint specific patterns of brain activity associated with pain empathy to considering it as a process relying on the dynamic construction of neural networks. Here we examine brain responses to pain empathy using an inter-subject phase synchronization (ISPS) approach, an exploratory analysis that reveals

We applied the ISPS approach to a large sample of fMRI data (252 subjects) collected during a pain empathy task including physical and facial pain stimuli as well as corresponding non-pain stimuli. ISPS analysis combines the instantaneous phase synchronization measure and independent component analysis (ICA). We used a 10-component ICA solution for the current analysis. The conventional general linear model (GLM) analysis was also conducted to permit comparison of results from these two complementary approaches.

Two networks synchronized during physical pain empathy processing. One had strongest spatial weights in the bilateral clusters of inferior and superior parietal lobule, and another had strongest spatial weights in the bilateral inferior frontal gyrus and insula. ISPS analysis also revealed networks related to visual processing or processing of limb or face stimuli, but no significant networks synchronized across subjects during processing facial expressions of pain. The ISPS approach revealed novel patterns of brain activity across participants that did not align completely with results from the conventional GLM approach, and provides insight into the neural mechanisms subserving empathy for pain across individuals.

C-45

Proximal threats promote enhanced acquisition and persistence of reactive fear circuits

Leonard Faul – Duke University; Josh M. Stivers – Duke University; Daniel Stjepanovic - University of Queensland; Gregory W. Stewart – Duke University; John L. Graner – Duke University; Kevin S. LaBar – Duke University

Recent work in humans suggests that as a threat becomes more proximal, neural activity shifts from cognitive circuits for planning escape strategies to reactive circuits for a fight/flight response. Here we investigated whether distance to a threat also has implications for the acquisition, extinction, and reinstatement of a learned fear response. Forty participants were presented with four human avatars (two near, two far) while passively navigating a 3D virtual environment during functional magnetic resonance imaging. During acquisition, one character at each distance was partially reinforced with aversive shocks and one character explicitly unreinforced, which was followed by fear extinction in a novel context. The next day, participants returned for extinction recall in the extinction context and fear reinstatement in the acquisition context. Skin conductance response (SCR) and shock expectancy ratings were recorded for each character presentation, which revealed an amplified fear response for proximal threats during acquisition. Whole-brain activation and anygdala/hippocampal connectivity assessments further revealed distinct reactive (midcingulate/motor) and cognitive (ventro/dorsolateral prefrontal) circuits for proximal and distal threats, respectively, during acquisition and extinction. Greater prefrontal-amygdala connectivity during acquisition and midbrain-hippocampal connectivity during extinction correlated with greater SCR for proximal threats. Similar neural differences persisted throughout extinction recall, while shock expectancy ratings were higher for proximal threats during reinstatement. Thus, proximal threats not only acquired a fear response more readily, but also elicited activation of reactive circuits that persisted throughout extinction and promoted greater fear reinstatement. These findings a during reinstatement. These extinction and proximal threats disorders.

C-46

Willingness to pain: Risk taking and probability sensitivity in decisions involving painful and monetary outcomes

Lina Koppel - Linköping University; David Andersson - Linköping University; India Morrison - Linköping University; Gustav Tinghög - Linköping University; Daniel Västfjäll - Linköping University; Decision Research

Many everyday decisions involve affect-rich outcomes such as pain. Furthermore, people often make trade-offs between these affect-rich outcomes and money: we spend money on pain relief, take out sick days at work, etc. However, much of what is known about decision making comes from experiments involving monetary, affect-poor outcomes, often in the positive domain. Here, we conducted four experiments (total n = 174) in which participants made risky decisions involving painful and monetary outcomes. In study 1, participants chose between two options that each involved some probability of monetary loss (affect-poor task) or painful heat stimulation (affect-rich task). They also indicated how much they were willing to pay to avoid some probability of pain or monetary loss. In studies 2 and 3, participants chose between pain and monetary loss with varying probabilities. In study 4, we compared monetary and painful decisions from description (in which magnitudes and probabilities were explicitly stated) to equivalent decisions from experience (in which magnitudes and probabilities were revealed by sampling outcomes from each option). Overall, our results indicate that decision processes are similar for affect-rich and affect-poor outcomes. Specifically, they suggest that people can and do take probabilities into account when making decisions involving painful outcomes, at least when choices are presented numerically in a joint-evaluation format. This is in contrast with a large literature on probability neglect and the affect gap in risky choice, which has suggested that people ignore probabilities when choices involve strong affect.

C-47

Unpacking the temporal self: Evidence that future and past selves are temporally compressed

Sasha Brietzke - Dartmouth College; Meghan Meyer - Dartmouth College

Although it is well-known that people feel disconnected from their past and future selves, the underlying mechanism supporting this phenomenon is underspecified. In visual perception, as objects become distant, they appear compressed, making them hard to distinguish. Here, we examined whether temporal self-perception abides by the same principle. In Study 1, participants (n=178) made traits ratings across 9 time intervals in the past and future. A linear mixed model revealed a significant cubic effect of time, (B=-2.171, p=0.003) such that participants compressed their past and future selves relative to their present self. To examine whether such effects are specific to the self, in Study 2, participants (n=174) rated themselves and another known-target (Angela Merkel) across the same set of time intervals. A linear mixed model revealed a significant cubic time by target interaction (B=-2.015, p

C-48

Gender Identification and Gender Salience Predict Preferential Processing of Same-Gendered Faces

Ilona A. J. H. Domen - Utrecht University, The Netherlands; Belle Derks - Utrecht University, The Netherlands; Ruth van Veelen - Utrecht University, The Netherlands; Daan T. Scheepers - Utrecht University/Leiden University, The Netherlands

The very early perceptional processes that underlie social categorization can be detected with event-related brain potentials (ERPs). The present work aims to detect differential attentional processing of ingroup and outgroup members based on gender categories. Specifically, three EEG studies aimed to determine whether the neural categorization effects already found for ethnic groups are generalizable to gender groups and how social identity motives (namely gender identification and contextual salience of gender) moderate these attentional processes at early stages of social perception. Results showed that both women (Study 1a) and men (Study 1b) differentiated stronger proups and low gender groups and low social identity motives (namely gender outgroup members (more relative attention to the ingroup), but only when they identified more strongly with their own gender group. Study 2 revealed that when women's low relative status position in an intergroup context was made salient (i.e., when women were numerically underrepresented versus equally represented in a work group paradigm), women, irrespective of their level of gender identification, showed more attention to ingroup than to outgroup faces. Together, this work provides empirical evidence for (1) the neural gender categorization effect among both men and women as soon as 100 ms after face presentation (2) the moderating role of social identity motives in early gender categorization. To conclude, gender identification and contextual cues make people look at others through the lens of their gender. Implications for the combined investigation of social identity and social categorization processes using ERP responses are discussed.

C-49

2019 SANS Poster Award Winner

The neural mechanisms of learning to balance fairness and self-interest: a reinforcement learning account

Michael R. Giffin - University of Leiden; Maël Lebreton – University of Geneva; Andrea Fariña – University of Leiden; Jörg Gross – University of Leiden; Carsten De Dreu – University of Leiden Market inefficiencies emerge because buyers offer more than their seller's threshold (leaving money on the table) or too little (foregoing trade), but how buyers learn their seller's thresholds and create efficient trade remains poorly understood. Taking a reinforcement learning approach to efficient trading in ultimatum bargaining, we combined computational modeling, behavioral experiments and neuroimaging. Proposers (viz. buyers) were matched with responders (viz. sellers) drawn from populations with different acceptance thresholds (social condition) or with computer generated lotteries programmed to mimic the different acceptance functions of human responders (social condition). Because responders with different thresholds had distinct symbolic identifiers, proposers could learn thresholds from responder's acceptance/rejections to their offers. Using a novel reinforcement learning algorithm we found (i) that proposers learned the slope and intercept of each opponent's logistic acceptance function, which mapped the investment amount into a victory or a defeat; (ii) that this model-based learning process robustly tracked canonical reinforcement learning neural circuitry; and (iii) that learning occurred faster in the non-social condition than in the social condition. Finally, neuroimaging results showed (iv) that decision-making in the non-social relative to the social condition was associated with differential neural processing in the dorsal anterior cingulate, a region associated with strategic conflict monitoring, as well as the superior temporal sulcus, a region associated with social cognition and theory of mind. Taken together these findings suggest that learning to trade efficiently is hindered by social concerns, and that this interference of learning is predicated on conflict monitoring and social cognition neu

C-50

Brain Network Topology and Dynamics in ADHD Individuals During Video Game Play

Jacob T. Fisher - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Frederic R. Hopp - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Chelsea Lonergan - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber -

We present the result of an experiment designed to investigate differences in the topology and dynamics of large scale cognitive control and social information processing brain networks in individuals with ADHD during a naturalistic task. In this experiment, subjects play Asteroid Impact (http://github.com/medianeuroscience/asteroid_impact) while undergoing functional brain scanning. Asteroid impact is an open-source video game that allows for high levels of experimental control. Cognitive load, perceptual load, and reward are manipulated during game play and performance on the primary task and on proximal tasks is recorded at high temporal resolution.

Two behavioral data collections are complete (n = 158, n = 135), and brain imaging data collection will be completed by the time of the SANS conference. Overall, ADHD participants performed worse in the primary task in both experiments. An interaction effect was also observed between ADHD and perceptual load on task performance (Experiment 1: F(1, 157) = 7.59, p = .005, Experiment 2: F(1, 122) = 7.06, p = .007). These results point to promising outcomes for perceptual load's modulatory effect on the brain networks of cognitive control in ADHD participants.

A total of 60 subjects have been recruited for the brain imaging portion of this study (30 with ADHD and 30 without ADHD). Results will be presented regarding network topology/dynamics in cognitive control and reward networks between conditions and between groups (ADHD/Non-ADHD). Among other things, we expect that perceptual load will increase the robustness of connectivity in cognitive control networks during game play

C-51

The Joy of Mediated Punishments: Moral Transgressions in Auditory Narratives Elicit Cortical Synchronization in Listeners

Frederic R. Hopp - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Chelsea Lonergan - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Jacob T. Fisher - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber - UC Santa Barbara, Media Neuroscience Lab, Department of Communication; Rene Weber -

Mounting evidence suggests that humans are equipped with a neural monitoring system that yields an intuitive pleasure response when socially normative (moral) behaviors are observed and displeasure when non-normative (immoral) behaviors are observed (Tooby et al., 2005). Moral Foundations Theory (Graham et al., 2013; Greene et al., 2001) indicates the existence of five universal, innate moral modules that motivate behaviors according to what is considered best for society as a whole. These modules produce sensibilities towards (observed) behaviors concerned with care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, and sanctity/desecration.

We examined neural responses to ten experimental auditory narratives (Tamborini et al., 2013) that describe actors which (a) either adhere to or violate one of the five moral foundations, and (b) are either punished or rewarded for their actions. To better understand the cognitive mechanisms of different moral transgressions and their consequences, a total of 64 subjects underwent fMRI while listening to these narratives. The degree of listener engagement with each narrative is examined via intersubject correlation analyses across brain networks (ISC; Hasson et al., 2004).

It is hypothesized that narratives with different moral transgressors elicit high ISCs in separable networks, especially when transgressors are punished. Identifying and punishing moral transgressors serves an important function of maintaining group cohesion and hence is argued to elicit universal neural activation patterns. Findings are relevant for furthering the understanding of the social brain as well as the role of moral considerations and story outcomes in listener engagement with narratives.

C-52

Emotion regulation enhances rational decision-making during the ultimatum game

Shawn E. Fagan - The Graduate Center, City University of New York; Catherine Chan - Brooklyn College, City University of New York; Yu Gao - Brooklyn College, City University of New York; The Graduate Center, City University of New York

The Ultimatum Game (UG) is a common economics task in which one player offers to split a sum of money with a partner who can either accept or reject the offer. Unfair offers are often rejected, likely due to emotional interference from inequity aversion (Fehr & Schmidt, 1999). Thus, the rational decision (accepting an unfair offer) requires emotion regulation (ER; the ability to manage one's response to a salient affective experience). A reliable biomarker of ER is heart rate variability (HRV), which indexes parasympathetic nervous system activity. Specifically, elevated HRV during rest and high HRV reactivity reflect adaptive ER (Beauchaine & Thayer 2015). In this study, we examined how engagement of ER affects physiological responses and subsequent decision-making in the UG. Sixty-five college students played two blocks of a computerized UG task during continuous physiological recording. In each trial, participants played as responder and then proposer with the same partner. Before the second block, an ER prompt instructed participants to view each offer analytically and not let their emotions interfere while making a decision. Higher resting HRV, reflecting better emotion regulation, predicted lower self-reported frustration as well as lower rates of retaliatory unfair offers during block 1. Additionally, in both blocks, higher task-specific HRV reactivity relative to block 1, it did increase unfair offer acceptance rates. Findings suggest that engaging in ER does increase rational decision-making, though it does not affect physiological indices of ER.

C-53

Looking for general principles of coordination dynamics in social systems

Emmanuelle Tognoli - Florida Atlantic University; Mengsen Zhang - Florida Atlantic University; Christopher Beetle - Florida Atlantic University; J. A. Scott Kelso - Florida Atlantic University

Social systems involve dynamical interactions on multiple scales, from molecular and cellular machinery to entire organisms participating in mutual interactions. At each level, the parts (cells, organs, individuals, and communities) engage and disengage in collective behaviors amongst themselves, as well as with structures at both larger and smaller scales (examples of upward-downward causation across scales include genes or neurons influencing social behavior, and vice versa). The phenomenon of multiscale organization makes evident the need to integrate multiple levels of description in models of bio-social systems. We ask whether processes at different scales abide by some common principles, reflected in general equations that apply irrespective of level, and of level-specific details. In part I of this work, we present a series of experimental observations because coordinative structures as in systems characterized by weak coupling among their parts — which permits a rich dynamics of shifting associations because coordinative structures. In part II, we illustrate new insights from mathematical models of social phenomena among multiple agents, at various levels, and across a range of dynamic contexts. We conclude that a general framework for social coordination dynamics is on the horizon, in which models support experiments with mechanistic explanations and testable hypotheses.

C-54

A neurostimulation approach to the role of dorsomedial prefrontal cortex in observational learning

Pyungwon Kang - University of Zurich; Marius Moisa - University of Zurich; Alexander Soutschek - University of Zurich; Björn Lindström - University of Zurich; Christian Ruff - University of Zurich; Philippe Tobler Converging evidence implicates dorsomedial prefrontal cortex (DMPFC) activity in observational learning. However, its exact role for observational action-outcome versus imitation learning remains unclear. To test for a causal role of DMPFC in observational learning, we performed a within-subject inhibitory theta-burst magnetic stimulation (TMS) study targeting DMPFC or vertex. We dissociated observational action-outcome learning from imitation learning by varying the amount and quality of observable information. In the action-outcome condition, both action and outcome of the demonstrator were observable whereas in the imitation condition only the action was observable. To ensure that participants processed not only the action but also the outcome in the action-outcome condition (and thereby fully distinguish it from the imitation condition), we employed demonstrators with good or bad performance. If participants fail to take outcomes into account, performance would be as bad in the action-outcome condition with the bad demonstrator as in the imitation condition with the bad demonstrator.

TMS-free pilot data showed similarly good performance when observing good and bad demonstrators in the action-outcome condition but impaired performance when observing bad demonstrators in the imitation learning condition. Thus, observing the outcomes helped participants compensate for the inferior performance of the bad demonstrator. If DMPFC plays a specific role for action-outcome learning, we predict that TMS will impair learning from a bad demonstrator more than from a good demonstrator (where learning can be based on imitation too). Conversely, if DMPFC is crucial for imitation learning, disrupting DMPFC activity should affect imitation learning more strongly than action-outcome learning.

C-55

Distributed neural activity patterns to facial expressions signaling threat

M. Justin Kim - University of Hawaii at Manoa; Annchen R. Knodt - Laboratory of NeuroGenetics, Department of Psychology and Neuroscience, Duke University; Ahmad R. Hariri - Laboratory of NeuroGenetics, Department of Psychology and Neuroscience, Duke University

Meta-analysis of functional magnetic resonance imaging (fMRI) is an increasingly effective method in providing an overview of how information processing is represented in distributed patterns of brain activity. Here, we examine pairwise pattern similarities (i.e., correlation between pairs of vectorized voxels), between whole brain meta-analysis maps (MAMs) for discrete emotional categories and individual contrast maps (ICMs) of emotional facial expressions. Specifically, we compared MAMs (Wager et al., 2015) representing five emotion categories (fear, anger, disgust, happiness, sadness) with ICMs for fearful > neutral or angry > neutral facial expressions from an independent fMRI dataset of 1263 young adults. We predicted that fear and anger ICMs would show the greatest pattern similarity to fear and anger MAMs, respectively. Then, we examined the possibility that this information is distributed across the whole brain by systemically selecting the voxels that were submitted for pattern similarity analysis, which was achieved by varying the MAM thresholds. Finally, we tested whether or not the MAM-ICM pattern similarity became more selective, the specificity of MAM-ICM correspondence decreased. Excluding the analyses did not change the overall results. Our findings suggest that widely distributed patterns of brain activity from ICMs best capture emotional categories identified by MAMs and that there may be little categorical specificity in amygdala activity.

C-56

A behavioral measure for testing social motivation towards robots

Anna Henschel - University of Glasgow; Emily Cross - University of Glasgow

As robots receive citizenship, are treated as beloved pets, and are given a place at Japanese family tables, it becomes clear that these machines are taking on increasingly social roles. While human robot interaction research relies heavily on self-report measures for assessing people's perception of robots, a distinct lack of robust cognitive and behavioral measures to gage the scope and limits of social motivation towards artificial agents exists. Adapting Conty and colleagues' (2010) paradigm, we presented a classic Stroop task to 32 participants. In a twist on this traditional set-up, we showed four kinds of distractor images above incongruent and neutral words: human faces, object faces (for example, a cloud with facial features) and flowers (control). We predicted that social stimuli, like human faces, would be extremely salient and would thus draw attention away from the to-be-processed words. A repeatedmeasures ANOVA indicated that while the task worked (the Stroop effect was observed), a distractor dependent enhancement of Stroop interference did not emerge. However, exploratory analyses using linear mixed effects models indicated that in addition to the classic Stroop effect, specifically human faces presented above incongruent words significantly slowed participants' reaction times. To investigate this further, we are now testing a larger stimulus set and sample size. The eventual goal of developing this behavioral task is to use it as an outcome measure following real human robot interaction scenarios and comparing the effect of robot exposure on social relevance, as measured by the Social Stroop.

C-57

The power of maternal voice - N400 diferentiate semantic language in ASD patients whew stimuli is presented by patients mothers

Paulo Boggio - Mackenzie Presbyterian University; Claudia Valasek - Mackenzie Presbyterian University

One of the most described characteristic of ASD patients is the deficit in semantic processing. Studies have revealed that such changes may be related to the procedures and tests used in the evaluation of these patients. A strategy to evaluate semantic processing is using EEG and later analysis of the N400 component. Recently, the presence of N400 in infants with less than 1 years old has been demonstrated; interestingly, greater amplitude is associated with incongruent pairs when presented with the maternal voice as compared to a stranger voice. Thus, the main goal of this study was to investigate the presence of the N400 in ASD children (5.6 y/o) compared to an age-matched control group. The semantic task consisted in presenting images of objects paired with the voice of the mother or an unknown woman naming the object comprouely. In addition to the N400 component, we analyzed P1 and N170, we verified a greater amplitude of the P1 during the presentation of the stimuli by the maternal voice and the presence of the N400 component with greater amplitude during incongruent pairs when presented with the maternal voice. Contrary to what has been described in the literature, we verified that ASD patients have a N400 component discriminating incongruent pairs from congruent ones. However, this result was observed only when the stimuli were presented with the maternal voice. The data is discussed in the light of the theories of maternal attachment as well as basic psychological processes such as attention.

C-58

How to comprehend the joke? The role of N400 and LPP on ToM and non-ToM humor comprehension

Paulo Boggio - Mackenzie Presbyterian University; Alice Proverbio - Milano-Biccoca University; Pamella Sanchez - Mackenzie Presbyterian University; William Comfort - Mackenzie Presbyterian University; Lucas Maraues - Mackenzie Presbyterian University: Beatriz Ribeiro - Mackenzie Presbyterian University: Mirella Manfredi - Mackenzie Presbyterian University

The present study sought to examine the cognitive processes involved in humor comprehension by investigating possible differences in the time course and neural bases of the perception of ToM humor, non-ToM humor and semantic incongruity. Four different comic strips were presented to a group of heathy adults while their EEG was recorded: strips containing humorous scenes that required ToM abilities, non-ToM humorous strips, non-humorous semantically coherent strips and non-humorous semantically incoherent strips. Both humorous conditions and the incongruent condition elicited an N400 effect. However, only the humorous ToM strips elicited a frontal late positive, maybe reflecting the active deployment of ToM abilities such us perspective-taking and empathy that allow for the resolution and interpretation of apparently incongruent strips in our study may reflect the combined activation of neural mechanisms involved in the experience of amusement and ToM abilities. Overall, humor comprehension seems to require different cognitive steps such as detecting incongruent elements and forming semantic coherence, and the appreciation of different subsets of humoristic information is related to individual traits such as empathy.

C-59

Targeted action of intranasal oxytocin on brain functional connectivity in Autism Spectrum Disorder

Elissar Andari - Emory University, School of Medicine; Gopinath Kaundinya - Emory University, 2Department of Radiology and Imaging Sciences; Gabriella Caceres - Emory University; Opal Ously - Emory University; Michael Morrier - Emory University; James Rilling - Emory University; Joseph Cubells - Emory University, School of Medicine; Larry Young - Emory University

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and social interaction. A growing body of evidence supports a potential role for intranasal oxytocin (IN-OXT) in improving social functioning in ASD. However, questions remain on the therapeutic effectiveness and the long-term benefits of IN-OXT. Here, we tested the effects of several doses of IN-OXT (8IU, 24IU, 48IU, placebo) on brain functional connectivity during resting state (rsFC) in adult males with ASD (N=32, ages 18 - 45, IQ>70) in a randomized, double-blind, within-subject design. We hypothesized that IN-OXT affects the rsFC (8 minutes, open eyes) between brain networks that are involved in socio-emotional processes and in particular, the empathy network. MRI images were acquired on a 3T Siemens Magnetom Trio TIM scanner, and data analysis was performed using AFNI and FSL software packages. Independent component analysis showed that 48IU of IN-OXT increased the rsFC between the empathy network and visual areas, as compared to lower doses or placebo. It also decreased the rsFC among executive networks. These findings provide evidence for the dose-dependent targeted action of IN-OXT on brain function. The results help to define optimized oxytocin-based acute interventions in individuals with ASD and argue strongly for further studies to examine chronic interventions bolstering OXT-mediated neurotransmission as potential therapies for ASD and other conditions with impairments in social functioning.

The Computational Theory of Mind Brain with a Bayesian Integration Model

Haiyan Wu - California Institute of Technology; Giovanni Gentile - California Institute of Technology; Quanying Liu - California Institute of Technology; Antonio Rangel - California Institute of Technology; Dean Mobbs - California Institute of Technology

During social interaction, people rely on the capacity to infer the thoughts, feelings, or preferences of other. "Simulation" or "self-projection" views of social cognition hold that people may think other's thinking is similar to their own thought processes. However, one theory is that one's own mind may not facilitate the understanding of other's mind, but bias it, due to a self-other prior knowledge discrepancy. We hypothesized that the self-other prior knowledge discrepancy. We hypothesized that the self-other prior knowledge discrepancy. We hypothesized that the self-other prior knowledge discrepancy of Mind task design. Participants (n = 32) first learned four colored coins corresponding to 20% to 80% bias for HEADs, and asked to infer a partner's belief after viewing certain coins (coin sequence length of 2, 4, 6 and 8) with HEADs and TAILs (20%, 40%, 60% and 80%). The behavioral results showed lower accuracy and longer reaction time under the condition with prior knowledge. Our Bayesian inference computational model results capitalize on the possibility that one's own prior knowledge is a critical aspect of inferring the mental states of other people. Our models showed that the posterior distribution estimation also corresponded with increased activity in the medial prefrontal cortex (MPFC), anterior cingulate cortex (ACC) and temporo-parietal junction(TPJ), regions that are involved in inferring other mental states and integrate one's own prior knowledge and the evidence.

Intersubject Correlation for Social and Non-Social Videos in the Default Mode Network

Mark A. Straccia - University of California, Los Angeles; Alex Gordon - University of California, Los Angeles; Matthew D. Lieberman - University of California, Los Angeles

Using intersubject correlation, previous research has shown the default mode network is similarly engaged across participants when they watch videos and listen to narratives. From this research, however, it is not clear which aspect of narratives recruit the default mode network. Some have suggested it is verbal story comprehension per se that drives this effect. However, given that the videos are typically social in nature it has not been possible to disentangle narrative vs. social cognitive components of the responses. To address this, we ran 30 participants in an fIRI scanner while they watched social (e.g. short story, interviews, reality TV, storytelling) and non-social videos (e.g. documentaries, how it's made, science videos). Social videos required participants to maintain information about others and reason about their actions while non-social videos required participants maintain information about physical objects and reason about the processes involved with these objects. Using intersubject correlations, we find most of the default mode network is consistently engaged during the social videos. These effects occurred regardless of whether there is language in the videos.

C-62

Identifying perceptual and neural sources of racial bias in pain treatment

Azaadeh Goharzad – University of Delaware; Alexis Drain – University of Delaware; Jennie Qu-Lee – New York University; Jay van-Bavel – New York University; Peter Mende-Siedlecki – University of Delaware Systematic disparities in pain treatment for Black Americans in the United States are well documented. The pain of Black Americans is consistently under-diagnosed and under-treated relative to White counterparts. While several factors, including access to healthcare, intergroup gaps in empathy, and explicit stereotypes are likely to contribute to gaps in pain care, previous work in our lab has identified a separate perceptual source of biases in care. Specifically, racial bias in the perception of painful facial expressions predicts biased treatment recommendations above and beyond stereotypes of strength, status, and pain sensitivity, as well as explicit racial bias. In the present experiment, we collected behavioral and neuroimaging data examining the neural basis of this perceptual bias. Sixty-four subjects viewed images of Black, White, and Asian faces in varying degrees of pain, made judgements of how which are explicit access to show stricter thresholds (PSEs) for perceiving pain on Black versus White faces and that bias in perception predicts lower treatment recommendations for Black targets. Critically, we observed divergent patterns in neural activity when viewing Black (versus White) faces in increasing pain in areas associated with both visual perception in general and social perception in particular. These data demonstrate a perceptual and neural basis for disparities in pain care that may inform interventions aimed at reducing the consequences of ineffective pain treatment.

C-63

2019 SANS Poster Award Winner

Population-level stimulus effects are reflected in distributed neural representations of affect and value

Bruce Dore - University of Pennsylvania; Christin Scholz – University of Amsterdam; Elisa C. Baek - University of Pennsylvania; Nicole Cooper - University of Pennsylvania; Matthew B. O'Donnell - University of Pennsylvania; Steven Tompson - University of Pennsylvania; Emily B. Falk - University of Pennsylvania

Neuroimaging studies have identified individual brain regions that correlate with population-level effects of stimuli like advertisements and news articles, but they have not identified whole-brain representations that underlie these effects. Across four studies, we used fMRI to measure whole-brain responses to advertisements and news articles relevant to population health (anti-smoking ads, anti-binge drinking ads, and New York Times health articles). Beyond activity in core affect- and value-related regions (e.g., amygdala, striatum, and vmPFC) our analytic approach leveraged whole-brain responses to each stimulus, quantifying expression of distributed neural patterns meta-analytically enhanced accuracy in predicting population-level outcomes, in some cases more than doubling the variance that could be explained by individual ROIs or self-reports. The predictive efficacy of the meta-analytic patterns was not reducible to activity within core affect- and value-related regions but rather depended on larger-scale processes spanning multiple cortical and subcortical systems. Overall, this work identifies patterns of distributed neural activity that yield robust prediction of population stimulus effects not afforded by structure-centric models of psychological processing.

C-64

The Effects of Socialization Processes on Stigmatized Individuals

Rachel C. Amey - University of Delaware; Adam B. Magerman - University of Delaware; Chad E. Forbes - University of Delaware

To date, there is a gender gap in STEM fields in terms of representation and expectations of ability; women are both underrepresented and believed to have lower abilities. These beliefs can trigger stereotype threat (ST) leading to women's disengagement from STEM fields. Using U.S. census data collected from students' childhood hometowns (i.e., where they were socialized) during their youth, three studies explored the impact of socialization processes of traditional STEM ("more men in STEM") vs. non-traditional STEM ("more women in STEM") roles on the susceptibility of women to ST. Social STEM roles were operationalized in terms of the difference between the number of men and women with occupations in STEM, and related to how students under ST performed, had ST perceptions, and neurally processed information related to STEM tasks. Results demonstrated that the more traditional STEM demographics were in participants' hometowns, the worse women performed on standardized math exams; while men performed better. Non-traditional STEM demographics, however, mitigated ST perceptions among women – the more women in STEM in participant's hometowns, the less threat they reported in ST contexts. These STEM demographics also predicted differences in neural mechanisms behind performance cognition and feedback processing. To the extent women were raised around traditional STEM demographics (indexed via neural network connectivity) to traditional STEM cues seen in ST contexts. Results show how scaffolding formed from socialization processees can have lasting negative impacts on those susceptible to ST, perpetuating the gender gap in STEM domains.

C-65

Decoding Joint Attention to Emotional Videos Using fMRI

Junaid S. Merchant - University of Maryland; Diana Alkire - University of Maryland; Sara Dziura - University of Maryland; Adnan Rashid - University of Maryland; Deena Shariq - University of Maryland; Dustin Moraczewski - University of Maryland; Elizabeth Redcay - University of Maryland

Although joint attention is a key social-communicative skill, much of the research on adults has been limited to examining joint attention to emotionally neutral images, and has largely ignored the role of affect in the naturalistic experience of sharing attention with another. The present study aims to address this gap through a novel fMRI task in which participants view 20-30 second video clips that are either positive, negative, or neutral. Participants viewed half of the videos alone ('solo') and watched the other half with a viewing partner via a pseudo-live stream ('joint'). Based on prior work, we hypothesized the involvement of the brain's mentalizing and reward systems during joint attention. We also predicted involvement of affective systems given the emotional content of the videos. To address that relative contribution of these systems, we used a 'virtual-lesion' multivariate decoding approach constrained by ROIs derived from the associated search terms in Neurosynth. Analysis of nine pilot subjects in this ongoing study suggests that the full network of ROIs is able to classify joint and solo attention with significantly above chance accuracy, and, importantly, that the relative importance of an ROI can be assessed by its removal through 'virtual-lesion' MVPA. We discuss the utility of this approach in disentangling the contribution of ROIs in the composite brain network involved in joint attention, and compare the findings to those obtained from a univariate contrast approach in a larger sample of participants.

C-66

How does simulation induce malleability in neural representations of the self?

Zidong Zhao - Princeton University; Sasha Brietzke - Dartmouth College; Meghan L. Meyer - Dartmouth College; Diana I. Tamir - Princeton University

The self is dynamic. How we see ourselves fluctuates over the course of development and across situations. We propose that simulating others might be a novel source of self-change. When simulating others' mental states and traits, people access self-knowledge, while concurrently considering and incorporating information about the target. Memory research has demonstrated that episodic and semantic knowledge is malleable and susceptible to post-retrieval interferences, incorporating new, post-event information into the initial representation. If self-knowledge is similarly malleable, simulation may change self-knowledge such that it incorporates information about the simulated person, and renders the self more similar to the simulated other. Our group recently found evidence in support of this hypothesis in a behavioral paradigm where participants recalled personal information, simulated other people in similar contexts, and then re-recalled the same personal information. Across a series of eight studies simulating others changed self-knowledge to become more similar to the simulated other. In the current study, we attempt to demonstrate that this Simulation Induced Malleability (SIM) effect can be observed at the level of neural representation. While undergoing functional neuroimaging, 40 participants recalled personal memories, simulated other people in similar situations, and then re-recalled the same personal memories. Using MVPA, we test the hypothesis that neural representations of one's own experiences will become more similar to the neural representation of a simulated experience after simulation. Our results could provide a novel neural mechanism by which the self is malleably remembered and constructed.

C-67

Memory load, distracter interference, and dynamic adjustments in cognitive control influence working memory performance across the lifespan

Anthony P. Zanesco - University of Miami; Joanna E. Witkin - University of Miami; Alexandra B. Morrison - California State University, Sacramento; Ekaterina Denkova – University of Miami; Amishi P. Jha – University of Miami

Deficits in WM performance in older individuals have been attributed to failures in their ability to suppress the processing of irrelevant distracting information. But the trajectory of this capacity over the lifespan, and its contribution to WM performance, requires further characterization. Additionally, performance upregulates in subsequent moments in response to a broad range of cognitive demands, including the presentation of irrelevant distracting information and high mnemonic load in WM tasks. Yet, little research has characterized these sequential trial effects across the lifespan or examined their contribution to WM performance deficits in older adults. In the present study, we investigated the influence of age on WM performance in individuals (N=505) with ages ranging from adolescence to older adulthood (range=14-77). Memory load (1 vs. 2 memoranda) and distracter interference (confusable vs. non-confusable with memoranda) were parametrically manipulated in a delayed-recognition WM task, and task performance was examined as a function of current (N) and previous (N-1) trial demands. Multi-level models of age revealed age-related change in distracter interference processing that was exacerbated in the present even in older adults. Thus, a compromised ability to protect memoranda from interference when supporting cognitive systems are taxed, and upregulate cognitive resources resources memory-load triggered dynamic adjustments mere likely a strong contributor to age-related deficits in WM.

C-68

Neural activity during risky decision making reflects adolescents' online social network clustering structure

Rui Pei - University of Pennsylvania; Nina Lauharatanahirun - University of Pennsylvania; Christopher N. Cascio - University of Wisconsin, Madison; Matt B. O'Donnell - University of Pennsylvania; Jean M. Vettel - U.S. Army Research Laboratory; Emily B. Falk - University of Pennsylvania

Social groups, reflected as clusters in social networks, are fundamental for self-identity and well-being. Forging relationships with new social groups involves taking social risks (e.g., approaching unknown others), and fosters adaptive adolescent development. Previous work has linked individual differences in personality and neural characteristics with social network structures. Yet, it is unclear what neural processes might support the formation of social groups. To address this gap, we examined the relationship between adolescents' neural activation during risk taking and the clustering structure of adolescents' online social networks using fMRI and social network analysis. Participants included seventy-one adolescent males (16 - 17 years old) who provided access to their online Facebook social network and completed the Balloon Analogue Risk Task (BART) while undergoing fMRI. We measured neural activation during risk taking in the ventral striatum (VS), a key brain region involved in decision making. Clusters in social networks were computed using community detection algorithms on objective logs of participants' Facebook friendship networks. Adolescents with higher VS activity during risk taking had a greater number of clusters within their social networks, suggesting that higher reward-related activation during risk taking may contribute to adolescents' to adolescents' to one of the potential benefits of heightened reward-related neural activity during adolescence: having more groups of friends.

C-69

Neural correlates of social norms

Christopher N. Cascio - University of Wisconsin-Madison; Xinyi Wang - University of Wisconsin-Madison; Matthew Brook O'Donnell - University of Pennsylvania; Emily B. Falk - University of Pennsylvania Neuroimaging studies suggest that neural systems associated with positive subjective valuation, conflict monitoring, and mentalizing are key processes associated with social influence. However, these processes have typically been studied using explicit social feedback about others' preferences, rather than more subtle observation of social norms. Given that social norms about important and health relevant topics are commonly modeled in social and mass media, it is important to understand how social norms work in these contexts. Therefore, the current study (N=62) aimed to examine whether key processes identified in prior neuroimaging studies of social influence are also associated with processing more subtle social norms modeled through media representations of health behaviors. Further, we examined whether this neural activity is predictive of normative beliefs and individual differences in coformity. Specifically, we examined activity within functional regions within dMPFC (extending into dACC) identified in a prior, independent, large-scale study of social influence, and meta-analytically defined regions of ventral striatum (VS) and ventral medial prefrontal cortex (VMPFC) involved in positive valuation during exposure to smoking norm images (compared to non-smoking images). Results indicated that increased activity in the functionally defined region of dMPFC/dACC was associated with greater pro-smoking norms (t(47)=2.24, p=.03) and increased conformity to peer feedback (t(43)=2.25, p=.03). No significant relationships were found with activity in the VS+VMPFC, p>.05. These findings show that more subtle media depictions of negative health behaviors activate similar brain regions to prior, more controlled studies of peer influence, and particularly highlight the role of dMPFC in this process. C-70

Physiological responses to lives at risk depend on whether they are at home or abroad

Jo L. Cutler - The University of Sussex; Jolyon J. Miles-Wilson - The University of Sussex; Daniel K. Campbell-Meiklejohn - The University of Sussex

Emotional responses and altruism often differ toward single victims compared to mass suffering, and can depend on location and identity. However, social norms and moral beliefs that lives have equal value can prevent detection of these biases. Measuring physiology offers potential for additional insight. We recorded galvanic skin responses (GSR) while 189 UK residents (122 UK nationality, 65 non-UK, 2 non-disclosed) read 120 events taken from real news stories (60 in the UK, 60 abroad), in which varying numbers of people were at risk of dying, then discovered whether they lived or died. GSR to the presentation of risk in the UK were greater than responses to stories abroad (t = 2.17, p = .03). The increased responses to UK events compared to abroad were not predicted by nationality or national identity, suggesting a mechanism of proximity or familiarity. Across participants, the number of people did not affect responses because some participants showed increased responses to single victims whereas others responded more to mass suffering. The relationship between the (log) number of people and GSR during events in the UK for each participant was negatively correlated with the relationship for events abroad (p < .001). These relationships were also differentially related to charitable giving measures, showing further differences in physiological responses, depending on geographical location. In contrast, behavioural measures of willingness to pay did not show differences between the value of lives at home and abroad, highlighting the utility of physiological measures to detect unreported biases.

Self-Reported PTSD Symptoms are Associated with Task Performance in a Delayed-Recognition Working Memory Task with Affective Distracters in a Military Cohort

Joanna E. Witkin - University of Miami; Ekaterina Denkova - University of Miami; Anthony P. Zanesco - University of Miami; Amishi P. Jha - University of Miami

Working memory (WM) is critical for emotion regulation and performance success. Yet, WM is known to be compromised in psychological disorders, such as PTSD, in both civilian and military populations. The current study examined the relationship between individual differences in PTSD symptom severity assessed via the self-reported PTSD checklist (PCL-M) and task performance during a WM task in active-duty military servicemembers. Participants (N=514) completed the PCL-M and a delayed-recognition WM task in which mnemonic load (low- vs. high-load) and affective interference (negative-combat vs. neutral-civilian images) were parametrically manipulated over trials. Hierarchical linear modeling was utilized to examine the relationship between current and previous trial WM demands and scores on PCL-M. Overall, higher PCL-M scores were associated with decreased WM performance. Importantly, higher PCL-M was related to greater impairments on current trials with negative compared to neutral distracters, as well as trials following negative vs. neutral distracters. These findings suggest that higher PCL-M scores or promance on trials following negative vs. neutral distracters, associated with decreased performance on trials following negative vs. neutral distracters, whereas this pattern was reversed in individuals with lower PCL-M. These results suggest a link between self-reported PCL-M and objective performance on a WM task with combat-related negative distracters.

2019 SANS Poster Award Winner

CD38 is Associated with Communal Behavior, Partner Perceptions, Felt Security and Adjustment in Romantic Relationships

Jennifer A. Bartz - McGill University; Gentiana Sadikaj - McGill University; D. S. Moskowitz - McGill University; D. Zuroff - McGill University

Understanding the neurobiology of attachment and pair-bonding has been of long standing interest given the well-established association between close relationships and psychological and physical health. More than four decades of research in non-human animals has identified oxytocin as a key factor in the neural basis of attachment. Although recent work suggests that oxytocin is also involved in human social cognition and behavior, few studies have investigated oxytocin in the context of attachment relationships, and only a handful have focused on romantic pair-bonds—one of the most salient relationships for adults. We investigated whether variation in CD38, a gene implicated in oxytocin secretion and attachment behavior in non-human animals, is associated with human romantic relationship dynamics as they unfold in every-day life. A sample of 131 community couples participated in a study that used Event Contingent Recording, an intensive repeated measurement method that assess interpersonal behavior, perception, and affect in daily social interactions. Couples also completed measures of relationship adjustment and attachment. CD38 information was available for 118 individuals. As predicted, one previously identified CD38 polymorphism, rs379686, was also related to these interpersonal processes, highlighting the strong interdependence that characterizes these pair-bonds. Overall, these findings support the role of oxytocin in the interpersonal processes implicated in the maintenance of successful close relationships.

C-73

Different patterns of directed neural connectivity occur both between and within experiences of anger and anxiety

Cameron M. Doyle - University of North Carolina, Chapel Hill; Stephanie T. Lane - Institute for Defense Analyses; Jeffrey A. Brooks - New York University

Different emotions—and different instances of the same emotion—are thought to be represented via connectivity between the brain's canonical networks. Participants were scanned while they listened to unpleasant music and imagined personally relevant scenarios that made them feel angry or anxious. To test connectivity patterns between emotions, we used a data-driven directed connectivity approach (GIMME; Gates & Molenaar, 2012) to reveal different mean-level patterns amongst canonical brain networks (Shirer et al. 2012). To assess whether different connectivity patterns characterized different individuals experiencing the same emotion, we used a data-driven subgroups of individuals for each anger and anxiety. For instance, one anger subgroup had greater connectivity between the subnetworks of the salience network (aSAL and pSAL) and default mode network (dDMN and vDMN), whereas a second subgroup was characterized by a greater degree of connectivity between pSAL and the dorsal attention network and greater connectivity amongst left and right frontopsare constructed from activity within the brain's canonical networks and that different patterns of connectivity not only characterize different emotions, but also instances of the same emotion.

C-74

Adult Age Differences in Subjective Responses to Dynamic Socioemotional Incentives

Eliana G. Armora - Center for Cognitive Neuroscience, Duke University; Sade Abiodun - Center for Cognitive Neuroscience, Duke University; Kendra L. Seaman - Center for Cognitive Neuroscience, Duke University; Center for the Study of Aging and Human Development, Duke University; Gregory R. Samanez-Larkin - Department of Psychology and Neuroscience, Duke University; Center for Cognitive Neuroscience, Duke University; Gregory R. Samanez-Larkin - Department of Psychology and Neuroscience, Duke University; Center for Cognitive Neuroscien

While studies have traditionally examined incentivized decision-making using monetary incentives, some studies suggest that older adults value social incentives more than monetary incentives (Seaman et al., 2016). Based on the agerelated positivity effect, we predicted older adults would experience higher levels of positive arousal to socioemotional stimuli than middle-aged and younger adults.

A total of 99 participants across adulthood (age range = 21-76, M = 48.31) were recruited by Qualtrics Panels to make valence and arousal ratings after viewing dynamic emotional expressions. Using Dynamic FACES (Holland et. al, 2018), we created videos of three emotional expressions (anger, happiness, sadness) that each varied in magnitude of expression (low, medium, high).

Valence and arousal ratings significantly differed across emotional expressions and by expression magnitude (Abiodun et al., 2018), and these effects were more pronounced in middle-aged and older adults. Compared to younger adults, middle-aged and older adults rated all happy expressions as more arousing and positive, high magnitude happy expressions as more positive and arousing compared to lower magnitude happy expressions, and high magnitude angry and sad expressions as more negative than lower-magnitude angry/sad expressions.

Consistent with socioemotional selectivity theory and the age-related positivity effect, older adults reported higher levels of positive arousal to socioemotional stimuli than younger adults. We also found that middle-aged adults were more similar in their ratings to older adults than younger adults. In ongoing studies we are comparing the differential effectiveness of socioemotional and monetary incentives for motivating cognition and health behavior in adults of different ages.

C-75

The neural mechanisms of social emotion regulation

Jocelyn Shu – Columbia University; Noga Cohen - University of Haifa; Ottavia Haifa - University of Milano-Bicocca; Jochen Weber – Columbia University; Yi Zhang – Columbia University; Tianyun Zhang – Columbia University; Kateri McRae – University of Denver; Kevin N. Ochsner – Columbia University

The ability to regulate emotions has long been recognized as important for maintaining social relationships, but it is unclear why. It may be that regulating one's emotions draws upon similar mechanisms for helping others regulate their emotions. We investigate this by using fMRI to assess whether similar neural mechanisms underlie reappraisal for one's own and another's emotions to autobiographical memories (n = 34). fMRI results (alphasim corrected) indicated that in line with prior research, thinking about one's own memories recruited the vmPFC, whereas thinking about another person's memories recruited the TPJ. However, significantly dissociable structures for regulating one's own and another's emotions were not seen through contrasts. Conjunction analysis indicated that reappraising for oneself and another recruits overlapping control regions established in prior research on reappraisal, in paptricular, the dmPFC (p = .001, k = 130). Behavioral results indicated that reappraisal success for one's own emotions was correlated with a measure of access to emotional support from others (rs = .37, p = .03). Similar patterns were seen in another task with negative images instead of memories. These results indicate that 1) reappraising for oneself and other's emotions, and 3) emotion regulation is associated with having supportive relationships. These findings have implications for understanding how interpersonal processes may be impacted in disorders that affect emotion regulation.

C-76

Psychological and Neural Overlap and Differentiation in Representations of Social Attitudes

B. Locke Welborn - University of California, Santa Barbara; Macrina Cooper-White - University of California, Los Angeles; Matthew D. Lieberman - University of California, Los Angeles

Understanding the distance between our own attitudes and those of others is an indispensable ability, critical for navigating complex social environments and maintaining interpersonal relationships. While we are sometimes acutely aware of being in the minority, on other occasions we inaccurately project our attitudes onto others and thereby overestimate the prevalence of our own views within the population. In a series of studies, we employ behavioral and neuroimaging methods to explore the space between our own opinions and those of others. First, we examine the role of motivationed processes in shaping and maintaining consensus bias (i.e. the false consensus effect), querying brain regions involved in valuation, self-related cognition, and mental state reasoning. Activity in these regions is associated with the tendency to project our own attitudes on to others, especially when challenged by disconfirmatory social feedback. Next, using multivariate patterns analysis, we provide evidence of a common neural encoding scheme for representing social attitudes in the brain. Overlap and divergence in neural patterns are associated, respectively, with behavioral tendencies to presume similarities and discrepancies between our own attitudes, and then generalize to patterns associated with thinking about others' attitudes – but only in circumstances in which participants believe their attitudes and those of others are similar. These results have implications for the study of the neural mechanisms underlying attitude representations and attitude change, as well as consensus estimation and persuasion.

C-77

How We Influence Others: Neurocomputational Mechanisms Underlying Social Controllability

Soojung Na - Icahn School of Medicine at Mount Sinai; Dongil Chung - Ulsan National Institute of Science and Technology; Andreas Hula - Austrian Institute of Technology; Jennifer Jung - The University of Texas at Dallas; Vincenzo G. Fiore - Icahn School of Medicine at Mount Sinai; Peter Dayan - Max Planck Institute for Biological Cybernetics; Xiaosi Gu - Icahn School of Medicine at Mount Sinai
The ability to exert control to influence others is critical in social interactions. However, the neurocomputational mechanisms underlying social controllability remain unknown. Here we investigated this question using functional magnetic resonance imaging (fMRI) and a social exchange paradigm in which participants could ('In Control') or could not ('No Control') influence their partners' proposals in the future. We found that a two-step 'future thinking' (FT) model incorporating calculation of future interactions with their partners best characterized participants' choice behaviors in controllable social environments. Specifically, participants integrated value signals derived from both the discolateral present and the simulated future to influence their partners. Combined values of the present and the future were encoded in the ventral striatum and anterior insula, while enhanced hemodynamic responses in the dorsolateral prefrontal (dIPFC) and lateral orbitofrontal (IOFC) cortices were associated with the greater weights on future thinking in valuation processes. We also found that individuals who suffered the illusion of control, i.e., reporting faulty beliefs that they were in control in uncontrollable social environments, exhibited poorer performance, less reliance on future thinking, and diminished responses in the dIPFC and IOFC when they were actually given control. Taken together, these findings demonstrate that people engage in future thinking to exert control during social interactions, a process subserved by striatal-insular and lateral prefrontal regions; and that the illusion of control could undermine one's actual ability to exert control over social others.

C-78

Measuring Brain Complexity During Neural Motor Resonance

Brandon M. Hager - Brandeis University; Albert Yang - Harvard Medical School, BIDMC; Jennifer Gutsell - Brandeis University

Background: EEG mu-desynchronization, an index of motor resonance (MR) is used to study social interaction deficiencies, but finding desynchronization differences does not reveal how nonlinear brain dynamics respond to MR. The current study explored how nonlinear brain dynamics change during MR. We hypothesized that changes to entropy measured over the sensorimotor area during MR would be mu frequency band (8-13 Hz) specific. Additionally, we determined whether entropy at baseline and entropy changes during MR would predict changes in network dynamics.

Methods: EEG was recorded from healthy participants (n=45) during rest and action observation. Baseline brain activity was measured followed by participants observing videos of hands squeezing stress balls. We used multiscale entropy (MSE) to quantify complexity during MR. We then performed graph theory analysis to explore brain network topology.

Results: We found significant mu-desynchronization during action observation and increased mu entropy compared to rest, while gamma, beta, theta, and delta bands showed decreased entropy. Moreover, resting-state entropy was significantly predictive of mu desynchronization. We also observed a decrease in clustering coefficient in the mu band and a significant decrease in global alpha efficiency during MR. MSE during MR was strongly correlated with alpha network efficiency.

Conclusions: The current findings suggest that mu desynchronization during MR results in increased mu complexity in sensorimotor areas. This may reflect a release from alpha inhibition that is mediated by the baseline MSE in the mu band. The dynamical complexity and network analysis of EEG may provide a useful addition for future studies of MR.

C-79

Social interaction alters representations of the self by patients with schizophrenia: A cross-cultural EEG study

Daina Craifa - McGill University; Mathiew B. Brodeur - McGill University

Background: Social interactions require rapid, real-time information integration of dynamic and highly subjective social information. Our previous studies found that healthy individuals suppress their own social values during interactions with friendly strangers and identified neural correlates using fMRI. This study extends our previous research by investigating whether culture and patient status influence this response.

Methods: Three cultural cohorts of matched healthy controls and patients with schizophrenia were recruited: Anglo-Saxon Canadians, French Canadians, and Chinese adults living in Canada (<5 years). They participated in a social interaction procedure with a same-culture peer and answered a self-identity questionnaire during EEG before and after the social interaction. Results were compared using repeated measures ANOVA. Extensive preliminary testing was conducted to ensure that 1) the Canadians cohorts constituted separate cultural groups (not just linguistic groups) on the experimental measures, and 2) there were no statistical confounds attributable to materials' language or repetition.

Results: Confirming our previous findings, social interaction alters representations of the self for both patients and controls. Culture and patient/control status influenced neurobehavioral processing of self-relevant information. Patients with schizophrenia apply the social information atypically compared to controls. The social interaction differently influenced self-representation as a function of culture.

Conclusions: These findings demonstrate the influence brief social interactions can have on neurobehavioral processing of self-identity. They also demonstrate the contributions of the social environment in the construction of the self, and point to potential pathways for peer-based sociocultural learning. Relevance to cultural neuroscience and transcultural clinical psychiatry will be discussed.

C-80

Lifetime stress is selectively associated with aversion to ambiguity, but not risk

before cognitive symptoms emerge, and relate to atrophy in brain regions that are critical for socioemotional functioning.

Candace M. Raio – New York University; Ben Lu – New York University; Lewis Leone – New York University; Michael Grubb; Grant Shields - University of California, Davis; George Slavich - University of California, Los Angeles; Paul Glimcher – New York University

Although stress exposure is an inevitable part of daily life where decisions with uncertain outcomes are made, reports of stress effects on such decisions are equivocal across the literature. One reason for this may be because research has primarily focused on stress effects on risky decisions for which outcomes probabilities are explicitly known. However, real-world decision contexts often involve choices for which probabilities of decision outcomes are unknown (ambiguity). To directly test how real-world stressors relate to these dissociable forms of decision-making under uncertainty, we used a novel comprehensive lifetime stressor inventory (the STRAIN) coupled with a standard economic decision-making task that independently measures risk and ambiguity preferences. Participants made 240 binary choices between a certain gain of 55 and a lottery where they could win \$0 or a larger amount of money. Critically, the probability of winning was either stated explicitly (risk) or with some degree of ambiguity. We examined how the proportion of lottery choices for each form of uncertainty related to lifetime stress count and severity. Our results revealed that greater cumulative stress exposure was selectively related to ambiguity aversion but exerted no detectable influence on risk preferences. Specifically, individuals who experienced higher lifetime stress were less likely to choose ambiguous lottery choices, while no relationship emerged for risky choices. Our findings identify lifetime stress exposure as a novel factor that is uniquely associated with a lower willingness to choose options for which the likelihood of potential outcomes is unknown.

C-81

Smaller Social Networks in Healthy Older Adults with Alzheimer's Biomarkers Relate to Default Mode and Limbic Network Atrophy

Eena L. Kosik - University of California, San Francisco; Samir Datta - University of California, San Francisco; Luke W. Bonham - University of California, San Francisco; Isabel J. Sible - University of California, San Francisco; Renaud La Joie - University of California, San Francisco; Joel H. Kramer - University of California, San Francisco; Bruce L. Miller - University of California, San Francisco; Jennifer S. Yokoyama - University of California, San Francisco; Gil D. Rabinovici - University of California, San Francisco; Virginia E. Sturm - University of California, San Francisco

Alterations in socioemotional behavior are a common yet often overlooked feature of Alzheimer's disease (AD). In the clinical phase of AD, when individuals are symptomatic, patients show enhanced emotional sensitivity to certain types of social cues. Whether socioemotional changes also characterize the preclinical phase of AD—the years or decades that precede overt symptoms despite abnormal beta-amyloid protein aggregation in the brain—is not well understood. We used the Social Network Index to measure social network size in 115 cognitively normal, healthy older adults (ages 60-90) who had undergone amyloid PET imaging, structural MRI, and genetic testing for Apolipoprotein E4 (ApoE4), a major risk factor for AD. Results indicated that individuals who were ApoE4 negative but with an amyloid-positive PET scan (i.e., a positive biomarker that indicates the presence of AD pathology) had smaller social networks in a mayloid-positive PET scan (I.e., a positive biomarker that rindicate cortex (T=5.05) and left temporal networks is in the amyloid-positive individuals revealed that atrophy in the right posterior cingulate cortex (T=5.05) and left temporal pole (T=5.12), brain regions that support episodic memory and social cognition, was associated with smaller social networks (pFWE<.05). Our results suggest in coil relationships may occur in the very early stages of AD, in some cases even