SOCIAL & AFFECTIVE NEUROSCIENCE SOCIETY

10th Annual Meeting

Los Angeles, California

March 16-18, 2017

Social & Affective Neuroscience Society Annual Meeting 2017

March 16-18 | University of California, Los Angeles

UCLA MEYER & RENEE **LUSKIN** CONFERENCE CENTER

Conference Chairs
Naomi Eisenberger, University of California, Los Angeles
Matthew Lieberman, University of California, Los Angeles
Carolyn Parkinson, University of California, Los Angeles
Jennifer Silvers, University of California, Los Angeles

Program Committee
Molly Crockett, Yale University
Dominic Fareri, Adelphi University
Chad Forbes, University of Delaware (Committee co-chair)
Jonathan Freeman, New York University
Nicole Giuliani, University of Oregon
Johanna Jarcho, Stony Brook University
Hedy Kober, Yale University
Liz Losin, University of Miami
Dean Mobbs, CalTech
Kyle Ratner, University of California, Santa Barbara
Daniela Schiller, Mount Sinai School of Medicine (Committee co-chair)
Damian Stanley, Adelphi University
Diana Tamir, Princeton University
Dylan Wagner, The Ohio State University

SANS Executive Committee
Paul Whalen, President
Mauricio Delgado, President-Elect
Elizabeth Phelps, Past-President
Kateri McRae, Secretary
Emily Falk, Treasurer
Lauren Atlas, Member-at-Large
Mina Cikara, Member-at-Large
Jamil Zaki, Member-at-Large
Oriel FeldmanHall, Social Media Chair

Conference Schedule

Thursday, March 16

Start	End	Session
12:00 PM	2:45 PM	Registration
2:45 PM	3:00 PM	Opening Remarks
3:00 PM	4:15 PM	Symposium Session 1: Social and Affective Decision Making

Brian Knutson: From brain to internet: Neuroforecasting social preferences

Hedy Kober: Mindfulness-based emotion regulation: Theoretical and neural mechanisms

Alison Harris: Accounting for taste: A multi-attribute neurocomputational model explains divergent choices for self and others

Steve Chang: Neuronal coupling between the anterior cingulate cortex and the amygdala reflects social decision outcomes

4:15 PM	5:15 PM	Keynote Address

Tania Singer: Plasticity of the social brain: Effects of a one-year mental training study on brain plasticity, social cognition and attention, stress and prosocial behavior

5:15 PM	6:45 PM	Poster Session A & Welcome Reception

Friday, March 17

Start	End	Session
8:00 AM	9:00 AM	Coffee & Snacks
9:00 AM	10:15 AM	Symposium 2: Social Influences on Emotion

Jamil Zaki: Empathy beyond the empathizer

Dominic Fareri: Reciprocation from a friend enhances coupling between the default mode network and ventral striatum

Haemy Lee Masson: Neural representation of socio-affective interpersonal touch

Marie Monfils: Dominance status predicts social fear transmission in laboratory rats

10:15 AM	10:30 AM	Coffee Break

2

10:30 AM	11:30 AM	Keynote Debate

Ralph Adolphs: Emotions are objective and should be distinguished from concepts and feelings

Lisa Feldman Barrett: How emotions are made: The theory of constructed emotion

11:30 AM	11:45 AM	Coffee Break
11:45 AM	12:45 PM	Faculty Blitz

Damian Stanley: Using model-based approaches to reveal specific theory-of-mind impairment in autism

Maital Neta: Through the eyes of the beholder: Perceptual input from a gaze contingent window modulates valence bias in response to emotional ambiguity

Ajay Satpute: Contextual connectivity: A framework for understanding the intrinsic dynamic architecture of functional networks

Diana Tamir: Simulating other people changes the self

Luke Chang: Mapping computation to brain with inter-subject representational similarity analysis

Darby Saxbe: The fathering brain and body

Eliza Bliss-Moreau: Anterior cingulate cortex damage impedes decision-making and eliminates social preference

12:45 PM	2:00 PM	Buffet lunch provided on the Centennial Terrace Deck
2:00 PM	3:30 PM	Symposium Session 3: Understanding Other Minds

Alex Todorov: Mapping the social space of the face
Jon Freeman: Neural mechanisms of stereotypic vision
Greg Berns: Functional MRI in awake unrestrained dogs
Rebecca Saxe: Early origins of the social brain

3:30 PM	5:00 PM	Poster Session B & Presidential Reception
5:00 PM	6:30 PM	Presidential Symposium

Todd Heatherton: A Google model of MPFC

Alex Martin: Can aberrant patterns of functional connectivity be modified? And, if so, would it matter?

Saturday, March 18

Start	End	Session
8:00 AM	9:00 AM	Coffee & Snacks

9:00 AM	10:15 AM	Symposium Session 4: Social and Reward Learning

Andreas Olsson: New approaches to the social transmission and learning of affective information

Oriel FeldmanHall: Stimulus generalization as a mechanism for learning who to trust

Yina Ma: Neurocomputation of social values: Distinct oxytocin effects in individualists and prosocials

Adriana Galván: Better learning in adolescents than adults: The role of the developing brain

10:15 AM	11:45 AM	Poster Session C & Coffee Break
11:45 AM	12:45 PM	Distinguished Scholar Address

BJ Casey: Self control: When social and affective processes overshadow cognitive processes

12:45 PM	2:00 PM	Buffet lunch provided on the Centennial Terrace Deck

1:15 – 1:45 PM: Optional Adolescent Brain Cognitive Development (ABCD) Study Q & A Session led by BJ Casey in Centennial Ballroom A/B

2:00 PM	3:00 PM	Trainee Blitz

Eshin Jolly: Spontaneous mentalizing about parasocial relationships

Ian Roberts: Acetaminophen reduces the effects of social expectations on economic decision-making via dampened affect

Meghan Meyer: Evidence that default network connectivity during rest consolidates social information

Song Qi: How survival circuits optimize escape decisions in humans

Julian Wills: Shifting prosocial intuitions: Neural evidence for a person x situation account of group-based cooperation

Jie Hu: vmPFC mediates the effect of trait empathy on other-regarding tendencies in altruistic behavior

Regina Lapate: Lateral prefrontal function causally determines the pervasiveness of affect

3:00 PM	3:15 PM	Coffee Break
3:15 PM	4:30 PM	Symposium Session 5: Novel Approaches to Studying Social and Affective Processes

Bill Kelley: Combining fMRI and mobile sensing technology to study the social brain

Asieh Zadbood: How do we share our memories with other brains?

Richard Betzel: Positive affect, surprise, and fatigue are correlates of network flexibility

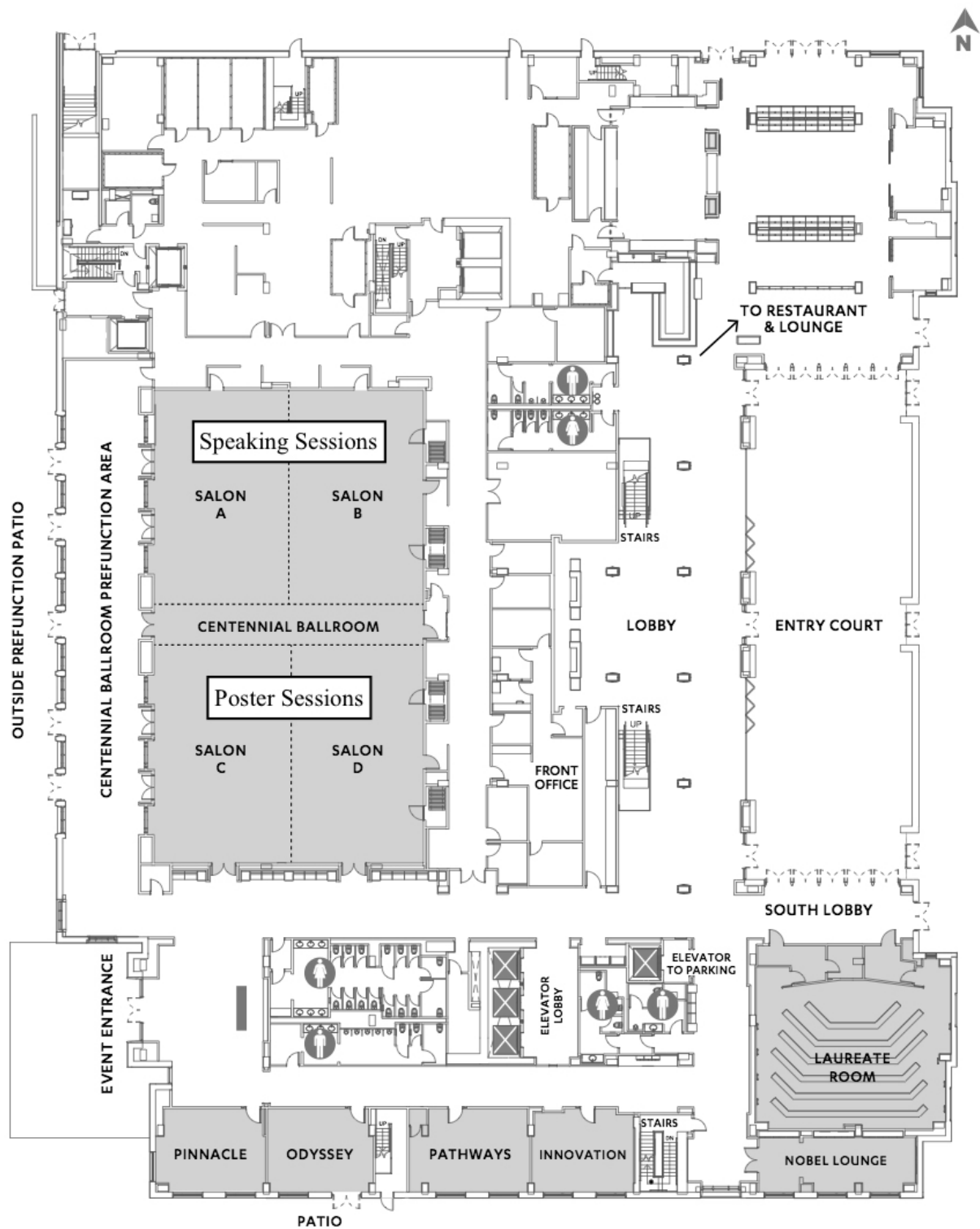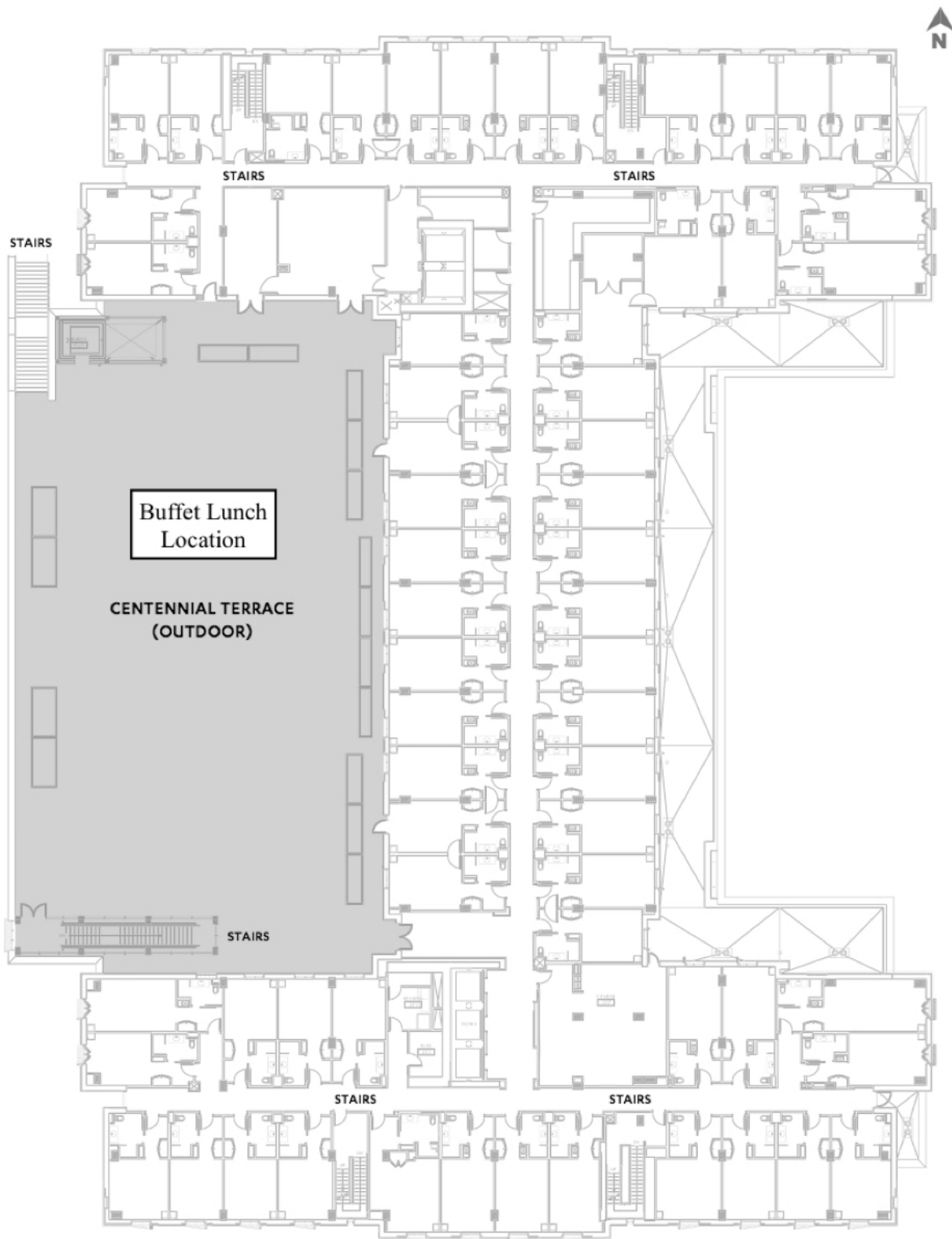**Hakwan Lau**: Unconscious fear reduction via decoded fMRI neurofeedback

4:30 PM	5:00 PM	Presidential Closing Remarks

Paul Whalen, SANS President

Luskin Conference Center | Level 1

Speaking Sessions

SALON A

SALON B

CENTENNIAL BALLROOM

Poster Sessions

SALON C

SALON D

OUTSIDE PREFUNCTION PATIO

CENTENNIAL BALLROOM PREFUNCTION AREA

TO RESTAURANT & LOUNGE

STAIRS UP

LOBBY

ENTRY COURT

STAIRS UP

FRONT OFFICE

SOUTH LOBBY

EVENT ENTRANCE

ELEVATOR LOBBY

ELEVATOR TO PARKING

LAUREATE ROOM

STAIRS DN

PINNACLE

ODYSSEY

PATHWAYS

INNOVATION

NOBEL LOUNGE

PATIO

Luskin Conference Center | Level 3

STAIRS

STAIRS

STAIRS

Buffet Lunch
Location

CENTENNIAL TERRACE
(OUTDOOR)

STAIRS

STAIRS

STAIRS

2017 Awards

Distinguished Scholar Award

BJ Casey, Yale University

Innovation Awards

Lockwood, P. L., Apps, M. A., Valton, V., Viding, E., & Roiser, J. P. (2016). Neurocomputational mechanisms of prosocial learning and links to empathy. *Proceedings of the National Academy of Sciences, 113*(35), 9763-9768.

Stolier, R. M., & Freeman, J. B. (2016). Neural pattern similarity reveals the inherent intersection of social categories. *Nature Neuroscience, 19*(6), 795-797.

SANS Poster Awards[1]

Kristin M. Brethel-Haurwitz
Casey L. Brown
Robert Chavez
Jin Hyun Cheong
Alex W. daSilva
Bruce P. Dore
Selene Gallo
Joao F. Guassi Moreira
Martin A. Imhof
Pyungwon Kang
Yuan Chang Leong
Hause Lin
Philip Parnamets
Michael H. Parrish
Maya L. Rosen
Christin Scholz
Roberta A. Schriber
Benjamin S. Stillerman
Ryan M. Stolier
Alicia Vallorani

SANS 2016 Logo – Designed by Lianne Barnes, University of California, Los Angeles
Icon made by Freepik from Flaticon

---

[1] *In recognition of the top 20 most highly rated abstracts that will be presented as posters.*

Thursday, March 16 2017

Opening Remarks

Thursday, March 16 2017

2:45 – 3:00 PM

Symposium

Social and Affective Decision Making

Thursday, March 16 2017

3:00 – 4:15 PM

Chaired by: Gregory Samanez-Larkin, Yale University

Brian Knutson, Stanford University

Hedy Kober, Yale University

Alison Harris, Claremont McKenna College

Steve Chang, Yale University

ABSTRACTS

FROM BRAIN TO INTERNET: NEUROFORECASTING SOCIAL PREFERENCES
Brian Knutson – Stanford University
Researchers now use neuroimaging data to predict individual financial choices -- but do they also predict choices that benefit others, and further forecast those choices at market scale? Recent findings on microlending and crowdfunding suggest that some neural predictors of individual prosocial choice may also forecast those choices on the internet.

MINDFULNESS-BASED EMOTION REGULATION: THEORETICAL AND NEURAL MECHANISMS
Hedy Kober – Yale University
Mindfulness is typically defined as (1) attention to present-moment experience, coupled with (2) a non-judgmental, accepting attitude. In two studies we investigated how mindfulness works to regulate emotion. In study 1, we trained cigarette-smoking participants to use mindfulness-acceptance to regulate their cigarette craving. We exposed them to smoking-related images, known to increase cigarette craving. On alternating trials, we asked participants to either respond naturally, or practice mindful-acceptance of craving. We found that mindful-acceptance reduced self-reported craving, and neural activity in regions previously associated with the experience of craving. However, we did not find concomitant increases in prefrontal activity, unlike prior work with reappraisal-based emotion regulation. In study 2, we trained healthy adults in mindful-acceptance of negative emotion and physical pain. We exposed them to negative and neutral images and to painful and neutral temperatures. On alternating blocks, we asked them to either react naturally or exercise mindful-acceptance. We found that mindful-acceptance reduced self-reported negative affect for negative images and painful temperatures. Further, mindful-acceptance reduced amygdala responses to negative

images, and reduced pain-evoked responses in medial and lateral pain systems. Classification analysis showed that mindful-acceptance significantly reduced activity the "neurological pain signature" - a multivariate, a priori pattern previously established as a biomarker for experimental pain. However, mindfulness-based regulation did not depend on prefrontal recruitment. Taken together, findings suggest that mindful-acceptance reduces reactivity to emotional stimuli via different mechanisms than cognitive reappraisal. Importantly, its effects appear to extend beyond judgment, decision-making, and self-report to influence affective brain processes in neurobiologically-meaningful ways.

ACCOUNTING FOR TASTE: A MULTI-ATTRIBUTE NEUROCOMPUTATIONAL MODEL EXPLAINS DIVERGENT CHOICES FOR SELF AND OTHERS

Alison Harris – Claremont McKenna College; John Clithero – Pomona College; Cendri Hutcherson – University of Toronto

Although research suggests that we construct choices for ourselves through the weighted integration of different choice-relevant attribute values, dual-process models posit that separate mechanisms are recruited when choosing on behalf of others. Here we examine this issue by simultaneously fitting a multi-attribute extension of the drift diffusion model (DDM) to choices, response times (RT), and event-related potentials (ERP) from a social decision-making task. Hungry participants with unrestricted diets selected foods for themselves, a similarly unrestricted eater, and a dissimilar, self-identified healthy eater. We demonstrate that a single computational process not only accounts for the choices we make for ourselves and others, but also when and why those choices diverge. Bayesian hierarchical modeling revealed different weighting of taste and health attributes depending on the recipient, with increased sensitivity to health information when choosing for the healthy eater. These varying attribute weights were reflected in both behavioral and neural parameters, and explained a prominent pattern in the choice and RT data frequently attributed to dual processes: participants took longer to decide when making different choices for themselves versus others. Furthermore, neural value signals emerge within the same time window for self and others, reflect health and taste preferences of the recipient, and are linked to evidence accumulation in the DDM. Our results provide a parsimonious explanation for divergent choice and RT patterns in social decision-making based not on a dual process account, but rather on a single neurocomputational mechanism.

NEURONAL COUPLING BETWEEN THE ANTERIOR CINGULATE CORTEX AND THE AMYGDALA REFLECTS SOCIAL DECISION OUTCOMES

Steve Chang – Yale University

One critical component of social processing is the computation of prosocial and antisocial decisions, and recent studies have begun to elucidate how neurons from individual brain regions such as the anterior cingulate gyrus (ACCg) and the basolateral amygdala (BLA) are engaged in social decision-making. Although strong reciprocal connections between BLA and ACCg suggest their functional interactions, the mechanisms by which BLA and ACCg are coordinated remain elusive. In a social reward allocation task in which an actor monkey chooses among delivering juice rewards to himself (Self), another monkey (Other), both himself and the other (Both), or a juice collection bottle (Neither), we recorded local field potential (LFP) activity from ACCg and BLA simultaneously to investigate their neuronal coordination. The actors preferred to deliver rewards to Other over Neither, but preferred to deliver rewards to Self over Both, providing the behavioral contexts for examining the neuronal interaction with respect to prosocial and antisocial decisions. We found enhanced coupling in the beta and gamma frequency bands between ACCg and BLA for prosocial reward outcomes (contrasting Other versus Neither) compared to antisocial reward outcomes (contrasting Self versus Both). Over multiple days of testing, the preference to donate reward to Other compared to Neither

(prosocial) and the degree of ACCg-BLA synchrony were correlated, whereas such a correlation was absent for preference to deliver juice to Self compared to Both (antisocial). Our results demonstrate that neuronal synchronization between ACCg and BLA carries unique signatures underlying the computations of prosocial and antisocial decisions.

Keynote

Keynote Address

Thursday, March 16 2017

4:15 – 5:15 PM

Introduced by: Jamil Zaki, Stanford University

Tania Singer
Director of the Department of Social Neuroscience
Max Planck Institute for Human Cognitive and Brain Sciences

ABSTRACT

PLASTICITY OF THE SOCIAL BRAIN: EFFECTS OF A ONE-YEAR MENTAL TRAINING STUDY ON BRAIN PLASTICITY, SOCIAL COGNITION AND ATTENTION, STRESS AND PROSOCIAL BEHAVIOR
Tania Singer – Max Planck Institute for Human Cognitive and Brain Sciences
In the last decades, plasticity research has suggested that training of mental capacities such as attention, mindfulness, and compassion is effective and leads to changes in brain functions associated with increases in positive affect, pro-social behavior, and better health. I will introduce the ReSource Project, a large-scale multi-methodological one-year secular mental training program. Participants were trained in three separate modules allowing us to distinguish effects based on training of a) attention and interoceptive body awareness (Presence), b) care, compassion, and emotion-regulation (Affect), and c) Theory of Mind and meta-cognitive awareness (Perspective). We assessed data from more than 300 training and control subjects, with over 90 measures including subjective measures, questionnaires, event-sampling data, a variety of behavioral, brain, physiological and biological data. I will present first evidence of training-module specific changes in markers of both, functional and structural brain plasticity, stress reduction, subjective well-being, and different psychological as well as economic measures assessing social cognitive capacities such as empathy, compassion, and Theory of Mind as well as prosocial behavior and cooperation. These findings will be discussed in relation to their meaning for models of social cognition, plasticity research and contemplative studies in general, and their importance to initiate societal change.

Posters

Poster Session A & Welcome Reception

Thursday, March 16 2017

5:15 – 6:45 PM

See page 31 for abstracts.

Friday, March 17 2017

Coffee & Snacks

Friday, March 17 2017

8:00 – 9:00 AM

Symposium ## Social Influences on Emotion

Friday, March 17 2017

9:00 – 10:15 AM

Chaired by: Naomi Eisenberger, University of California, Los Angeles

Jamil Zaki, Stanford University

Dominic Fareri, Adelphi University

Haemy Lee Masson, University of Leuven

Marie Monfils, University of Texas, Austin

ABSTRACTS

EMPATHY BEYOND THE EMPATHIZER
Jamil Zaki – Stanford University
Decades of neuroimaging research demonstrate that empathizers who consider the emotions of social "targets" engage a consistent system of brain regions, including midline and lateral temporal cortex. These regions appear to be involved in empathic inference, but virtually all studies of this phenomenon focus on the brains of *empathizers* alone. In the work I'll describe here, my lab widens the study of empathy to instead explore brain processes beyond the empathizer. In one study, we used simultaneous EMG and fMRI to isolate brain processes that *targets* bring online when expressing themselves to empathizers. When they believed they were visible to empathizers, targets expressed themselves more clearly, engaged brain structures associated with empathic inference, and exhibited coupling between facial expressions and activity in these structures. This suggests that instead of spontaneously "leaking out" their internal states, targets manage their expressions to produce a particular impression in empathizers. In a second study, we focused on people who *encounter* empathic community members. We characterized dorm networks at Stanford and scanned individuals with fMRI while they viewed images of empathic, versus less empathic, dorm-mates. A stable pattern of brain activity including MPFC, posterior cingulate, and temporal pole robustly predicted the empathy of dorm members viewed by individuals in the scanner. This occurred even in the absence of an active task, suggesting that people chronically monitor social others' social value. Together, this work demonstrates the utility of looking past empathizers alone and considering the brain processes of people engaged in multiple roles within an empathic exchange.

RECIPROCATION FROM A FRIEND ENHANCES COUPLING BETWEEN THE DEFAULT MODE NETWORK AND VENTRAL STRIATUM

Dominic S. Fareri – Adelphi University; David V. Smith – Temple University; Mauricio R. Delgado – Rutgers University

Close social relationships are inherently rewarding, satisfying basic social needs of belongingness and promoting emotional and mental well-being. We have recently demonstrated that close relationships can also enhance the value of positive experiences: rewards shared with a close friend elicit stronger reward value signals in the ventral striatum (VS) than those shared with a stranger. Moreover, decisions to pursue shared rewards with a friend rely on a neurocomputational signal of social value in the VS and medial prefrontal cortex (mPFC), contingent upon subjective perceptions of relationship strength. An intriguing question pertains to whether such representations of social value evoke interactions between socially oriented neural networks and value-related regions. The default mode network (DMN) is of particular interest because nodes within this network (e.g., mPFC, precuneus, posterior cingulate) routinely process social information. To examine how these nodes collectively contribute to social reward processing, we employed a novel network-based psychophysiological interaction analysis (nPPI) on a task where participants (N = 26) played an iterated trust game with a close friend, a stranger, and a computer. We conducted a spatial regression to extract the timeseries from the DMN and other canonical functional networks. Our nPPI analysis using the DMN as a seed revealed DMN coupling with VS only when participants experienced reciprocation from a close friend. Interestingly, DMN coupling emerged with a region of mid/posterior cingulate, but not VS, when a stranger reciprocated. These findings suggest that close relationships uniquely influence interactions between socially oriented networks and value-related regions during social reward processing.

NEURAL REPRESENTATION OF SOCIO-AFFECTIVE INTERPERSONAL TOUCH

Haemy Lee Masson – University of Leuven; Hans Op de Beeck – University of Leuven

Interpersonal touch conveys a vast amount of socio-affective information between interacting people. Understanding interpersonal touch behavior from visual observation is crucial for social competence and empathy processing both of which are driven by theory of mind (ToM) mechanisms. Previous studies suggest that such vicarious touch information is processed in several brain areas, including also somatosensory cortices. These studies, however, used only a limited range of stimuli, leaving the question open which brain areas may be involved in touch observation. In the present study, we therefore first created a larger database of interpersonal touch actions (39 videos, 3s duration). Next, participants (N=15) judged the valence and arousal of all videos from which we extracted group affective similarity matrices. Subsequently, the same participants viewed the stimuli in the scanner while performing an orthogonal task. Using correlational multivariate pattern analysis, we extracted group neural similarity matrices in early somatosensory cortex (BA2) and temporoparietal junction (TPJ) as regions of interest. Lastly, multiple regression analysis was implemented to predict the neural similarity matrix using valence and arousal judgments, as well as the motion energy of each video. Statistical permutation tests showed that both early somatosensory area and TPJ represent valence information even after controlling for the effects of arousal and motion energy. Our results for the first time chart how both socio-cognitive brain areas as well as early somatosensory cortex represent high-level information about observed touch – a finding that may be explained by touch imagery during observation in the absence of actual touch.

DOMINANCE STATUS PREDICTS SOCIAL FEAR TRANSMISSION IN LABORATORY RATS

Marie Monfils – University of Texas, Austin

Acquiring information about stimuli that predict danger, through either direct experience

or inference from a social context, is crucial for individuals' ability to generate appropriate behaviors in response to threats. Utilizing a modified demonstrator-observer paradigm (fear conditioning by proxy) that allows for free interaction between subjects, we show that social dominance hierarchy, and the interactive social behaviors of caged rats, is predictive of social fear transmission, with subordinate rats displaying increased fear responses after interacting with a fear-conditioned dominant rat during fear retrieval. Fear conditioning by proxy conserves some of the pathways necessary for direct fear learning (e.g., lateral amygdala) but is unique in that it requires regions necessary for emotional regulation (e.g., anterior cingulate cortex), making this paradigm an important tool for evaluating learning and behavior in the laboratory setting.

Coffee Break

Friday, March 17 2017

10:15 – 10:30 AM

Debate

Keynote Debate

Friday, March 17 2017

10:30 – 11:30 AM

Moderated by: Matt Lieberman, University of California, Los Angeles

Ralph Adolphs, Caltech

Lisa Feldman Barrett, Northeastern University

ABSTRACTS

EMOTIONS ARE OBJECTIVE AND SHOULD BE DISTINGUISHED FROM CONCEPTS AND FEELINGS
Ralph Adolphs – Caltech
A main challenge for affective neuroscience is that it doesn't make enough distinctions when it studies emotions, and that it often takes as foundational phenomena that are identified subjectively. I view emotion states as evolved functional states that regulate complex behavior, in both people and animals, in response to challenges that instantiate recurrent environmental themes. Affective neuroscience studies emotions in this sense, but it also studies the conscious experience of emotion ("feelings"), our ability to attribute emotions to others and to animals ("attribution", "anthropomorphizing"), our ability to think and talk about emotion ("concepts of emotion", "semantic knowledge of emotion"), and the behaviors caused by an emotion ("expression of emotions", "emotional reactions"). While they are of course related, these are all different things. I think that the most pressing challenge facing affective neuroscience is the need to carefully distinguish between these distinct aspects of "emotion". Limitations of this view are that it may omit many phenomena often studied as "emotional"; but it will help clarify what a neuroscience of emotion is really about, as distinct from consciousness studies or social neuroscience.

14

HOW EMOTIONS ARE MADE: THE THEORY OF CONSTRUCTED EMOTION
Lisa Feldman Barrett – Northeastern University
The science of emotion has been structured according to the mental categories bequeathed by ancient mental philosophy. Scientists have spent the last century searching for the elusive brain basis of these categories, on the assumption that the emotion categories we experience and perceive as distinct must also be distinct in nature. If the history of science has taught us anything, however, it is that human experiences are a poor guide to the way that the natural world works. The last two decades of neuroscience research have brought us to the brink of a paradigm shift in understanding the workings of the nervous system, setting the stage to revolutionize our scientific understanding of emotions (or any mental category). In this debate, I will begin with several of these new insights about the structure and function of the human brain, and then ask what sorts of emotions a human brain can make. The answer, I will suggest, is a computational theory of emotion called the theory of constructed emotion. I will introduce the theory's basic hypotheses, contrast them briefly with the classical view of emotion, and consider selected findings on the brain basis of emotion through the theory's lens. I will also explain why functionalism cannot save the classical view of emotion.

Coffee Break

Friday, March 17 2017

11:30 – 11:45 AM

Blitz Talks

Faculty Data Blitz

Friday, March 17 2017

11:45 AM – 12:45 PM

Chaired by: Anne Krendl, Indiana University

Damian Stanley, Adelphi University

Maital Neta, University of Nebraska – Lincoln

Ajay Satpute, Pomona College

Diana Tamir, Princeton University

Luke Chang, Dartmouth College

Darby Saxbe, University of Southern California

Eliza Bliss-Moreau, University of California, Davis

ABSTRACTS

USING MODEL-BASED APPROACHES TO REVEAL SPECIFIC THEORY-OF-MIND IMPAIRMENT IN AUTISM
Damian Stanley – Adelphi University
Successful navigation of our social environment requires the probabilistic representation

of social targets (i.e. individuals and groups) as well as the ability to incorporate novel information, integrate multiple representations, and utilize this information to act. While Social Neuroscience has shed light on many of these processes, we still lack a coherent, information-processing-based account of the specific neural computations that give rise to social cognition. To develop this account requires theoretically-informed, and experimentally-testable, models of how we perceive, learn, and make decisions about others. In support of this goal, we used a model-based theory-of-mind (mbToM) task to characterize the probabilistic representation of theory-of-mind (ToM) and its impairment in autism spectrum disorder (ASD). Participants (26 high-functioning adults with ASD and 53 matched healthy controls) observed a social target's behavior as they chose whether to donate money to three different charities or keep it for themselves. The social targets had probabilistic beliefs about whether the computer was reversing their decisions or not and idiosyncratic preferences across the three charities. Thus, the mbToM task required participants to integrate probabilistic representations of the social target's beliefs with their decision behavior in order to learn their underlying preferences. Both ASD and Control participants were able to reason correctly about the task and track the social target's beliefs, however individuals with ASD were specifically impaired at learning the social target's preferences. These results demonstrate the utility of model-based approaches to Social Neuroscience for delineating the specific computations required for successful social behavior.

THROUGH THE EYES OF THE BEHOLDER: PERCEPTUAL INPUT FROM A GAZE CONTINGENT WINDOW MODULATES VALENCE BIAS IN RESPONSE TO EMOTIONAL AMBIGUITY

Maital Neta – University of Nebraska–Lincoln

Although some facial expressions provide clear information about the emotions and intentions of others (happy, angry), others (surprise) are ambiguous because they have signaled both positive (e.g., a surprise party) and negative outcomes (e.g., witnessing an accident). Without a clarifying context, surprised expressions are interpreted as positive by some people and negative by others, and this valence bias is stable across time. When compared to fearful expressions, which are consistently rated as negative, surprise and fear share similar morphological features (e.g. widened eyes) primarily in the upper part of the face (eyes). Recently, we demonstrated that the valence bias was associated with a specific pattern of eye movements when viewing these faces (positive bias was associated with faster fixation to the lower part of the face). In this follow-up study, we identified the participant with the most positive and most negative valence bias in our previous work. The eye movements on each image from these two individuals were used to create two gaze contingent windows such that new participants would see the same faces, but through the eyes of these two people (subjects saw only the areas of the face that were directly fixated by the original participants in the exact order they were fixated). We found that the input provided by the gaze contingent windows modulated the valence ratings of surprise, but not fear faces. These findings suggest there are meaningful individual differences in how people process faces, and that these differences impact our emotional experience.

CONTEXTUAL CONNECTIVITY: A FRAMEWORK FOR UNDERSTANDING THE INTRINSIC DYNAMIC ARCHITECTURE OF FUNCTIONAL NETWORKS

Ajay B. Satpute – Pomona College; Rastko Ciric – Pomona College

Investigations of the human brain's connectomic architecture have produced two alternative models. One describes the brain's spatial structure in terms of localized, canonical networks, such as the "default mode" network. The other describes the brain's temporal structure in terms of whole-brain connectivity states. Using tools from connectivity dynamics, we deconstructed the elementary units of both models- the spatial network and the temporal state- into a common factor, or spatially localized

connectivity state in order to examine the fit of each model. Inconsistent with the canonical model of localized and temporally stable networks, we found that brain networks are temporally decomposable into an array of connectivity states. Moreover, each local connectivity state also provides information about the global state of the entire brain. However, inconsistent with whole-brain models that disregard network boundaries, our results also indicate that networks retain a degree of modularization. To accommodate these findings, we advance an alternative model, "contextual connectivity", in which networks are composed from a set of dynamically recurring states, each of which is associated with a specific whole-brain context. Applications of our model are discussed for the default mode network and the salience network.

SIMULATING OTHER PEOPLE CHANGES THE SELF

Diana Tamir – Princeton University

The self is not static. Instead, our identities change considerably over development and across situations. Here we propose one mechanism for self-change: simulating others. This suggestion builds from two previous lines of research. First, social cognition research finds that people retrieve knowledge about themselves—their past experiences, beliefs, and reactions—when simulating other people's experience. Second, memory research finds that when information is retrieved, it enters a labile state and can be altered by concurrently presented information. Thus, when simulating another person, retrieved self-knowledge may enter a labile state and blend together with information about the other person. This should alter self-knowledge to become more similar to the target of simulation. We test this hypothesis in four studies. In each study, participants (i) recalled episodic memories (Studies 1 & 4) or reported personal traits (Studies 2 & 3), (ii) simulated the same episodes/traits for other people, and (iii) re-recalled personal episodes/traits. This allowed us to measure changes in similarity between self and the simulated other from pre- to post-simulation. Results consistently demonstrated that simulation changed self-knowledge. People's episodic memories and trait knowledge both became more similar to the target post-simulation. This change persisted even after a 24-hour delay. Finally, recruiting more self-knowledge during simulation corresponded with greater increases in similarity between the self and simulated other. These results suggest that simulation changes the self to be more similar to the other, and that this effect is dependent on retrieval of self-knowledge during simulation.

MAPPING COMPUTATION TO BRAIN WITH INTER-SUBJECT REPRESENTATIONAL SIMILARITY ANALYSIS

Luke Chang – Dartmouth College; Eshin Jolly – Dartmouth College; Jin Hyun Cheong – Dartmouth College

A major goal of social and affective neuroscience is to identify systematic mappings between psychological and neural function. The standard paradigm is to manipulate a social/affective state and identify regions of the brain that change consistently across people. However, this approach cannot scale to more naturalistic experimental paradigms and assumes that systematic differences across people are noise. Here we identify the social and affective processes associated with representing complex character relationships while participants watch a TV drama (Friday Night Lights) using *Inter-Subject Representational Similarity Analysis*. Combining ideas from Inter-Subject Connectivity and Representational Similarity Analysis, this technique leverages individual variability to link covariance in brain responses to covariance in psychological processes across people. In other words, participants who share similar perceptions about character relationships should have similar brain responses in regions involved in making the judgments. Indeed, this method finds that temporal patterns of activity in the TPJ, STS, and PCC across participants exhibit a similar structure to participants' perceptions of character relationships. In addition, this technique is also sensitive to affective experiences. Participants who liked the same characters had a similar response profile in

the ventral striatum while watching the show. Together these results demonstrate that variation in responses across participants do not simply reflect noise, but rather can provide a powerful technique to extract meaningful signals associated with psychological processes. We hope that this technique will help social and affective neuroscience researchers explore new experimental avenues using naturalistic paradigms.

THE FATHERING BRAIN AND BODY

Darby Saxbe – University of Southern California

Caring for young children is emotionally and cognitively demanding. For example, when an infant cries, an effective parent orients to the distress, interprets its source, modulates his/her own emotional response to the cry, and makes decisions about how to soothe the child. Parents must also find caregiving sufficiently rewarding to motivate the frequent, sustained interactions that childrearing requires. Therefore, the "parenting brain" should recruit a wide variety of systems that support salience detection, empathy and perspective-taking, executive functioning and decision-making, distress tolerance, and motivation/reward processes. The hormonal milieu of the "parenting body" should reinforce nurturant, affiliative behavior and dampen sexual motivation, competition, and aggression. Given the evolutionary importance of infant care, the brain and body should show multiple mechanisms for adapting to parenthood. The transition to parenthood may represent a critical window for neuroplasticity in both parents. In women, pregnancy, birth, and breastfeeding have profound neuroendocrine effects. Absent these direct experiences, fathers' neurobiological changes may entrain with mothers or be shaped by the experience of caring for a new baby. Despite the importance of fathers and variability in fathering, surprisingly little is known about the factors that predict fathers' successful transition to and sustained investment in parenting. This blitz talk will present pilot data on men's hormonal changes over the transition to parenthood, and describe a newly-launched neuroimaging protocol to examine structural and functional changes in the brains of new fathers.

ANTERIOR CINGULATE CORTEX DAMAGE IMPEDES DECISION-MAKING AND ELIMINATES SOCIAL PREFERENCE

Eliza Bliss-Moreau – University of California, Davis

The anterior cingulate cortex (*ACC*) has been broadly implicated in cognitive, social, and emotional processing, although the extent to which normal ACC function is *required* for these processes is not clear. To address that question, we evaluated both decision-making and preference for social information in male rhesus macaques that received neurotoxic lesions to the ACC (N=6) or sham operations (N=7). Monkeys completed a task in which they selected "social" or "nonsocial" videos by visually fixating on one of two "choice" stimuli —a blue square or a yellow square. Fixating on the blue square activated a social video and fixating on the yellow square activated a nonsocial video (or the reverse, counterbalanced across monkeys). Monkeys completed 40 trials or 2 hrs of testing per day for 5 days. Significant group differences were observed both in terms of choice and preference for social information. Control animals completed significantly more trials than the ACC-lesioned animals, because lesioned animals often became "stuck" during the choice phase. Control animals were more efficient at choosing, as evidenced by significantly fewer fixations on the choice stimuli. They also selected more social videos than did ACC-lesioned animals and demonstrated a preference for social versus nonsocial information. In contrast, ACC-lesioned animals did not select social or nonsocial videos more frequently than chance, indicating no preference for one type of information. Implications for the ACC's role in cognitive control and social processing will be discussed.

Lunch

Friday, March 17 2017

12:45 – 2:00 PM

Buffet lunch provided on the Centennial Terrace Deck.

Understanding Other Minds

Friday, March 17 2017

2:00 – 3:30 PM

Chaired by: Jasmin Cloutier, University of Chicago

Alex Todorov, Princeton University

Jon Freeman, New York University

Gregory Berns, Emory University

Rebecca Saxe, Massachusetts Institute of Technology

ABSTRACTS

MAPPING THE SOCIAL SPACE OF THE FACE
Alex Todorov – Princeton University
People form instantaneous impressions from faces and agree in these impressions. These impressions are also consequential, predicting important outcomes ranging from sentencing decisions to political elections. But what determines these impressions? In the first systematic study of first impressions in psychology, Secord and his colleagues noted that "the conventional 'elementalizing' used by psychologists in seeking to explain their data is simply inappropriate." In the last 10 years, we have introduced data-driven computational methods that allow us to visualize the configurations of face features leading to specific impressions such as trustworthiness. Building on these methods and using novel techniques to mask faces, we can visualize not only the face configurations important for specific impressions but also those that spontaneously emerge in consciousness. Moreover, we can use these methods to visualize neural responses. Currently, we are applying the methods to intracranially recorded EEG in patients undergoing treatment for epilepsy. Recording from the amygdala and temporal cortex, we show that different face configurations are distributed over multiple loci and temporal windows. We are also exploring the applications of these methods to fMRI data. Although the application of the methods to neural data is challenging because of the multi-dimensional nature of the data, the methods have a considerable promise of elucidating the principles of neural coding of faces.

NEURAL MECHANISMS OF STEREOTYPIC VISION
Jon Freeman – New York University; Ryan Stolier – New York University
Visual perceptions of social categories are often thought to reflect direct 'read outs' of facial features. Recent computational models suggest, instead, that they emerge from a

dynamic negotiation between the processing of facial features and top-down factors (e.g., stereotypes) harbored within perceivers. In such models, faces activate social categories, which in turn spontaneously activate stereotypes. Once triggered, stereotypes can create biases in how a face is perceived, leading its visual representation to become more consistent with stereotypes. We tested key predictions of such models across four fMRI studies. Study 1 used MVPA to provide evidence that faces simultaneously activate multiple social categories that manifest in patterns of the right fusiform gyrus (FG). In Study 2, neural patterns elicited by viewing faces, category-labels, and stereotype-traits demonstrated that faces automatically elicit stereotype activation that is represented in the left anterior temporal lobe (ATL). In Study 3, we show that overlapping stereotypes (male and Black categories sharing stereotypes: 'aggressive') bias the visual perception of social categories and lead those categories to exhibit greater neural-pattern similarity in the FG and orbitofrontal cortex (OFC). Study 4 replicated this effect but controlled for visual confounds and linked it to inter-individual variability in stereotypical associations. Together, the results suggest that social categories automatically activate stereotypes that in turn shape their own perception. The findings point to a network underlying stereotypic vision, in which faces activate stereotypical associations in the ATL, which are used by the OFC to form visual predictions that in turn modulate FG face representation.

FUNCTIONAL MRI IN AWAKE UNRESTRAINED DOGS

Gregory Berns – Emory University; Peter Cook – New College of Florida; Ashley Prichard – Emory University; Andrew Brooks – Emory University; Mark Spivak – Dog Star Technologies

The domestic dog's accessibility, social intelligence, and evolutionary history with humans has led to increasing interest in canine cognition. Despite a growing body of data about canine behavior and cognitive skills, relatively few advances have been made in understanding canine brain function. Practical and ethical concerns had limited the use of the invasive brain imaging techniques typically used with primate and rodent models. However, the demonstration that dogs can be trained to cooperatively participate in fMRI studies has opened up a wealth of new data about canine brain function. Canine fMRI experiments can be divided into passive and active tasks. Passive tasks focus on mapping different perceptual systems of the canine brain and include responses to simple and complex visual stimuli (e.g. colored shapes vs. faces), auditory stimuli (sounds, voices), and olfactory stimuli (simple volatiles, biological odors). Passive tasks do not require the dog to do anything except remain motionless. In contrast, active tasks involve the elicitation of a response or a trained behavior. Active tasks present unique challenges because of the potential confound of subject movement. However, when the dog is trained to move only on cue, the movement artifacts can be delayed in time from the salient neural events. Examples of this approach include response inhibition and delayed match paradigms for memory. Many of these neural measures are found to correlate with out-of-scanner metrics of personality and behavior, and may eventually be used to predict a dog's suitability for specific working roles.

EARLY ORIGINS OF THE SOCIAL BRAIN

Rebecca Saxe – Massachusetts Institute of Technology

Humans are the ultra-social animal, and we have a correspondingly ultra-social brain. Large swaths of human "association cortex" turn out to be preferentially active when perceiving, conceiving, or interacting with other people. How does this functional organization develop? We collected fMRI data while young children, and infants, watched movies involving other people. Both experiments suggest that the large scale organization of the social brain is present as early as we can look for it; over time, these regions become increasingly selective for specific aspects of other people.

Poster Session B & Presidential Reception

Friday, March 17 2017

3:30 – 5:00 PM

See page 57 for abstracts.

Presidential Symposium

Friday, March 17 2017

5:00 – 6:30 PM

Introduced by: Paul Whalen, Dartmouth College

Todd Heatherton, Dartmouth College

Alex Martin, National Institute of Mental Health

ABSTRACTS

A GOOGLE MODEL OF MPFC
Todd Heatherton – Dartmouth College
A key question in psychology and neuroscience is how activity in the brain gives rise to the unitary and coherent sense of self that exists across time and place. Neuroimaging research has emphasized the importance of a region in the medial prefrontal cortex (MPFC) when people perform tasks that are relevant to the self. An open question, however, is what exactly the MPFC does in contributing to the sense of self. I propose that the search engine Google provides an analogy for MPFC functioning. Google links together information from different Internet sites and tries to interpret what the searcher is looking for. Accordingly, the Google model of self proposes that MPFC integrates and interprets the output of neural activity across widely distributed brain networks. This talk focuses on the affective nature of self, such as the neural basis of self-esteem and positivity biases.

CAN ABERRANT PATTERNS OF FUNCTIONAL CONNECTIVITY BE MODIFIED? AND, IF SO, WOULD IT MATTER?
Alex Martin – National Institute of Mental Health
Recently, there has been tremendous progress in our ability to uncover the intrinsic, large-scale functional architecture of the human brain by evaluating the covariation of spontaneously fluctuating neural signals during the so-called 'resting state'. One of the most interesting aspects of this research has been the discovery that patterns of functional connectivity at rest can predict subsequent task performance in normal subjects, as well as clinical outcome in neuropsychiatric patients (Plitt et al., PNAS, 2016). My talk will focus on our recent attempt to directly modify aberrant patterns of functional connectivity in patients with autism by using implicit, real-time, fMRI-based neurofeedback to strengthen between-region connectivity. Our results suggest that fMRI neurofeedback can directly alter complex, clinically-relevant patterns of connectivity, potentially leading to improved clinical outcome.

Saturday, March 18 2017

Coffee & Snacks

Saturday, March 18 2017

8:00 – 9:00 AM

Social and Reward Learning

Saturday, March 18 2017

9:00 – 10:15 AM

Chaired by: Jennifer Silvers, University of California, Los Angeles

Andreas Olsson, Karolinska Institutet

Oriel FeldmanHall, Brown University

Yina Ma, Beijing Normal University

Adriana Galván, University of California, Los Angeles

ABSTRACTS

NEW APPROACHES TO THE SOCIAL TRANSMISSION AND LEARNING OF AFFECTIVE INFORMATION
Andreas Olsson – Karolinska Institutet
In rapidly changing environments, humans and other animals often use the behavior of others to learn about what should be approached and avoided. In humans, the unique expressiveness of the face enables the transmission of a wide range of value-based information, from the painfulness of a shock to the inappropriateness of a social interaction. In contrast to learning from direct, personal, experiences, little is known about the mechanisms underlying these forms of social learning. I will discuss studies using behavioral, imaging, and pharmacological techniques examining both the sender and receiver during various forms of social learning. Consistent with research across species, our results show that social threat and safety learning draw on processes partially shared with direct conditioning and extinction learning, respectively. Importantly, the outcome of social learning depends on features of both the sender and receiver.

STIMULUS GENERALIZATION AS A MECHANISM FOR LEARNING WHO TO TRUST
Oriel FeldmanHall – Brown University; Joseph Dunsmoor – New York University; Alexa Tompary – New York University; Lindsay Hunter – Princeton University; Alexander Todorov – Princeton University; Elizabeth Phelps – New York University
Through repeated encounters humans can learn to trust. Yet humans constantly meet new individuals where judgments of trustworthiness are blind to reputation. In these cases, what drives decisions to trust strangers? We test whether the ability to generalize across stimuli and situations—an essential feature of adaptive learning—underpin novel

decisions to trust unfamiliar others; and, whether such a mechanism recruits a gradient of structurally similar neural patterns. Subjects first play an iterative Trust Game with three players who are highly trustworthy, somewhat trustworthy, and highly untrustworthy. Subjects then select partners for a future Trust Game. Unbeknownst to the subject, each potential new partner was parametrically morphed with one of the three players from the original game. Results reveal a preference for strangers (in reality, morphs) that resemble an individual previously learned to be trustworthy. In contrast, subjects strongly preferred not to play with a morph that even partially resembled someone they learned was untrustworthy (i.e. overgeneralization or a 'better safe than sorry' strategy). An imaging experiment replicated these findings, demonstrating BOLD activity in the amygdala tracks increasing perceptual similarity along the untrustworthy gradient. Multivariate representational similarity analyses further reveal increasingly similar patterns of activity in the amygdala selectively index adaptive decisions to withhold trust from individuals baring perceptual resemblance to the untrustworthy player. Additionally, we observed that striatal representational patterns broadly track adaptive choices in both trustworthy and untrustworthy domains. Together, these data demonstrate a novel behavioral and neural mechanism for how humans adaptively learn to trust during dynamic social environments.

NEUROCOMPUTATION OF SOCIAL VALUES: DISTINCT OXYTOCIN EFFECTS IN INDIVIDUALISTS AND PROSOCIALS

Yina Ma – Beijing Normal University

Computation of social values is fundamentally important for understanding social interactions, but the underlying neurobiological mechanisms remain elusive. Here, by integrating functional MRI and pharmacological challenge, we investigate the contribution of a neuropeptide, oxytocin (OT) to social preferences of the division of resources and the underlying neurocomputational mechanisms. In a double-blind, placebo-controlled between-subject procedure, we asked people with prosocial or individualistic social orientation to evaluate the desirability of pairs of rewards for the self and the other. We computed subjective preference based on the weights of allocentric and egocentric distance on the desirability evaluation of reward pairs and found that subjective preferences aligned well with individual's social orientation. The distance between reward distribution and individual's subjective preference is encoded in the amygdala and ventral tegmental area, the activity of which positively predicts individual differences in inequality aversion. Moreover, we demonstrate a normalization effect of intranasal OT on the behavioral and neural responses, making individualists less egocentric and prosocials less allocentric by increasing amygdala activity in individualists, but decreasing that in prosocials. This normalization effect of OT remains unchanged in a competitive ("winner takes all") context, suggesting a generic role of OT in social value representation. Taken together, our findings suggest a new functional role of OT in social interactions in affecting encoding of social values by modulating amygdala activity.

BETTER LEARNING IN ADOLESCENTS THAN ADULTS: THE ROLE OF THE DEVELOPING BRAIN

Adriana Galván – University of California, Los Angeles

Adolescents are notorious for making risky decisions, a tendency attributed to heightened activity in the brain's reward systems during adolescence. It has been suggested that reward sensitivity in adolescence might also be behaviorally adaptive, but evidence of such an adaptive role has been scarce. Using a probabilistic reinforcement learning task and functional magnetic resonance imaging (fMRI) in humans, we found that adolescents showed enhanced learning from reinforcement. This enhanced learning in adolescents was associated with a stronger link between reinforcement learning and episodic memory for rewarding outcomes, with greater activation in the hippocampus, and with greater functional connectivity between the hippocampus and the striatum during learning.

These findings reveal an important role for the hippocampus in supporting reinforcement learning in adolescence. More broadly, they suggest that reward sensitivity in adolescence is related to adaptive differences in how adolescents learn from experience.

Posters

Poster Session C & Coffee Break

Saturday, March 18 2017

10:15 – 11:45 AM

See page 83 for abstracts.

Award Address

Distinguished Scholar Address

Saturday, March 18 2017

11:45 AM – 12:45 PM

Introduced by: Leah Somerville, Harvard University

BJ Casey, Yale University

ABSTRACT

SELF CONTROL: WHEN SOCIAL AND AFFECTIVE PROCESSES OVERSHADOW COGNITIVE PROCESSES
BJ Casey – Yale University
Emotions impact our choices and actions across many social interactions throughout the course of a day. These emotional and social interactions often require cognitive control - the ability to suppress inappropriate emotions, desires or impulses in favor of goal oriented ones. A key question that has driven our research over the last decade is in what contexts do these social and affective processes diminish or enhance cognitive control and how do circuit-based models account for observed behavioral differences in these contexts? This presentation will highlight a series of studies that investigate behavioral and neural correlates of cognitive control in emotionally charged and social situations based on developmental, individual and group factors. The first series of experiments examine adolescent specific changes in the ability to exercise control in the context of rewards, potential threats and social cues and highlight the importance of hierarchical changes in the development and function of prefrontal and limbic circuitry. The second series of experiments examine how individual differences in cognitive control early in life, as measured by delay of gratification, can predict impulsive actions up to 40 years later. The last series of experiments examine how the ability to exercise self control in emotionally arousing situations is impacted by sociocultural group information. Together, these studies suggest that emotional states of arousal interact with developmental, individual and sociocultural group factors to differentially modulate our actions. These results point to the importance of understanding the specific situational factors that can diminish and enhance our capacity for self control.

Lunch & ABCD Q & A

Saturday, March 18 2017

12:45 – 2:00 PM

Buffet lunch provided on the Centennial Terrace Deck.

1:15 – 1:45 PM: Optional ABCD (Adolescent Brain Cognitive Development) Study Q & A Session led by: **BJ Casey**, Yale University (Centennial Ballroom A/B)

Blitz Talks

Trainee Data Blitz

Saturday, March 18 2017

2:00 – 3:00 PM

Chaired by: Lauren Atlas, National Institutes of Health

Eshin Jolly, Dartmouth College

Ian Roberts, The Ohio State University

Meghan Meyer, Princeton University

Song Qi, Caltech; Columbia University

Julian Wills, New York University

Jie Hu, Peking University

Regina Lapate, University of California, Berkeley

ABSTRACTS

SPONTANEOUS MENTALIZING ABOUT PARASOCIAL RELATIONSHIPS
Eshin Jolly – Dartmouth College; Jin Hyun Cheong – Dartmouth College; Luke Chang – Dartmouth College
Individuals spend a significant amount of their lives thinking about other people. These thoughts typically involve close personal relationships, but can also involve parasocial relationships, i.e. fantasies about distant others' lives such as celebrities, athletes, or fictional characters. One reason for this behavior may be that individuals actively simulate what it might be like to live someone else's life and imagine the benefits from doing so. Using characters from a TV drama (Friday Night Lights), we examined this phenomenon in a three part paradigm where participants (1) watched an episode of the show, (2) passively viewed photographs of the main characters in the scanner, and (3) rated how much they wanted to be each character. We found evidence supporting the hypothesis that individuals spontaneously engaged in mental simulation and valuation of others. Whole brain contrasts of participants' most highly and least highly rated characters revealed clusters in regions involved in social cognition (dmPFC) and valuation (NAcc). Furthermore, a whole brain multivariate regression model successfully predicted participants' ratings with a modest, but reliable degree of accuracy. Consistent with univariate results, regions involved in social cognition and valuation were amongst the

features of the model that most strongly contributed to the prediction. These findings suggest that individuals spontaneously simulate others' lives during a passive viewing task, and demonstrate how machine learning approaches can be used to uncover psychological processes even in the absence of an explicit task.

ACETAMINOPHEN REDUCES THE EFFECTS OF SOCIAL EXPECTATIONS ON ECONOMIC DECISION-MAKING VIA DAMPENED AFFECT

Ian Roberts – The Ohio State University; Ian Krajbich – The Ohio State University; Paul E. Stillman – The Ohio State University; William A. Cunningham – University of Toronto; Baldwin M. Way – The Ohio State University

Our recent work has shown that acetaminophen not only blunts pain, but also affective evaluations (Durso et al., 2015). To determine the behavioral effects of affective blunting by acetaminophen, we examined the effects of acetaminophen in a series of economic games across multiple studies. In two studies, acetaminophen reduced the impact of both favorable and unfavorable expectations, which caused trust game investors to invest more when they expected low returns from the trustee but invested less when they expected high returns, relative to placebo. In other words, the direction of drug effect changed with different expectations. In study 3, acetaminophen reduced the effect of varying fairness expectations on offer acceptance in an ultimatum game. Acetaminophen also caused trust game trustees to adhere less to their beliefs about investors' expectations when deciding how much to return. This reduced reciprocity was accompanied by reduced guilt when the same trustees were asked how they would feel if they had returned less. To identify the neural mechanisms of acetaminophen's affect dampening effects and the implications for economic decision-making, we are conducting an fMRI study in which participants evaluate affective stimuli (i.e., IAPS images). The relationship between affective neural responses and subsequent social economic choices outside the scanner will be examined. Overall, our behavioral findings are the first to show an over-the-counter medication to affect the fundamental social processes of trust, fairness, and reciprocity. Furthermore, our results demonstrate the importance of considering social psychological context (e.g., social expectations) when studying the behavioral effects of drugs.

EVIDENCE THAT DEFAULT NETWORK CONNECTIVITY DURING REST CONSOLIDATES SOCIAL INFORMATION

Meghan Meyer – Princeton University

Over the past few decades a lingering question has pervaded social neuroscience research: why do the same brain regions that support social cognition also spontaneously engage during rest? Building off of past research suggesting that rest is a time when new information is committed to memory, this study tested whether one function of MPFC and TPJ engagement during rest may be to consolidate new social information. Replicating past work, MPFC-TPJ resting state functional connectivity was enhanced during a baseline rest period. Critically, these regions significantly increased functional connectivity during rest following the acquisition of new social information, and this effect correlated with superior social associative memory performance. Given the importance of successfully navigating the social world, the tendency to engage MPFC and TPJ during rest may tune people towards social learning.

HOW SURVIVAL CIRCUITS OPTIMIZE ESCAPE DECISIONS IN HUMANS

Song Qi – Caltech, Columbia University; Demis Hassabis – Google DeepMind; Brian Suen – Columbia University; Fangjian Guo – Massachusetts Institute of Technology; Nathaniel Daw – Princeton University; Dean Mobbs – Caltech, Columbia University

Flight initiation distance (FID), the distance at which an organism flees from an approaching threat, is an ecological metric of cost-benefit functions of escape. In the context of changing reward and threat values, we used looming artificial predators with

varying attack distances to examine escape decisions. We showed that rapid escape decisions relied on reflexive fear circuits in the midbrain and anterior mid-cingulate cortex (aMCC). Protracted escape decisions, defined by larger buffer zones, were associated with posterior cingulate cortex (PCC), hippocampus and ventromedial prefrontal cortex (vmPFC) circuits implicated in behavioral flexibility and strategic decision-making. Using a Bayesian decision model, we also found that the optimal levels of subjects' decision making under rapid and protracted escape decisions were differentially associated with aMCC and bilateral hippocampus activity, respectively. Our findings suggest that survival circuits that support fear and anxiety in humans, also give rise to optimal flight decisions associated with the attack distance.

SHIFTING PROSOCIAL INTUITIONS: NEURAL EVIDENCE FOR A PERSON X SITUATION ACCOUNT OF GROUP-BASED COOPERATION

Julian Wills – New York University; Leor Hackel – Stanford University; Jay Van Bavel – New York University

Cooperation is essential for adaptive group living. However, the neurocognitive basis of this behavior remains controversial, as different models have proposed different roles for intuitive and deliberative processing. Dual-process models argue cooperation stems from intuition (versus deliberation). In contrast, value-based decision models argue that intuitive processing depends on the strength of one's prosocial preferences, as well as any contextual factors that shift these preferences. We tested whether neural activity implicated in intuition and deliberation is modulated by prosocial preferences and social norms. While undergoing fMRI, subjects played a public goods game with students from two fictitious universities where the norm was either free-riding (antisocial school) or cooperating (prosocial school). Participants who were more prosocial overall showed greater ventromedial prefrontal cortical (VMPFC) activity when cooperating and heightened connectivity between VMPFC and dorsolateral prefrontal cortex (DLPFC) when free-riding, demonstrating that individual prosocial preferences modulated the contribution of brain regions implicated in intuition and deliberation. Moreover, among norm-sensitive subjects, deviating from the group norm involved greater DLPFC-VMPFC connectivity. As a result, these findings suggest the relative contribution of intuition or deliberation may critically hinge on prosocial preferences rooted in individual dispositions and contextual norms. Furthermore, these findings affirm value-based decision models in favor of dual-process theories of cooperation.

VMPFC MEDIATES THE EFFECT OF TRAIT EMPATHY ON OTHER-REGARDING TENDENCIES IN ALTRUISTIC BEHAVIOR

Jie Hu – Peking University; Yue Li – Peking University; Philip R. Blue – Peking University; Xiaolin Zhou – Peking University

Why do we help others at a cost to ourselves? One line of research suggests that empathic concern for others' welfare is central to altruistic behavior, while another line of research suggests that value-based computation of costs and benefits drives altruistic behavior. However, whether and to what extent these two sub-processes (i.e. empathic concern and value-based computation) act together to influence altruistic behavior is still unclear. Here, we examined participants' altruistic behavior by asking them to perform a task in which they decided whether to donate a certain amount of money to help others avoid a certain amount of unpleasant noise stimulation. We used a computational model to fit the behavioral data and calculate the weight that the participants assign to others' suffering when deciding whether to help. This weight was taken as a measure of participants' other-regarding tendency. Behaviorally, we found that participants' other-regarding tendencies correlated positively with their trait empathy scores. Neuroimaging results showed that participants' other-regarding tendencies correlated positively with activity in ventromedial prefrontal cortex (vmPFC) when they decided to act altruistically, as opposed to when they decided to act selfishly. Importantly, this activity in vmPFC

mediated the relationship between trait empathy and other-regarding tendency. Thus, our findings highlight the importance of empathic concern in the value-based computation of altruistic behavior.

LATERAL PREFRONTAL FUNCTION CAUSALLY DETERMINES THE PERVASIVENESS OF AFFECT

Regina C. Lapate – University of California, Berkeley; Richard J. Davidson – University of Wisconsin-Madison

Emotional events can rapidly shape one's behavior. Optimal functioning in everyday life therefore requires the ability to efficiently override reflexive emotional responses and prevent the spillover of affect to situations or people unrelated to the source of emotion. Across two affect misattribution studies, we demonstrate that this ubiquitous and implicit form of context-appropriate emotion regulation depends on intact lateral prefrontal (LPFC) function. In both studies, participants evaluated the likeability of novel neutral faces after being briefly exposed to a negative or positive stimulus. First, in an fMRI experiment, we found that the magnitude of affective misattribution correlated with LPFC-amygdala coupling during negative emotional-stimulus processing. Next, we used Transcranial Magnetic Stimulation (TMS) to temporarily inhibit LPFC function and test the causal role of this region in regulating the influence of emotional information on subsequent social evaluations. We found that while the incidental emotional information did not influence likeability of novel neutral faces in the control condition (when LPFC was operative), LPFC inhibition produced a significant bias in participants' ratings of novel faces according to the previously-processed emotion. Remarkably, TMS-induced emotion misattribution was long lasting: Biased first impressions formed during LPFC inhibition were still detectable outside of the laboratory 3 days after the TMS session—suggesting that a rapid, one-trial emotional learning can take place when LPFC function is perturbed, in the absence of alterations to mood or explicit memory. Collectively, these findings indicate that the LPFC serves an important emotion-regulatory function in preventing incidental emotional encoding from automatically biasing social behavior.

Coffee Break

Saturday, March 18 2017

3:00 – 3:15 PM

Symposium

Novel Approaches to Studying Social and Affective Processes

Saturday, March 18 2017

3:15 – 4:30 PM

Chaired by: Carolyn Parkinson, University of California, Los Angeles

Bill Kelley, Dartmouth College

Asieh Zadbood, Princeton University

Richard Betzel, University of Pennsylvania

Hakwan Lau, University of California, Los Angeles

ABSTRACTS

COMBINING FMRI AND MOBILE SENSING TECHNOLOGY TO STUDY THE SOCIAL BRAIN

Bill Kelley – Dartmouth College

There is a growing trend in social and affective neuroscience to use brain data obtained in fMRI to predict real world behavior. Our research uses recently developed applications of network analysis to assess resting state functional connectivity (RSFC). We examine the functional coupling of brain networks in the absence of task demands, patterns of statistical coherence across brain regions that arise throughout development, in a manner that permits assessment of a network's integrity. The guiding hypothesis of this research is that individual differences in the integrity of RSFC networks can predict individual differences in appetitive behavior, social behavior, vulnerability to stress and their relation to self-affect. An important innovation in this work is the automated collection of relevant behavioral data through passive smartphone sensing to infer human dynamics and behavior. For example, mobile sensing applications can automatically and accurately infer activity measures (stationary, walking, running, driving, cycling), sleep duration, and sociability (e.g., the number of independent conversations and their durations). We discuss how the combination of fMRI, smartphone sensing technology, and ecological momentary assessments show great promise for understanding changes in social behavior and affect, including prediction of development of mood or anxiety disorders.

HOW DO WE SHARE OUR MEMORIES WITH OTHER BRAINS?

Asieh Zadbood – Princeton University; Janice Chen – Princeton University; Yuan Chang Leong – Stanford University; Kenneth Norman – Princeton University; Uri Hasson – Princeton University

In daily life we often recall and share our past experiences (an episode that occurred this morning, a movie we watched last night, etc) using language. Strikingly, people who listen to these stories are able to imagine details of the episode which they have not personally experienced. However, it is unknown how strongly the neural patterns elicited by imagining specific episodes in the listener's brain resemble the neural states elicited during the original encoding of those episodes in the speaker's brain. In the current study, using fMRI and a natural communication task, we traced how neural patterns associated with specific scenes of a movie are encoded, verbally recalled, and then transferred to a group of naïve listeners. By comparing neural patterns across the three conditions, we report that event-specific neural patterns are observed in the default mode network (DMN) and shared across the encoding, reinstatement (spoken recall), and imagination of the same real-life episode. This study uncovers the intimate correspondences between memory encoding and imagination, and highlights the essential role that our common language plays in the process of transmitting one's experiences to other brains.

POSITIVE AFFECT, SURPRISE, AND FATIGUE ARE CORRELATES OF NETWORK FLEXIBILITY

Richard Betzel – University of Pennsylvania

Advances in neuroimaging have made it possible to reconstruct functional networks from the activity patterns of brain regions distributed across the cerebral cortex. Recent work has shown that flexible reconfiguration of human brain networks over short timescales supports cognitive flexibility and learning. However, modulating network flexibility to

enhance learning requires an understanding of an as-yet unknown relationship between flexibility and brain state. Here, we investigate the relationship between network flexibility and affect, leveraging an unprecedented longitudinal data set. We demonstrate that indices associated with positive mood and surprise are both associated with network flexibility -- positive mood portends a more flexible brain while increased levels of surprise portend a less flexible brain. In both cases, these relationships are driven predominantly by a subset of brain regions comprising the somatomotor system. Our results simultaneously suggest a network-level mechanism underlying learning deficits in mood disorders as well as a potential target -- altering an individual's mood or task novelty -- to improve learning.

UNCONSCIOUS FEAR REDUCTION VIA DECODED FMRI NEUROFEEDBACK
Hakwan Lau – University of California, Los Angeles
Procedures to extinguish fear generally involve repeated presentation of unreinforced fear-conditioned cues. However, exposure to feared cues is itself aversive, and thus limits its clinical applicability. Using real-time fMRI with multivariate decoding, we extinguished fear by directly reinforcing the activation patterns in visual cortex that resembled the decoded features of feared visual stimuli. Participants then went through Pavlovian conditioning, and acquired fear for the two conditioned stimuli (CS+) as they were paired with electric shocks. Afterwards, participants went through three days of neural reinforcement sessions during which they were rewarded on a trial-by-trial basis when the activation patterns in V1/V2 resembled the previously decoded patterns for one of the CS+ (Target) but not for the other (Control). Participants were not informed of the purpose of this procedure, and post-session tests confirmed they were not consciously aware of the occurrence of the neural representation of Target CS+ during the Neural reinforcement sessions. Nevertheless, participants showed reduced fear response for the Target CS+ relative to the Control CS+. These results show that fear can be reduced without explicit reactivation of the fear memory, and this procedure may support new treatments for fear-related disorders such as phobia and post-traumatic stress disorder (PTSD), via unconscious processing. I further speculate how we can apply the same approach to move towards a placebo-controlled clinical psychology.

Presidential Closing Remarks

Saturday, March 18 2017

4:30 – 5:00 PM

Paul Whalen, Dartmouth College
SANS President

Poster Session A

A – 1 *SANS Poster Award winner*
EMPATHIC ACCURACY IN NEURODEGENERATIVE DISEASE: DIAGNOSTIC DIFFERENCES AND NEURAL CORRELATES

Casey L. Brown – University of California, Berkeley; Alice Y. Hua – University of California, Berkeley; Howard J. Rosen – University of California, San Francisco; Bruce P. Miller – University of California, San Francisco; Robert W. Levenson – University of California, Berkeley

Empathic accuracy, the ability to recognize other's emotions, is critical for social functioning. Neuroimaging and neurological studies of empathic accuracy often examine individuals' ability to identify emotions shown in static photographs. These tasks fail to capture the dynamic ways emotions unfold over time in interpersonal contexts. Deficits in empathic accuracy can be caused by neurodegenerative disease. However, to our knowledge, no studies have investigated differences in empathic accuracy between types of neurodegenerative diseases using a dynamic tracking task. 186 patients with a variety of neurodegenerative diseases and 22 controls watch a film of an actress experiencing a range of emotions. Participants used a rating dial to indicate how the actress was feeling continuously. Empathic accuracy was determined by computing time-lagged cross correlations between participant ratings and ratings obtained from an expert panel. Findings revealed that patients with Alzheimer's disease, behavioral variant frontotemporal dementia, and progressive supranuclear palsy had significantly lower empathic accuracy compared to controls. Additionally, we used whole brain voxel-based morphometry to examine the neural correlates of empathic accuracy in 181 of these participants. Grey matter atrophy in a large bilateral cluster was associated with lower empathic accuracy, including regions involved in the recognition of emotion such as the superior medial frontal gyrus, ventrolateral prefrontal cortex, anterior cingulate cortex, and insula (pFWE <.05). Atrophy in the right precuneus, left superior parietal gyrus, and bilateral postcentral gyrus also predicted lower empathic accuracy (p<.001). These findings highlight the neural networks involved in real-world empathic accuracy.

A – 2 *SANS Poster Award winner*
THE ROLE OF THE SOMATOSENSORY CORTEX IN PROSOCIAL BEHAVIOUR. FROM CORRELATION TO CAUSALITY

Selene Gallo – Netherlands Institute for Neuroscience; Riccardo Paracampo – University of Bologna; Laura Müller-Pinzler – Netherlands Institute for Neuroscience; Mario Severo – Netherlands Institute for Neuroscience; Christian Keysers – Netherlands Institute for Neuroscience; Valeria Gazzola – Netherlands Institute for Neuroscience

Witnessing another persons' suffering elicits vicarious brain activity in areas active when we ourselves are in pain. Using EEG, we investigated if highlighting the somatic origin of the observed pain alters the vicarious activity of the somatosensory cortex (S1) and whether the magnitude of the activity predicts prosocial behaviour (1st experiment). Then we test the causal involvement of the region in helping (2ndexperiment) using Transcranial Magnetic Stimulation (TMS). First, 28 participants underwent a costly helping paradigm. They witnessed a confederate receiving (a) a slap on the hand, with only the hand visible, highlighting the somatosensory component of pain (Hand-Videos) or (b) an electroshock on the hand with a visible facial expression of pain highlighting unpleasantness (Face-Videos). Participants could help by donating money. Using beamforming source reconstruction we identified S1 activity to be stronger while watching the Hand- than Face-Videos. Importantly the left-S1 activity could predict trial-by-trial amounts donated for both Video-types. In the second (ongoing) experiment, 10 participants performed the task under TMS over the left-S1 and under sham-stimulation. While viewing Hand-Videos, TMS selectively interfered with the relationship between intensity of the stimulation shown in the video and donation. In conclusion, S1 vicarious brain activation while watching somebody in pain can predict the helping behavioural outcome: the more the pain is shared, the more we are willing to help. This relationship is disrupted by TMS supporting the functional relevance of S1 in calibrating prosociality to the situation when the somatosensory component of pain is highlighted.

A – 3 *SANS Poster Award winner*
EXPLORING INDIVIDUAL DIFFERENCES AND THE NEURAL CORRELATES OF COGNITIVE REAPPRAISAL ACROSS DEVELOPMENT

Joao F. Guassi Moreira – University of California, Los Angeles; Katie A. McLaughlin – University of Washington; Jennifer A. Silvers – University of California, Los Angeles

Learning to regulate one's emotions is a critical developmental milestone. In the past two decades, dozens of studies in adults have informed our knowledge about the neural bases of cognitive reappraisal – an emotion regulation strategy that involves changing the meaning of an emotional stimulus so as to alter its emotional import. However, research examining how reappraisal emerges during childhood and adolescence remains in its nascence. To examine

age-related effects associated with cognitive reappraisal, we collected fMRI data on 86 youths aged 8-17 (Mage=12.79 years, 42F) while they completed a reappraisal task. Specifically, participants were shown aversive and neutral images and were instructed before each trial to look at the image as they normally would or to reappraise by distancing. Across the sample, reappraisal significantly reduced negative affect (t=-6.32, p<.001, d=-.57), but reappraisal success did not vary as a function of age (r=.19, p=.116). Neuroimaging results replicate prior work in adults showing that reappraising negative images, recruits vlPFC and vmPFC (Z = 3.18, xyz = [-26, 50, -14,], k = 661, p<.05). Age and individual differences in regulation success were explored as variables of interest. Regardless of age, reappraisal success was associated with greater vlPFC and ventral striatum activity whereas increased age predicted greater recruitment of cortical midline and cingulate areas. These data suggest that while effective reappraisal relies on prefrontal and control circuitry across the lifespan, neurodevelopmental changes in reappraisal may instead hinge on age-related improvements in the ability to self-monitor and engage in perspective taking while reappraising.

A – 4 *SANS Poster Award winner*
EFFECTS OF GROUP MEMBERSHIP ON OBSERVATIONAL LEARNING

Pyungwon Kang – University of Zurich; Grit Hein – University of Zurich; Chris Burke – University of Zurich; Philippe Tobler – University of Zurich

Learning from others (observational learning) can be affected by social context such as the learner's relation with the observed person. One of the strongest social context factors is group membership but it is an open question whether group membership also influences observational learning. In this study, we investigated whether and how observational learning from ingroup members differs from observational learning from outgroup members. Specifically, our hypothesis was that individuals learn faster when observing ingroup members than when observing outgroup members. We recruited thirty two participants for an fMRI experiment. Prior to the fMRI scan, we induced group identification based on political attitude. Next, participants performed an observational learning task in the scanner. Participants observed ingroup and outgroup members learning by trial and error which one of two options was associated with higher reward probability and were free to use the acquired knowledge for their own decisions. Finally, the participants also learned individually, without previous observational phase. Participants performed better when they observed the decisions of ingroup members than the decisions of outgroup members. In the neural data, we found that during the outcome phase TPJ activation was greater for ingroup members compared to outgroup members. Moreover, TPJ activation was related to the observer's performance and increased as individuals identified more strongly with ingroup members. These results suggest that processing of social outcomes is enhanced during observational learning from ingroup members and related to the strength of ingroup identification.

A – 5 *SANS Poster Award winner*
SEEING WHAT WE WANT TO SEE: MOTIVATION SHAPES PERCEPTUAL JUDGMENTS AND CATEGORY-SELECTIVE ACTIVITY IN THE VENTRAL VISUAL STREAM

Yuan Chang Leong – Stanford University; Brent Hughes – University of California, Riverside; Jamil Zaki – Stanford University

People often trust their visual system to construct an objective representation of the physical world. Yet, previous work suggests that goals, desires and wants can influence what people see. In this study, we explored the neural mechanisms underlying motivational influences on visual perception. Human participants were presented with images comprising a mixture of a face and a scene in different proportions while we measured their BOLD response using fMRI. Participants were tasked to categorize whether each image predominantly displayed a face or a scene, and were rewarded for each correct categorization. We manipulated the category participants were motivated to see by instructing them that they would win or lose extra money if the upcoming image was of a particular category. Even though the reward maximizing strategy was to perform the classification as accurately as possible, the additional financial incentive shifted participants' sensitivity to the motivation-consistent category - for the same face to scene ratio, participants were more likely to categorize an image as belonging to a category if they were motivated to see that category. We then applied multi-voxel pattern analysis methods to participants' BOLD response to quantify the level of face-selective and scene-selective activity in the ventral visual stream, and found evidence for enhanced category-selective activity for the motivation-consistent category during presentation of the ambiguous composite images. Our results suggest that motivation influence perceptual judgments via gain control mechanisms that increase the neural sensitivity to motivation-consistent perceptual features.

A – 6 *SANS Poster Award winner*
IDENTIFYING CHANGES IN THE EMOTIONAL EXPRESSIONS OF OTHERS: ADOLESCENT-SPECIFIC SALIENCE NETWORK RECRUITMENT THAT REDICTS SOCIAL BEHAVIOR

Maya L. Rosen – University of Washington; Margaret A. Sheridan – University of North Carolina, Chapel Hill; Kelly A. Sambrook – University of Washington; Meg J. Dennisont – University of Washington; Jessica L. Jenness – University

of Washington; Mary K. Askren – University of Washington; Andrew N. Meltzoff – University of Washington; Katie A. McLaughlin – University of Washington

The ability to hold in mind information about the emotional states of others is critical to guide social behavior. Adolescence is a unique developmental period when the salience of social and emotional information becomes particularly pronounced. Although this pattern has frequently been considered with respect to risk behaviors and psychopathology, evidence suggests that increased adolescent sensitivity to social and emotional cues might confer advantages. For example, greater sensitivity to shifts in the emotions of others is likely to promote flexible and adaptive social behavior. In this study, a sample of 54 children and adolescents (age 8-19 years) performed a delayed match-to-sample task for emotional faces while undergoing fMRI scanning. Recruitment of the dorsal anterior cingulate and anterior insula when the emotion of the probe face did not match the emotion held in memory was observed during a limited developmental window in early adolescence. These findings indicate meaningful developmental variation in the neural mechanisms underlying sensitivity to changes in the emotional expressions. Across all participants, greater activation of this network for changes in emotional expression was associated with less social anxiety and fewer social problems. These results suggest that the heightened salience of social and emotional information during adolescence may confer important advantages for social behavior, providing sensitivity to others' emotions that facilitates flexible social responding.

A – 7 *SANS Poster Award winner*
DO HOSTILE SCHOOL ENVIRONMENTS PROMOTE SOCIAL DEVIANCE BY SHAPING NEURAL RESPONSE TO SOCIAL EXCLUSION? AN FMRI STUDY IN MEXICAN-ORIGIN ADOLESCENTS

Roberta A. Schriber – University of California, Davis; Christina R. Rogers – University of North Carolina at Chapel Hill; Emilio Ferrer – University of California, Davis; Rand D. Conger – University of California, Davis; Richard W. Robins – University of California, Davis; Paul D. Hastings – University of California, Davis; Amanda E. Guyer – University of California, Davis

Ideally, schools provide a nurturing setting for learning and growing, including during adolescence, a time of enormous biological and social change. However, some schools are characterized by high levels of hostility that may sensitize youths to interpersonal threat and promote antisocial behavior. The present study examined how adolescent neural response to social exclusion was associated with earlier exposure to a hostile school environment (HSE) and future social deviance. Participants (166 Mexican-origin adolescents, 55% female, 16-17 years old) reported on their observation of discrimination and violence at school annually across grades 9-11. Subsequently, neural response to experimentally manipulated social exclusion was measured using functional magnetic resonance imaging (fMRI). Finally, social deviance as reflected in adolescents' self-reported antisocial behaviors and affiliations with deviant peers was measured in grade 12 (and in grade 9 for use as a covariate). Results showed that greater HSE exposure prospectively predicted greater response to social exclusion in subgenual anterior cingulate cortex (subACC), a region of interest from the "social pain" network that has also been linked to social susceptibility. Furthermore, greater subACC sensitivity to social exclusion mediated the association between adolescents' previous HSE exposures and their later deviant behaviors. Of note, this neurobiological path was moderated by earlier levels of family connectedness. Adolescents reporting stronger versus weaker family bonds showed no relation between their neural response to social exclusion and later deviant behavior. These findings suggest complex interplay of risk and protective factors across adolescents' social settings that impact adolescent socioemotional development through the brain.

A – 8
IMPAIRED PV AND PNN EXPRESSION IN CA1 HIPPOCAMPUS MAY UNDERLIE CONTEXTUAL DEFICITS AFTER AUDITORY FEAR CONDITIONING IN FMR1 KNOCKOUT MICE

Sonia Afroz – University of California, Riverside; Sarah Reinhard – University of California, Riverside; Pendi Kasim – University of California, Riverside; Hanania Yasmien – University of California, Riverside; Ethell Iryna – University of California, Riverside; Razak Khaleel – University of California, Riverside

Fragile X Syndrome (FXS) is a neurological disorder characterized by behavioral and cognitive deficits. FXS results from increased methylation of the Fragile X Mental Retardation 1 (FMR1) gene, reducing transcription of the FMR1 gene. This study investigated how FXS affects fear and anxiety in mice following auditory fear conditioning. WT and FMR1 KO mice were tested with a standardized fear conditioning protocol consisting of habituation, training, and extinction. Tone and context recall were measured as a percentage of freezing behavior. While tone recall did not significantly differ between genotypes, FMR1 KO mice experienced a deficit in context recall when compared to WT. This context-specific deficit prompted hippocampal immunostaining of the CA1 and the dentate gyrus (DG) for changes in cell densities following behavior. Parvalbumin (PV) cells, perineuronal networks (PNN), and co-localized PV and PNN were stained in both WT and FMR1 KO. Prior to fear conditioning, FMR1 KO mice showed decreased PV density in the DG compared to WT. PV density was further reduced in FMR1 KO following behavior. A general decrease in PNN cell density was noted for WT, but FMR1 KO mice experienced decreased PNN density particularly

around pyramidal cells of the CA1. Furthermore, co-localization increased in WT with behavior, but decreased in the CA1 for FMR1 KO mice. Prominent density shifts occurred within the CA1 of FMR1 KO mice, suggesting contextual deficits may be attributed to CA1 imbalances. By exploring the behavioral and cellular mechanism of FXS, our study advances the framework necessary for future treatment options.

A – 9
EXAMINING THE EFFECTS OF STEREOTYPE-BASED STRESS CONTAGION ON DYADIC MATH PERFORMANCE IN PROBLEM-BASED LEARNING CONTEXTS

Rachel C. Amey – University of Delaware; Adam B. Magerman – University of Delaware; Mengting Liu – University of Delaware; Tessa V. West – New York University; Kate Thorson – New York University; Chad E. Forbes – University of Delaware
Group-based learning approaches such as the Problem Based Learning (PBL) method have become increasingly popular, particularly in STEM domains. While sometimes effective, PBL contexts might also readily engender stereotype threats (ST; i.e., stressful performance situations where negative stereotypes about women's math ability are salient) among women in STEM classes because many cues that trigger ST are prevalent in PBL contexts (e.g., men outnumbering women in STEM domains). Past research has extensively documented the negative downstream consequences of ST on women and their disidentification and disengagement, however, all of this research has occurred at the individual level; thus a critical question is whether the deleterious stress-oriented consequences of ST on individuals can be transmitted to other, otherwise non-threatened women, in a process we refer to as stereotype-based stress contagion. The current study examined how stereotype-based stress contagion altered interactions among women in a dyadic performance context while continuous EEG activity was recorded. Results revealed that ST actors' emotional reactivity to negative performance feedback, operationalized as increased connectivity between brain regions integral for emotion-related processes, predicted increased connectivity in the same emotion network among non-threatened female partners in response to negative feedback on subsequent trials. Furthermore, increased emotion network connectivity in ST actors predicted decreased performance in their partner over time. These relationships were not evident when actors were placed in stereotype-neutral contexts. Findings suggest how stereotype-based stress contagion may manifest in group learning contexts to promote negative downstream consequences among both individuals experiencing ST and their non-threatened female peers.

A – 10
AFFERENT CARDIAC SIGNALS MODULATE ATTENTIONAL ENGAGEMENT TO LOW SPATIAL FREQUENCY FEARFUL FACES

Ruben T. Azevedo – The Warburg Institute, University of London; Deborah Badoud – University of Geneva; Manos Tsakiris – The Warburg Institute, University of London
There is a growing consensus that the continuous dynamic cortical representation of internal bodily states shape the subjective experience of emotions. However, the specific contribution of physiological afferent mechanisms to emotional processing is typically overlooked by research. Recent experimental approaches capitalize on the phasic properties of baroreceptor firing, i.e. active during cardiac systole and quiescent during cardiac diastole, to study how afferent autonomic signals modulate the processing of sensory information. In particular, it has been shown that baroreceptor activation enhances the processing of threat-signalling stimuli. Here, we aimed to look further into the mechanisms underlying the cardiac cycle enhancement of fear processing by investigating its impact in attentional capture processes. In an adapted version of the emotional dot-probe paradigm, we timed the presentation of cues, either fearful or neutral faces, to coincide with the different phases of the cardiac cycle. Capitalizing on the fact that distinct neural pathways are selectively sensitive to different ranges of spatial frequency information, we presented cues with different spatial ranges. Results revealed a selective enhancement of attentional engagement to low spatial frequency fearful faces presented during cardiac systole relative to diastole. No cardiac cycle effects were observed to high spatial frequency nor broad spatial frequency cues. These findings further our understanding of how body-brain interactions may impact the visual processing of fearful stimuli and contribute to the increased attentional capture of threat signals.

A – 11
PREFRONTAL CORTICAL ACTIVITY DURING THE STROOP TASK: NEW INSIGHTS INTO THE WHY AND THE WHO OF REAL-WORLD RISKY SEXUAL BEHAVIOR

Emily Barkley-Levenson – Hofstra University; Feng Xue – University of Southern California; Vita Droutman – University of Southern California; Lynn C. Miller – University of Southern California; Benjamin J. Smith – University of Southern California; David C. Jeong – University of Southern California; Zhong-Lin Lu – The Ohio State University; Antoine Bechara – University of Southern California; Stephen J. Read – University of Southern California
Research suggests that deficits in both executive functioning and trait impulsivity may play a role in risky sexual behavior. At the neural level, dysregulation of the prefrontal cortex has been linked to impulsivity, measured

neurocognitively and through self-report. However, the relationship between neurocognitive measures of executive control and trait impulsivity in jointly predicting risky sexual behavior has not been investigated. This study investigated the relationship between neural functioning during the Stroop task (a common measure of cognitive control) and risky sexual behavior as well as the effect of individual differences in urgent (positive and negative) impulsivity on this relationship. We analyzed data for 90 sexually active men who have sex with men (MSM) who self-reported their risky sexual behavior (instances of condomless anal intercourse in the last 90 days), completed the Stroop task during fMRI scanning, and completed the UPPS-P impulsivity inventory. Risky participants displayed greater activation than safe participants during the color congruent condition of the Stroop task in ACC/DMPFC, DLPFC, left frontal pole, and right insula. Across these regions, this neural activation mediated the link between (positive and/or negative) urgent impulsivity and risky sexual behavior. One interpretation of these findings suggests that the brains of men who engage in risky sexual behavior may be less adept at distributing cognitive resources efficiently during tasks of response inhibition and cognitive control than men who practice safe sex, and that this may be due to dysregulation of the prefrontal cortical/fronto-insular system implicated in impulse control.

A – 12
TESTING MONKEYS' PREFERENCE FOR SOCIAL STIMULI USING AN IN-CAGE TOUCH SCREEN TASK
Naz Belkaya – University of Pennsylvania; Michael L. Platt – University of Pennsylvania
The purpose of this research is to identify relevant variables in a simple touch screen task to reveal or predict the salience of the distracting picture to the subject. Primates were engaged in a task where they had to touch a black dot wherever and whenever it appeared on a touch screen mounted to their cages. Pictures of familiar monkey faces, unfamiliar monkey faces, monkeys averting gaze, monkeys with threatening expressions, and perineal swellings were used as distractor images and the resulting behavior analyzed for differences in the value these images had for each subject monkey. We predicted that behavior would vary depending on the category of the picture and its reproductive quality.

A – 13
PREDICTIVE CODING IN ACTION OBSERVATION: P600 AS A MARKER OF PREDICTION ERROR
Chiara Bozzacchi – Netherlands Institute for Neuroscience; Valeria Gazzola – Netherlands Institute for Neuroscience; Christian Keysers – Netherlands Institute for Neuroscience
Observing other people acting rarely generates surprise. Some features important to this predictability are (a) object affordances and (b) our prior experience with a specific actor. Here we investigate how predictions generated by these two factors influence the way our brain processes observed actions. In a 64-channels EEG experiment, we presented participants with pictures of objects initially strongly associated with the hand (e.g. teapot) or with the foot (e.g. pump). Participants were asked to predict on each trial whether the actor will act upon the object with the hand or foot. After reporting their prediction, a movie revealed the actor's action. 75% of trials showed an action using the effector incongruent with the object (e.g. pushing the teapot with the foot). Participants updated their expectations, eventually predicting the incongruent effector in ~50% of trials. ERPs revealed that trials in which participants saw actions that were at odds with the affordance of the object and/or with their trial-by-trial predictions, were characterized by an increased late component (P600). Predictive coding theories posit that occipito-temporal and parietal cortices should show augmented responses when observed actions violate (motor) predictions. In line with these theories, source localization analysis reports this P600 component to indeed originate from the Middle Temporal Gyrus and Inferior Parietal Lobule. In conclusion, affordances and prior knowledge of an actor both influence how we process observed actions and our data suggest the P600 as a marker of prediction error for action observation.

A – 14
THE NEURAL BASIS OF SOCIAL COGNITION: EXPLORING FALSE-BELIEF PROCESSING ACROSS THE LIFESPAN USING EEG MEASURES
Elisabeth E.F. Bradford – University of Kent; Victoria E.A. Brunsdon – University of Kent; Heather Ferguson – University of Kent
Theory of Mind (ToM), or social cognition, refers to the ability to understand, compute, and attribute mental states. Previous research has shown that even in healthy ageing, declines in social-cognitive abilities are often seen. The research presented here recruited younger (18-35 years-old) and older (60+ years-old) healthy adults to explore the neural basis of changes in social-cognition across the lifespan. Using EEG measures, we investigated the neural responses of older and younger participants when listening to stories involving true- or false-belief scenarios. In the stories, a character was described as having a true- or false-belief about an object's location, before acting in a manner consistent or inconsistent with this ascribed belief-state. Participants also completed questionnaires (including the Autism Quotient and Empathy Quotient) to assess self-report measures of general social abilities, and how these may predict individual differences in belief-state processing. Results revealed differences in how true- and

false-belief states were processed, with a significant role of belief-consistent versus belief-inconsistent outcomes; when the story character possessed a false-belief, belief-consistent outcomes led to a more negative-going N400 component than belief-inconsistent outcomes. These distinctions were more pronounced in older adults than in younger adults, suggesting a difference in how belief-states are processed at different ages.

A – 15
NEURAL PREDICTORS OF PERSUASION-INDUCED BEHAVIOR CHANGE, AS MEASURED WITH FNIRS

Shannon Burns – University of California, Los Angeles; Lianne Barnes – University of California, Los Angeles; Perri Katzman – New York University; Matthew Lieberman – University of California, Los Angeles

Functional neuroimaging can probe the cognitive processes involved in persuasion without relying on fallible self-reports. Specifically, activity in the medial prefrontal cortex and right dorsolateral prefrontal cortex as measured by fMRI during persuasive message exposure can predict future behavior change more accurately than subjective ratings of persuasiveness. The purpose of this study was to replicate these findings with fNIRS, a compact and movement-robust neuroimaging modality, in order to check the validity of these previous results in more ecologically valid contexts. Sixty-nine participants completed a behavioral survey of their weekly sunscreen use, read several messages during a scanning session persuading them to use more sunscreen, and then completed another behavioral survey one week later. Results from this study were comparable to previous fMRI work - medial and right dorsolateral prefrontal cortex activity during message exposure predicted sunscreen use one week later, and the strength of the negative correlation between the two brain areas was a significant predictor of behavior change, above and beyond reported behavioral intentions.

A – 16
SOCIOECONOMIC STATUS MODERATES THE NEURAL CORRELATES OF SOCIAL INFLUENCE

Christopher N. Cascio – University of Pennsylvania; Matthew Brook O'Donnell – University of Pennsylvania; Carolyn Yoon – University of Michigan; Matthew D. Lieberman – University of California, Los Angeles; Emily B. Falk – University of Pennsylvania

People routinely change their preferences and behaviors in response to social influence. Early development, however, may change the way that the brain responds to social cues, and as such people from different cultural upbringings may be influenced through different neurocognitive pathways. Consistent with this logic, one potential moderator of brain-social influence relationships is socioeconomic status (SES). The current study aimed to extend the current literature on social influence by examining whether SES moderated neural mechanisms associated conforming to peer feedback when misaligned with peers in a sample of young adults from high and low SES backgrounds. Overall, results from the current study demonstrated that although rates of conformity behavior were similar between high and low SES participants, the underlying neural mechanisms associated with conformity were different. Specifically, those from higher SES backgrounds show greater activity in DMPFC and VMPFC when conforming to peer feedback, whereas those from lower SES backgrounds show greater activity in TPJ, IFG, and MFG when conforming to peer feedback. Thus, those from high and low SES backgrounds recruit different neural processes when conforming to peer feedback, despite the fact that their ultimate behaviors appear similar on the surface. These results suggest that different backgrounds and environments (i.e., low versus high SES) may influence different learned approaches to problem solving and more generally navigating the social world. In turn, this may suggest that different intervention strategies would be useful for similar behaviors among those from different backgrounds and environments.

A – 17
PUBERTY: ASSOCIATIONS BETWEEN TIMING, TEMPO, FUNCTION, & STRUCTURE OF THE BRAIN

Rajpreet Chahal – University of California, Davis; Veronika Vilgis – University of California, Davis; Kate Keenan – University of Chicago; Erika Forbes – University of Pittsburgh; Allison Hipwell – University of Pittsburgh

Pubertal timing appears to play a critical role in shaping adolescent development (e.g., Keenan et al., 2014). Evidence suggests that pubertal hormones may influence structural brain development, though no research has investigated how timing and tempo may reflect differences in neural organization, such as white matter (WM) tract myelination. Myelination is reflected by increasing fractional anisotropy (FA) and decreasing mean diffusivity (MD) and radial diffusivity (RD) of water molecules (Hasan, 2007). We examined the relationship between girls' longitudinal pubertal maturation at early ages and WM architecture in early adulthood. In a subsample of 115 girls from the Pittsburgh Girls Study, pubertal status was assessed with the Petersen Physical Development Scale (PDS; Petersen, 1988) at ages 9-15, and FA, MD, & RD values were derived using a diffusion-tensor imaging (DTI) scan at age 19. Tract-based spatial statistics were used to analyze the association between pubertal intercepts (timing) and slopes (tempo) and WM integrity. Results indicated that girls further in pubertal maturation at age 9 showed significantly higher FA at age 19 in the inferior fronto-occipital (IFOF), uncinate (UF), superior longitudinal (SLF), and inferior longitudinal (ILF) fasciculi, and anterior thalamic radiation (ATR) (t (114)=3.32-5.08, p < .05). Further, faster pubertal progression at ages 9, 10, and 11 was associated with decreased MD in the IFOF, UF, ILF, SLF, and

corticospinal tract (t (114)=2.48-5, p < .05). These findings are among the first to show that pubertal timing & tempo may be associated with neural transmission later on in development across brain regions.

A – 18
INCREASED SUBJECTIVE EXPERIENCE OF NON-TARGET EMOTIONS AND NEUROANATOMICAL CORRELATES IN PATIENTS WITH FRONTOTEMPORAL DEMENTIA AND ALZHEIMER'S DISEASE

Kuan-Hua Chen – University of California, Berkeley; Alice Y. Hua – University of California, Berkeley; Sandy J. Lwi – University of California, Berkeley; Claudia M. Haase – Northwestern University; Howard J. Rosen – University of California, San Francisco; Bruce L. Miller – University of California, San Francisco; Robert W. Levenson – University of California, Berkeley

Experiencing non-target emotions in contexts that predominantly elicit one particular emotion may reflect alterations to emotion processing. We examined subjective experience of non-target emotions – emotions that the stimuli were not designed or selected to induce – in patients with frontotemporal dementia (FTD; n = 99), Alzheimer's disease (AD; n = 45), other neurodegenerative diseases (n = 45) and healthy controls (n = 37). Participants watched three film clips intended to elicit amusement, sadness, and disgust. Self-report of nine non-target emotions (e.g., anger) was analyzed. We found that patients with FTD reported more positive and negative non-target emotions, whereas patients with AD reported more positive non-target emotions when compared to normal controls and patients with other neurodegenerative diseases (ps < .001). The findings were limited to self-reported emotion as facial expressions of non-target emotions did not differ between groups. Examining neuroanatomical correlates of this effect using whole-brain VBM analyses revealed that greater experience of negative non-target emotions was associated with greater atrophy in left hemisphere regions associated with self-awareness of emotion, including the anterior insula and ventral striatum (pFWE < .05). Greater subjective experience of positive non-target emotions was associated with greater atrophy in left hemisphere regions associated with processing social contextual information, including the middle temporal and inferior temporal gyri (p < .001). These results suggest disease-related changes in subjective experience of non-target emotions in FTD and AD, which may be linked to atrophy in brain structures underlying self-awareness of emotion and social contextual processing.

A – 19
THE IMPACT OF EMOTIONAL CUES ON SHORT-TERM AND LONG-TERM MEMORY DURING ADOLESCENCE

Alexandra O. Cohen – Weill Cornell Medical College; May I. Conley – Yale University; Tariq Cannonier – Yale University; Makana D. Williams – Yale University; Danielle V. Dellarco – University of Miami; B.J. Casey – Yale University

Emotional information pervades daily life and can influence memory, which affects learning and performance of everyday cognitive tasks. Adolescence is a time of heightened sensitivity to emotional and social inputs, as dynamic changes in brain structure and function take place. In adults, emotional information typically enhances subsequent memory, via consolidation mechanisms involving the amygdala (Beyler et al., 2016); however, the impact of emotional and social content on memory across development, as neural circuitries continues to mature (Casey et al., 2016), remains unclear. The present study implements an emotional n-back task using happy, fearful, and calm faces as well as places in individuals ages 9 to 29. Participants are tested for their subsequent memory of the stimuli used in the task either immediately after completing the task or 24 hours later, to allow for memory consolidation. A mixed model building approach is used to characterize age-related trajectories in recognition memory, where we test for linear, quadratic, and cubic effects of mean-centered age (Braams et al., 2015). Adolescents show better memory for places than faces in the immediate recall condition. After 24 hours, we observe the emergence of non-linear age-related changes in corrected recognition memory (correct hits minus incorrect false alarms) for emotional cues. These preliminary results suggest that emotional and social information differentially influence short-term and long-term memory capacity across development.

A – 20
THE ENDOCRINOLOGY OF PAIN SENSITIVITY IN RESPONSE TO SOCIAL ACCEPTANCE AND REJECTION

Lindsay B. Cooper – Simon Fraser University; Neil V. Watson – Simon Fraser University

The common neural underpinnings of physical and social pain have recently been used to explain the relationship between emotional distress and fluctuations in pain sensitivity. However, the neuroendocrine correlates of these states are relatively unknown, as are any gender differences that might arise in response to an episode of social rejection or acceptance. In as much as social rejection is experienced as stressful, cortisol might be expected to increase in response to these kinds of interactions. Testosterone, often found to act in conjunction with cortisol to influence social behavior, may also be affected. Furthermore, the extent to which testosterone and cortisol are reactive to experiences of social exclusion and inclusion may play a role in determining pain sensitivity after these sorts of interactions. In pursuit of these questions, 2-3 mL of saliva was collected before and after a social

manipulation designed to make participants feel either accepted or rejected. The enzyme-linked immunosorbent assay (ELISA) method was used to determine hormonal fluctuations in response to this social manipulation. Significant gender differences were found in pain sensitivity after being socially accepted, with males displaying greater pain threshold and tolerance than females. These differences were not found after being rejected. Males but not females, had higher testosterone concentrations after being socially accepted than after being rejected, a change that was not found in cortisol. Finally, the extent to which fluctuations in testosterone and cortisol are predictive of pain sensitivity, as well as the evolutionary implications of this relationship, will also be discussed.

A – 21
NEURAL SYSTEMS UNDERLYING YOUTH IRRITABILITY: INVESTIGATING DISRUPTED EMOTIONAL RESPONSIVENESS AS A RISK FACTOR
Kathleen I. Crum – Boys Town National Research Hospital; Karina S. Blair – Boys Town National Research Hospital & University of Nebraska Medical Center; Joseph Aloi – Boys Town National Research Hospital & University of Nebraska Medical Center; Harma Meffert – Boys Town National Research Hospital; Stuart White – Boys Town National Research Hospital; Patrick M. Taylor – Boys Town National Research Hospital; Abraham Killanin – Boys Town National Research Hospital; Kathryn O. Adams – Boys Town National Research Hospital; Kayla H. Pope – Boys Town National Research Hospital & Creighton University; James R. Blair – Boys Town National Research Hospital & University of Nebraska Medical Center
Increased levels of irritability are a feature of a number of developmental disorders, and are associated with considerable impairment and poor long-term prognoses. Indeed, research has linked irritability to affective, anxiety, and behavior disorders, as well as adverse educational, occupational, and mental health outcomes into adulthood. Overall, the literature suggests that irritability represents a potential marker of underlying dysregulation related to psychopathology. However, an understanding of the neural systems that result, when compromised, in increased irritability remains in its infancy. It could be suggested that increased irritability might be related to increased threat responsiveness and/or deficient emotional regulation. To test this hypothesis, youth in a residential care facility and the surrounding community (N=122) performed the affective Stroop task during fMRI. This task allows both responsiveness to threat and positive emotional distracters to be indexed, and the functional integrity of systems engaged in top down attentional control that can automatically reduce emotional responsiveness. Results indicated that level of irritability, as indexed by the Affective Reactivity Index, was not related to the functional integrity of regions implicated in top down attentional control. However, increased levels of irritability were associated with disrupted responding within both the left amygdala and extensive regions of rostral medial frontal cortex, particularly on task trials involving threatening distracters. In conclusion, these data suggest that increased emotional responsiveness, irrespective of top down attention emotional regulation integrity, is a risk factor for increased levels of irritability.

A – 22
THE IMPACT OF UNCERTAIN THREAT ON AFFECTIVE BIAS: INDIVIDUAL DIFFERENCES IN RESPONSE TO AMBIGUITY
F. Caroline Davis – US Army Natick Soldier Research, Development & Engineering Center; Julie Cantelon – Tufts University; Zachary Haga – Tufts University; Caroline Mahoney – US Army Natick Soldier Research, Development & Engineering Center; Holly Taylor – Tufts University; Maital Neta – University of Nebraska-Lincoln
Individuals who operate under highly stressful conditions (e.g., military personnel and first responders) are often faced with the challenge of quickly interpreting ambiguous information in uncertain and potentially threatening environments. When faced with ambiguity, it is likely adaptive to view potentially dangerous stimuli as threatening until contextual information proves otherwise. One laboratory-based paradigm that can be used to simulate uncertain threat is known as threat-of-shock (TOS), where participants are told that they might receive mild but unpredictable electric shocks while performing an unrelated task. The uncertainty associated with this potential threat induces a state of emotional arousal that is not overwhelmingly stressful, but has widespread – both adaptive and maladaptive – effects on cognitive and affective function. For example, TOS is thought to enhance aversive processing and abolish positivity bias. Importantly, in certain situations (e.g., when walking home alone at night), this anxiety can promote an adaptive state of improved vigilance and defense mobilization. In the present study, we used TOS to examine the effects of uncertain threat on valence bias, or the tendency to interpret ambiguous social cues as positive or negative. As predicted, we found that heightened emotional arousal elicited by TOS was associated with an increased tendency to interpret ambiguous cues negatively. Such negative interpretations are likely adaptive in situations where threat-detection is critical for survival, and should override an individual's tendency to interpret ambiguity positively in safe contexts.

A – 23

HELPING US VS. THEM: NEURAL CORRELATES OF COSTLY HELPING TO INGROUPS AND OUTGROUPS IN YOUTH

Kathy T. Do – University of North Carolina, Chapel Hill; Eva H. Telzer – University of North Carolina, Chapel Hill
Intergroup biases can impact who individuals choose to help, resulting in a greater bias toward helping ingroups over outgroups. Brain networks involved in empathy, social cognition, and affective processing underlie intergroup helping behaviors in adults. However, little is known about the brain mechanisms of intergroup helping among youth, which could help reduce biases before they escalate in adulthood. We examined the neural mechanisms underlying prosocial decisions to ingroups and outgroups in a sample of children and adolescents (N=51, 8-16 years). Youth were assigned to a novel ingroup team and introduced to members of their team and an outgroup team. During an fMRI scan, participants made decisions to (1) keep or share points with ingroup or outgroup peers at a cost to themselves (costly donations; cost of sharing ranged from 1-5 points) and (2) keep points when there was no cost to themselves or benefit to another (pure reward). Across age, participants made costly donations to help ingroups significantly more than outgroups. However, there was an Age x Points (i.e., cost of sharing) interaction: while younger children did not discriminate between point values when making costly donations to ingroups versus outgroups, older adolescents showed greater ingroup loyalty when making donations with higher personal costs (3-5 points). Interestingly, youth who exhibited greater insula, pSTS, and amygdala activity to outgroups showed less bias in their decisions to help outgroups. These results suggest that neural regions involved in social and affective processing may moderate the effect of intergroup biases on helping in youth.

A – 24

NEURAL CORRELATES OF DYSFUNCTIONAL FACIAL EMOTION PROCESSING IN SCHIZOPHRENIA: AN UPDATED META-ANALYSIS WITH META-REGRESSION

Debo Dong – Key Laboratory for NeuroInformation of Ministry of Education, High-Field Magnetic Resonance Brain Imaging Key Laboratory of Sichuan Province, Center for Information in Medicine, School of Life Science and Technology, University of Electronic Science and Technology of China; Yulin Wang – Vrije Universiteit & University of Gent; Xuebin Chang – Key Laboratory for NeuroInformation of Ministry of Education, High-Field Magnetic Resonance Brain Imaging Key Laboratory of Sichuan Province, Center for Information in Medicine, School of Life Science and Technology, University of Electronic Science and Technology of China; Cheng Luo Key – Laboratory for NeuroInformation of Ministry of Education, High-Field Magnetic Resonance Brain Imaging Key Laboratory of Sichuan Province, Center for Information in Medicine, School of Life Science and Technology, University of Electronic Science and Technology of China; Dezhong Yao – Key Laboratory for NeuroInformation of Ministry of Education, High-Field Magnetic Resonance Brain Imaging Key Laboratory of Sichuan Province, Center for Information in Medicine, School of Life Science and Technology, University of Electronic Science and Technology of China
Impairment of facial emotion perception is a core feature in schizophrenia. Despite an increasing number of published functional neuroimaging studies related to this issue, the neural mechanism of impaired facial perception still remains unclear, not to mention the heterogeneity in previous published findings. To further elucidate neural underpinnings of this deficit, we conducted an update whole brain meta-analysis to identify the consistent and reliable abnormalities of neural patterns in schizophrenia using seed-based d mapping. Importantly, voxel wise meta-regression analyses were conducted to examine the influences of demographic (age, gender) and clinical variables (severity of symptoms, medication) on observed findings. Through a comprehensive literature search, 31 studies were included in the present meta-analysis based on our inclusion criterial. During facial emotion perception, we reliably found schizophrenia patients recruited less activation in visual cortex, including fusiform gyrus, calcarine fissure and inferior occipital gyrus; also less activation in subcortical structures, including amygdala, superior temporal gyrus, inferior frontal gyrus, insula, para-/hippocampus, thalamus, cerebellum, which are brain regions ranging across dorsal and ventral emotion systems. Importantly, the observed neural abnormalities from our data-analysis in facial emotion perception were influenced by age, gender, scores of psychiatric symptoms and the dosage of chlorpromazine equivalent. Our results highlighted a marked under-recruitment of the dorsal and ventral limbic emotion systems may underlie the impairment of facial emotion perception in Schizophrenia and future studies exploring the interacting between these two emotional sub-units should take the effect of age, gender, severity of symptoms, and dosage of medication into account.

A – 25

POSITIVE VALENCE BIAS IN RESPONSE TO AMBIGUOUS FACIAL EXPRESSIONS IS ASSOCIATED WITH EMOTION REGULATION ABILITY

Christopher R. Doxey – University of Nebraska–Lincoln; Tien T. Tong – University of Nebraska–Lincoln; Daniel J. Henley – University of Nebraska–Lincoln; Maital Neta University of Nebraska–Lincoln
Recent studies have examined individual differences in response to ambiguous facial expressions. In particular, although some expressions are consistently rated as positive (happy) or negative (angry), surprised expressions are

rated as positive by some and negative by others. This difference in ratings is one's valence bias. We have previously shown that the negative response to surprised faces is more automatic, and we have hypothesized that positive ratings require more regulation. Here, we tested this hypothesis by examining individual differences in valence bias in context of an explicit emotion regulation task. Participants rated surprised, angry, and happy expressions, and were divided into groups (those with a positive or negative bias) based on a median split of ratings of surprise. In the MRI, participants passively viewed surprised faces, and performed a separate regulation task, in which they viewed negative scenes and were asked, during some blocks, to maintain their natural response and, during other blocks, to reinterpret the images as less negative. The difference in negative ratings (maintain – reinterpret) was used as emotional regulation score for each participant. We found a significant positive correlation between vmPFC and amygdala during surprise, but only for individuals with a positive valence bias. Further, a region of vlPFC, which showed reinterpret > maintain activity, also showed greater activity during surprise in individuals with positive > negative bias, and this activity was positively correlated with emotional regulation score. Taken together, this suggests that a more positive valence bias is associated with greater explicit emotion regulation.

A – 26
INTRANASAL OXYTOCIN AFFECTS PERCEPTIONS OF FACIAL TRUSTWORTHINESS IN YOUNG AND OLDER ADULTS

Natalie Ebner – University of Florida; Tian Lin – University of Florida; Marilyn Horta – University of Florida; Adam Woods – University of Florida; Ronald Cohen – University of Florida; David Feifel – University of California, San Diego; Håkan Fischer – University of Stockholm

Perceptions of trustworthiness in others influence social decisions and impact the course of social interactions. Growing evidence suggests that intranasal administration of the neuropeptide oxytocin increases perceived trustworthiness of unfamiliar faces. To date, prosocial effects of oxytocin have been mostly investigated in young male individuals and effects in aging are largely unknown. Recent evidence that older adults experience decreased sensitivity to cues of trustworthiness highlights the importance of examining potential benefits of intranasal oxytocin administration on perceptions of facial trustworthiness in older adults. Adopting a developmental, brain−behavior analytic approach, in the present fMRI study, 48 young and 50 older women and men evaluated the trustworthiness of young and older male and female unfamiliar faces, intermixed with scrambled images. Participants were randomly assigned to either self-administer 24 IUs intranasal oxytocin or a placebo about 50 minutes before engagement in the task. Oxytocin compared to placebo administration resulted in increased activity in midline structures (e.g., medial prefrontal cortex, anterior and posterior cingulate) and face processing regions (e.g., insula, fusiform gyrus) to cues of facial trustworthiness, while there was no treatment effect for scrambled images. Age-differential analysis suggested a posterior-to-anterior shift in brain activity with age following OT administration. Findings from this study provide further evidence for a role of oxytocin in perceptions of facial trustworthiness. Results will be discussed in the context of an emerging literature on oxytocin's age-modulatory role in social cognition, prosociality, and affective processing.

A – 27
SIMULTANEOUS FMRI TO INVESTIGATE THE BRAIN BASIS OF THE PATIENT-CLINICIAN RELATIONSHIP IN PAIN TREATMENT

Dan-Mikael Ellingsen – Massachusetts General Hospital, Harvard Medical School; Changjin Jung – Massachusetts General Hospital, Harvard Medical School; Jeungchan Lee – Massachusetts General Hospital, Harvard Medical School; Kylie Isenburg – Massachusetts General Hospital, Harvard Medical School; Jessica Gerber – Massachusetts General Hospital, Harvard Medical School; Ishtiaq Mawla – Massachusetts General Hospital, Harvard Medical School; Roberta Sclocco – Massachusetts General Hospital, Harvard Medical School; Robert Edwards – Brigham and Women's Hospital, Harvard Medical School; John Kelley – Massachusetts General Hospital, Harvard Medical School; Irving Kirsch – Beth Israel Deaconess Medical Center, Harvard Medical School

The patient-clinician relationship can modulate symptoms such as pain, but the brain basis for this is unknown. Here, we simultaneously record fMRI in patients and clinicians (hyperscanning), who interact via video transfer, during clinician-initiated treatment of the patient's pain. We hypothesized concordant activation of circuitry involved in social mirroring, such as ventrolateral Prefrontal Cortex (vlPFC) and anterior Insula (aINS) in both patients and clinicians during pain treatment. Eight healthy volunteers participated in this pilot experiment. Each participant was matched with another participant, and assumed roles of 'patient' and 'clinician' (4 'dyads'). The patient received a number of moderately painful cuff pressures to the left leg (15 s), while the clinician used a button box to control (real or sham) electroacupuncture stimulation to the patient's leg to treat the cuff pain. Using MRI-compatible cameras, the participants were enabled to communicate non-verbally throughout the scan. fMRI preprocessing included motion correction, skull stripping, and registration to MNI152. After single-subject GLM analysis, we conducted a group GLM (whole-brain cluster-correction for multiple comparisons) followed by a group conjunction analysis, between patients and clinicians, of the pain+treatment>rest contrast. Patients (receiving pain+treatment) showed activation of insula,

primary and secondary somatosensory areas, vlPFC and dorsolateral prefrontal cortex (dlPFC). Clinicians (observing pain+treating) showed activation in anterior insula, S1, S2, vlPFC, and primary and secondary visual areas. A conjunction analysis indicated concordant activation of vlPFC and anterior insula for both patients and clinicians. Building on this pilot setup, we plan to enroll chronic pain patients and acupuncturists as subjects.

A – 28
HIERARCHICAL BRAIN REPRESENTATIONS OF NATURALISTIC "SOCIAL CONGRUENCY" MENTALIZING
Felipe Fernandes Pegado – University of Leuven
In real-life we interact with the world in a multisensory way. Nevertheless, research in cognitive neuroscience typically focuses on one separate sensory system. Further, complex natural tasks (e.g., mentalizing) engage not only a single system (e.g., visual) but instead several neural systems. We developed a naturalisitic multisensory mentalizing task for social perception, by asking participants "what do you think most of people would answer" when judging the congruency between vocal emotional responses to visual scenes having emotional content. For example, trials with negative-valence scenes coupled with negative-valence vocalizations were typically judged congruent, whereas with positive vocalizations in this case were assigned as incongruent. We thus avoided the 'logical reasoning' approach of the classical false-believe tasks. Here instead a "thin-slice perception" of social appropriateness was used to target mentalizing 'at a glance'. The first results revealed: 1) low-level visual areas only cares about low-level visual features, even in this naturalisitic complex context. Interestingly, comparisons with V1 models revealed that 'real-life' models (from independent V1 data) outperformed theoretical ones, e.g., HMAX, deep learning (last layer). 2) Surprisingly, high-level visual areas spontaneously and strongly discriminate animate versus inanimate images, which was task-irrelevant. 3) Crucially, cross-modal valence congruency (i.e., social congruency) could be discriminated in medial prefrontal cortex and precuneus, confirming their roles for metalizing beyond logical reasoning. Finally, new acquiring data from autism population will shed new light in the controversial topic: at which level of the brain hierarchy their neural representations differ: at sensory level or only at high-level social cognition?

A – 29
OVERLAPPING AND DISTINCT NEURAL CORRELATES OF IMITATING AND OPPOSING FACIAL MOVEMENTS
Detre A. Godinez – University of Denver; Daniel S. Lumian – University of Denver; Tanisha Crosby-Attipoe – University of Denver; Ana M. Bedacarratz – University of Denver; Paree Zarolia – University of Denver; Kateri McRae – University of Denver
This study explored overlapping and distinct neural processes associated with two of our most commonly experienced social behaviors – imitation and opposition of facial expressions. Utilizing a novel, flexible goal-oriented task with 40 participants, imitation and opposition of facial expressions recruited overlapping activation in frontal parietal regions, as well as premotor, superior temporal and anterior intraparietal regions. Opposing compared to imitating more strongly engaged the superior frontal gyrus, superior temporal sulcus, and the anterior intraparietal sulcus for both emotional and averted eye gaze photos. Stimulus type and instruction interacted such that greater activation was observed in the dorsal anterior cingulate for oppose compared to imitate for the eye gaze condition, with no differences for the emotional expression condition. In contrast for emotional expressions, opposing recruited the frontal pole and cuneus greater than imitating. Overlapping activation when imitating and opposing as well as increased activation for opposing, suggested that despite having very different goals, imitating and opposing may recruit similar neural networks previously associated with mirroring and goal maintenance. However, the increased conflict associated with opposing appears to drive differences in cingulate and frontal regions based on what type of movement is being opposed (eye gaze or emotional expression).

A – 30
ADOLESCENTS' EMPATHIC REACTIONS TO ABSTRACT SOCIAL STORIES ARE ASSOCIATED WITH NEURAL CONNECTIVITY AT REST, AND PREDICT SUBSEQUENT LONG-TERM MEMORY FOR STORIES
Rebecca JM Gotlieb – University of Southern California; Xiao-Fei Yang – University of Southern California; Hima Rajana – University of Southern California; Danielle Cremat – University of Southern California; Mary Helen Immordino-Yang – University of Southern California
Empathizing involves imagining others' internal cognitive or affective states. Empathizing is more complex in the context of abstract, values-oriented social situations rather than concrete social circumstances. We hypothesized that adolescents' proclivities toward empathizing would be associated with resting connectivity in the default mode network (DMN), as the DMN is known to support imagination and feeling abstract social emotions. Since the DMN is also involved in remembering, we further hypothesized that empathizing would promote long-term memory. As such, we asked 53 adolescents (mean age 15.99 years; 27 female) to describe their feelings to 10 abstract and 10 concrete social stories in an interview. Resting-state DMN connectivity was identified using independent component analysis from a 7-minute resting state scan. Two years later participants reported their memories for the stories. For abstract

social stories, controlling for age and verbal IQ, the extent to which adolescents expressed empathy was associated with DMN connectivity to the ventromedial prefrontal cortex and with DMN connectivity to the right anterior insula (thresholded at p < 0.05 corrected for multiple comparisons). Empathy also predicted memory for the stories two years later $F_{(1, 47)}= 6.40, P=0.02$. No such relationships were found for concrete social stories. Thus, adolescents may vary in neural and psychological readiness to deeply empathize, and greater ability to empathize may facilitate memory. Preliminary analyses suggest DMN connectivity may mediate the relationship between empathy for abstract stories and memory—a hypothesis our future research will investigate. Overall, current findings support educators' beliefs that social-emotional engagement facilitates learning.

A – 31
CHALLENGING THE RACE CONCEPT DECREASES BRAIN RESPONSES TO RACE

Shihui Han – Peking University; Na Du – Peking University

Race is a major social category of humans on the basis of external attributes such as skin tone and facial/body shapes, which strongly influences our emotion, attitude and behavior toward others. Brain imaging studies have shown increasing findings of brain activities that discriminate between same-race and other-face individuals, suggesting the presence of embedded neural coding of race in the human brain. However, it has been argued that race is a sociocultural construction obtained during development and this assertion allows us to predict that challenging the concept of race is able to reduce the differential neural responses to same-race and other-race individuals. We tested this hypothesis by asking Chinese healthy adults to read priming essays that challenge the concept of human race. After the priming procedure event-related brain potentials to Asian and Caucasian faces were recorded and implicit attitudes toward same-face and other-race faces were assessed using the Implicit Attitude Test. We found that, relative to participants who read essays about animal subspecies, participants whose human race concept was challenged tended to show decreased implicit positive attitudes toward same-race (vs. other-race) faces. Moreover, challenging the concept of race significantly decreased neural responses over the frontal (N1/P2) and lateral occipital (N170) regions that discriminated same-race and other-race faces in the control participants. Our findings indicate that, rather than being intrinsically rooted in the human brain, neural coding of race is flexible and can be altered by social influences.

A – 32
ATYPICAL BODILY MAPS OF EMOTIONS IN AUTISM

Laura Harrison – University of Southern California; Lynn Paul – California Institute of Technology; Lauri Nummenmaa – University of Turku; Ralph Adolphs – California Institute of Technology

People consistently report specific bodily sensations associated with different emotions – for example, a weakening of the limbs and growing heaviness in the chest during sadness, revealed through self-report emotional body maps drawn on a computer (Nummenmaa, et al., PNAS, 2014). These maps are consistent with the hypothesis that interpretation of bodily sensations gives rise to emotional experience, motivating the prediction that people who have difficulties judging their own bodily states, such as those with alexithymia or autism, might also be impaired in reporting where emotions are expressed in the body. We collected emotional body maps; empathy scores (Interpersonal Reactivity Index, IRI); and alexithymia scores (Toronto Alexithymia Scale, TAS) in 15 adults with ASD and 15 matched controls. In our analyses, we (1) tested for group differences in alexithymia and empathy scores; (2) compared the richness (total number of colored pixels) and typicality (relative to Nummenmaa's (2014) original normative sample of 302 subjects) of emotional body maps across groups; and (3) correlated these metrics with individuals' TAS and IRI scores. Results showed that (1) TAS-total scores were higher (d =1.37) and IRI-empathic concern scores were lower (d=1.06) in the ASD group; (2) ASD subjects colored fewer pixels in the torso (d=0.82) across basic emotions and had less typical body maps (d=0.73); and (3) across individuals, typicality positively correlated (rho=0.50) with IRI-fantasy scores. Surprisingly, TAS-total scores positively correlated (rho=0.51) with typicality in the ASD group. Future work will explore differences in the focus (action vs. feeling) of verbal reports of emotion.

A – 33
EFFECTS OF AGE AND OXYTOCIN ON FUNCTIONAL CONNECTIVITY OF FUSIFORM CORTEX DURING DYNAMIC EMOTION IDENTIFICATION

Marilyn Horta – University of Florida; Tian Lin – University of Florida; Maryam Ziaei – University of Queensland; Adam Soliman – University of Florida; Eric S. Porges – University of Florida; David Feifel – University of California, San Diego; Daniela Oliveira – University of Florida; Håkan Fischer – Stockholm University; Ronald A. Cohen – University of Florida; Natalie C. Ebner – University of Florida

Accurately reading the emotions of others is a crucial skill for maintaining healthy relationships across the lifespan. However, aging is associated with increased difficulty in emotion identification. The underlying neural mechanisms of this effect are largely unknown but could be associated with age-related change in network communication for face

processing, namely within the fusiform cortex (FC). Growing evidence also suggests that oxytocin may modulate the ability to identify facial emotions, though understudied in aging. Forty-seven young and 50 older participants administered intranasal oxytocin (24 IU) or placebo in a between-subject, randomized, double-blind procedure prior to engaging in a fMRI task in which participants viewed neutral faces that morphed into emotional expressions (happy, sad, angry, fearful). Participants indicated which emotion was displayed. Older compared to young participants were slower and less accurate in identifying these dynamic emotions. These effects were pronounced for negative emotions, but did not vary by treatment. Functional connectivity analyses showed that older participants, compared to young, had decreased connectivity of the FC with the hippocampus and amygdala across all emotions. Additionally, participants in the oxytocin group, compared to the placebo group, showed decreased connectivity of the FC with the cingulate gyrus for angry and fearful faces. Also, older participants in the oxytocin group, compared to older participants in the placebo group, showed decreased connectivity of the FC and frontal pole for angry faces. These findings suggest that age differences persist for dynamic emotion identification and that oxytocin affects FC connectivity during processing of facial emotions across age.

A – 34
A DOMAIN-SPECIFIC RISK-TAKING SCALE FOR ADOLESCENTS (ADOLESCENT DOSPERT)

Brian Huh – Columbia University; Lilly Kofler – Columbia University; Bernd Figner – Radboud University; Anna van Duijvenvoorde – Leiden University; Eveline Crone – Leiden University; Elke U. Weber – Princeton University
Risk-taking in adults is known to fluctuate across domains, as documented by the Domain Specific Risk-Taking (DOSPERT) scale. However, much of the risk-taking literature lacks the psychometric tools necessary for assessing risk preference and attitudes in developing populations. In this study, we aim to establish a version of the DOSPERT scale for adolescents in order to understand risk behavior as well as elicit judgments of perceived riskiness and expected benefits of the risky behaviors. Additionally, a measure of risk-taking for adolescents will allow developmental researchers to track risky behaviors over the lifespan, using Adolescent DOSPERT for ages 12 to 21 and Adult DOSPERT for all ages thereafter. Using a sample of 488 participants, we find in a confirmatory factory analysis that financial, recreational, and social domains load cleanly, while there is more overlap between the health and safety and ethical domains. In addition, Chronbach's alpha for the five subscales were between .69 and .88, suggesting strong internal validity within predicted domains. Further, analysis of test-retest data shows high positive correlations between risk-taking, risk perception, and expected benefit response scales across all domains, suggesting high reliability and consistency. We also explore construct validity with outcome variables as sensation seeking and alcohol consumption.

A – 35
PARASYMPATHETIC TONE, PTSD SYMPTOM PROFILES, AND PHASIC HEART RATE DURING THREAT ANTICIPATION

Theodore P. Imhoff-Smith – University of Wisconsin-Madison; Dan W. Grupe – University of Wisconsin-Madison; Richard J. Davidson – University of Wisconsin-Madison
Heart rate is a known physiological indicator of psychological health. While individual differences in heart rate responses to affective stimuli have been thoroughly investigated, less is known about heart rate during threat anticipation, particularly in relation to psychopathology. In this study, we examined phasic heart rate changes during threat anticipation in relation to individual symptom profiles of posttraumatic stress disorder (PTSD). Fifty-seven combat-exposed veterans with a spectrum of PTSD symptoms, as determined using the Clinician Administered PTSD Scale, completed an instructed threat anticipation task with different cues indicating threat of mild electric shock versus safety from shock. Functional MRI, respiration, and heart rate data were concurrently collected. We extracted peak heart rate changes from baseline for three distinct epochs, identified from the group-averaged time course and prior work (Bradley et al., 2001). We also assessed respiratory sinus arrhythmia (RSA) during a separate resting scan. Similar to previous research using visual stimuli, participants exhibited a characteristic triphasic heart rate response during threat anticipation. Increased re-experiencing symptoms were associated with a faster acceleratory response following threat cues ($p < 0.05$). Greater resting RSA was associated with a delay in this acceleratory response ($p < 0.1$) and a stronger acceleratory response to threat ($p = 0.01$). Collectively, these data link the timing and magnitude of heart rate acceleration with re-experiencing symptoms of PTSD and higher parasympathetic tone. Findings suggest that phasic heart rate during threat anticipation may be an indicator of psychological health in combat-exposed veterans, and provide a foundation for further study.

A – 36
EMOTIONAL CONFLICT ADAPTATION AND THE SEPARATION BETWEEN IMPLICIT AND EXPLICIT EMOTION REGULATION

Itamar Jalon – Tel Aviv University & Sourasky Medical Center; Alon Erdman – Sourasky Medical Center; Moran Artzi – Sourasky Medical Center & Tel Aviv University; Jackob N. Keynan – Sourasky Medical Center & Tel Aviv University;

Avihay Cohen – Sourasky Medical Center; Rany Abend – Sourasky Medical Center & Tel Aviv University; Eiran V. Harel – Beer Yaakov Mental Health Center; Talma Hendler – Sourasky Medical Center & Tel Aviv University
Deficient Emotion Regulation (ER) is associated with a broad range of psychopathologies, and is often divided into implicit and explicit processes. Emotional conflict adaptation (ECA), an elementary process of ER, refers to the tendency to engage top-down processes to anticipated emotional interference. ECA has been shown to involve vmPFC activation and amygdala deactivation, and to be disrupted in depression and anxiety. Our goal was to delineate this psychological process, and check whether it is a purely implicit process, by looking at connectivity between regions often implicated in implicit and explicit ER and at trait alexithymia, the inability to perceive and describe experienced emotion, which reflects a deficiency in explicit ER capacity. 45 participants completed an emotional stroop task while undergoing fMRI. The task used can differentiate anticipated and non-anticipated conflicts; ECA is inversely indexed by the difference in RT between such trials, with smaller values (high ECA) reflecting greater implicit emotion regulation. RT was longer for non-anticipated vs. anticipated conflicts. Greater ECA correlated with higher BOLD activation in vmPFC, and increased effective connectivity between vmPFC and vlPFC, a typical explicit ER region. Low ECA was related with higher alexithymia in both the scanned group, and another sample (N=120) completing the task outside the scanner. The results of this study demonstrate that ECA involved activation in regions related to both implicit and explicit ER, suggesting that in the context of the stroop task, these are not independent processes.

A – 37
FUNCTIONAL NETWORK AND SPATIOTEMPORAL DYNAMICS DURING REAPPRAISAL AND SUPPRESSION: GRAPH THEORY AND DYNAMIC FUNCTIONAL CONNECTIVITY ANALYSIS
Suhnyoung Jun – Yonsei University; Seung-Koo Lee – Yonsei University; Sanghoon Han – Yonsei University
Reappraisal and suppression are two most commonly adopted emotion regulation strategies. This study examined (1) the large-scale functional networks using graph theory-based approach to quantitate the topological characteristics of networks and investigate the functional segregation and integration of network modules, and (2) dynamic functional connectivity (FC) using sliding window correlation analysis to investigate temporally evolving spatial connectivity that may occur over successive and overlapping short periods of a scan. Network analysis suggested that reappraisal has the module that cognitively control the interpretation of the stimuli and regulate the emotional response. The functional network of suppression suggested that suppression requires a module that inhibits emotional response and monitors behavioral outcome of the emotional response (e.g., facial expression). For dynamic FC analysis, we focused on two distinctive features: interregional FCs with prolonged stability which may build skeletal structure of the dynamic network and those with inconstant fluctuation which work as modulators of the network. The dynamic reappraisal network showed that intra-hemispheric prefrontal connections have the most stable connectivity indicating dominant and constant role of cognitive control. The dynamic suppression network showed multiple interhemispheric connections prominently between the subregions of cingulate gyrus, indicating the constant awareness of one's own facial expression for suppression. Our study not only help us understand the systematic relations between the individual nodes during the use of specific emotion regulation strategy, but also propose a novel way to interpret the meaning of interregional FCs that have distinct temporal features, i.e., prolonged stability and inconstant fluctuation.

A – 38
IRRITABILITY AND AMYGDALA-VENTRAL PREFRONTAL CORTEX CONNECTIVITY IN CHILDREN WITH HIGH FUNCTIONING AUTISM SPECTRUM DISORDER
Cindy Kiefer –San Diego State University; Maria Kryza-Lacombe – San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology; Katrina Cole – San Diego State University; Catherine Lord – University of Michigan; Christopher S. Monk – University of Michigan; Jillian Lee Wiggins – San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology
Background: Irritability is a common, highly impairing symptom among youth with high functioning autism spectrum disorder (HF-ASD) and predicts long-term adverse outcomes. Impaired processing of emotional faces, found in both autism and irritability, may lead to inappropriate social responses. Indeed, amygdala hyperactivation elicited by emotional faces has been found in autism and irritability in other diagnoses (i.e., bipolar disorder, disruptive mood dysregulation disorder). Yet, little is known about the neural correlates of irritability in HF-ASD, nor how other brain regions within amygdala networks may relate to irritability within HF-ASD. To characterize neural correlates of irritability in HF-ASD, this study investigated amygdala functional connectivity. Methods: Children with HF-ASD (N=33, aged 8-19 years) performed an implicit face emotion processing task during fMRI acquisition, in which participants identified the gender of faces with happy, sad, fearful, and neutral expressions. Whole-brain amygdala functional connectivity across emotions was calculated for each individual and correlated with an irritability-like measure, the Aggressive Behavior subscale of the Child Behavior Checklist (CBCL), which includes items (e.g., "temper tantrums or hot temper") shown to comprise an irritability factor conceptualized as low threshold for anger.

Results: Whole-brain analyses revealed alterations in right amygdala to ventral prefrontal cortex functional connectivity, which correlated with the irritability-like subscale of the CBCL. Worse irritability-like symptoms related to greater amygdala-prefrontal cortex connectivity (xyz=34,62,-2, t31=3.12, p<.05, k=80). Conclusions: Results suggest that the neural substrates of irritability in HF-ASD include amygdala-prefrontal cortex dysfunction, providing evidence that faces may elicit emotion dysregulation in autism, which may lead to irritability.

A – 39
VENTRAL PREFRONTAL CORTEX LESION IS ASSOCIATED WITH ABNORMAL APPRAISAL AND REGULATION OF EVERYDAY EMOTIONAL EXPERIENCE – AN EXPERIENCE SAMPLING STUDY

Joseph Kim – University of Utah; Laura Green – Vanderbilt University; Scott Perkins – Vanderbilt University; David Zald – Vanderbilt University

Previous neuroimaging studies have suggested that the ventral prefrontal cortex (PFC) is involved in emotion regulation. However, evidence demonstrating the ventral PFC's direct influence on emotion regulation is lacking. Furthermore, it is unclear whether the hypothesized role of the ventral PFC in emotion regulation generalizes to naturalistic situations where uninstructed, spontaneous engagement of regulation is common. In the current study, we attempted to address these gaps by utilizing the experience-sampling method in a sample of patients with focal ventral PFC lesions. Specifically, we investigated whether the ventral PFC lesion sample (n=10) differed from controls (n=10) in: (i) the magnitude of positive and negative affect experienced, (ii) the fluctuation of emotional experience as measured by epoch to epoch change in affect magnitude, and (iii) the regulation strategy preference and frequency, as well as perceived effectiveness of regulation. Study results indicated that individuals with damage to the ventral PFC region experience decreased negative affect compared to controls but comparatively greater fluctuation in epoch to epoch changes in negative affect. Moreover, while controls who endorse greater magnitude of negative affect intensity also indicated greater utilization of a diverse set of regulation strategies, this was not the case in individuals with ventral PFC damage, who showed only higher utilization of distraction as a regulatory strategy. Findings from this study suggest that intact ventral PFC function plays a role in the maintenance of affect stability as well as the adaptive utilization of strategies important in the voluntary control of affective experience.

A – 40
LONG-TERM MEDITATORS SHOW INCREASED RSFMRI FUNCTIONAL CONNECTIVITY IN EMOTION PROCESSING NETWORKS

Tammi RA Kral – University of Wisconsin-Madison; Jeanette A. Mumford – University of Wisconsin-Madison; Melissa A. Rosenkranz – University of Wisconsin-Madison; Antoine Lutz – Lyon University; Richard J. Davidson – University of Wisconsin-Madison

One of the primary goals of training in mindfulness meditation is to change the way we approach our emotions. Such training can improve outcomes for individuals suffering from anxiety and depression, however the mechanisms underlying these changes are largely unknown. We investigated the impact of long-term mindfulness (Vipassana) meditation practice on resting-state functional connectivity (RS-fc) in networks related to emotion processing and regulation. We compared amygdala and posterior cingulate (PC) RS-fc between 23 long-term meditators (LTMs) with a lifetime of 3928 hours of practice on average (mean age(SD)= 49.9(11.5) years, 12 female) with 90 meditation-naïve participants (MNPs; mean age(SD)= 48.4(11.0) years, 58 female). The amygdala seed was defined independently based on a localizer task involving viewing negative versus neutral pictures. We focused on the right amygdala since LTMs and MNPs had differential amygdala activation to affective pictures specifically on the right. We compared right amygdala RS-fc within dorsal lateral and ventral medial prefrontal cortex masks (DLPFC and VMPFC, respectively) as these regions have been implicated in down-regulating amygdala activation. LTMs had greater amygdala-DLPFC RS-fc than MNPs (p<0.05, corrected), however there was no group difference within the VMPFC. Whole-brain analysis revealed that LTMs had greater right amygdala RS-fc with superior temporal sulcus and right temporal parietal junction than MNPs (p<0.05, corrected). Finally, we examined PC-DLPFC connectivity, which was reported to change with short-term mindfulness training and reflects interactions between executive control and default mode networks. We found that LTMs had greater PC-DLPFC RS-sfc than MNPs (t(109)=-2.33, p=0.022), providing a conceptual replication.

A – 41
REWARD AND PUNISHMENT MOTIVATION ARE ASSOCIATED WITH DISTINCT AND SHARED NEURAL ACTIVATIONS WHEN MOTIVATING THE SAME BEHAVIOR

Jessica I. Lake – University of California, Los Angeles; Zachary P. Infantolino – Stony Brook University; Jeffrey M. Spielberg – University of Delaware; Laura D. Crocker – Veterans Affairs San Diego Healthcare System; Cindy, M. Yee – University of California, Los Angeles; Wendy Heller – University of Illinois–Urbana; Gregory A. Miller – University of California, Los Angeles

Motivational processes supporting the attainment of reward and avoidance of punishment typically have been studied

separately or have relied on paradigms in which reward and punishment motivate different, often opposing, behaviors or choices. Yet possible rewards and punishments are often faced simultaneously and can motivate the same behaviors. Preparation of different responses may confound neural representations of reward and punishment motivation. Thus, this study sought to identify similarities and differences in how the brain responds to these disparate motivational processes when they motivate the same behaviors. Participants completed a modified monetary incentive delay task in which they were required to make a speeded button press after the presentation of a target. Cues prior to the target indicated whether a monetary reward and/or a monetary loss could be expected if the participant did or did not respond fast enough to the target. Participants showed greater neural activation during the cue period in bilateral posterior cingulate and right orbitofrontal cortex when anticipating possible punishment than when anticipating possible reward, suggesting that, even when reward and punishment motivate the same overt behaviors, neural processes associated with these motivational processes still differ. Nevertheless, conjunction analyses for possible punishment and possible reward cues revealed overlapping patterns of neural activation in bilateral dorsal anterior cingulate, left putamen, and left insula, consistent with common neural mechanisms. These findings support the operation of shared and distinct neural mechanisms of reward and punishment motivation even when such motivational processes do not demand unique response preparations.

A – 42
ASSOCIATIONS BETWEEN OXTR METHYLATION AND ATTACHMENT ACROSS ADULTHOOD

Tian Lin – University of Florida; Melis Muradoglu – University of Florida; Devon Weir – University of Florida; Travis Lillard – University of Virginia; Sue Carter – Kinsey Institute, Indiana University; Ronald A. Cohen – University of Florida; Natalie C. Ebner – University of Florida

The neuropeptide oxytocin (OT) has been implicated in a wide range of affiliative processes. OT exerts its functions via oxytocin receptors, which are encoded by the oxytocin receptor gene (OXTR). Epigenetic modification of OXTR through the process of DNA methylation has been associated with individual differences in behavioral phenotypes. Specifically, lower levels of OXTR methylation have been linked to enhanced social and affective functioning. However, research on epigenetic mechanisms of OXTR is scarce in non-clinical populations and even less is known about changes across adulthood. The present study assessed OXTR methylation levels at site -934 (hg38, chr3:8,769,121) in 22 young (20-31 years, M = 23.6) and 34 older (63-80 years, M = 71.4) participants. Lower levels of OXTR methylation were associated with less attachment anxiety but higher attachment avoidance. These effects of OXTR methylation on self-reported adult attachment were more pronounced in young than older participants and were not mediated by plasma OT levels. These findings suggest that epigenetic properties of OXTR are related to adult attachment, with variations across adulthood.

A – 43
NEURAL MECHANISMS OF OWNERSHIP

Patricia L. Lockwood – University of Oxford; Marco K. Wittmann – University of Oxford; Matthew A. J. Apps – University of Oxford; Glyn Humphreys – University of Oxford; Matthew Rushworth – University of Oxford

How do we learn what objects in the world are "mine" and how do we learn what belongs to other people? Much of our social lives require us to know what objects belong to whom. Multiple lines of evidence from social, language, perceptual and memory domains have suggested that processing of information related to ourselves is facilitated, such that it is better recalled and processed more rapidly than information related to other people. However, how these biased associations are formed and the computational processes that underpin them are still poorly understood. During fMRI, participants performed an associative learning task in which they were required to learn which pictures belonged to themselves, their best friend or to a stranger. This allowed us to parametrically vary the effects of interpersonal distance on ownership. After, participants rated how much they liked each picture. We found evidence for a self-bias at multiple levels of behaviour. Participants liked pictures more that they have learnt belong to themselves than to others (endowment bias). Participants were more likely to say something belonged to themselves even with no prior information. Computational modelling of behavior showed that participants had a higher learning rate when learning which pictures belonged to themselves than to others. Neurally, ownership prediction errors (PEs) were commonly encoded in similar neural regions to reward PEs (ventral striatum/vmPFC). However, ownership PEs were modulated by interpersonal distance with learning about those at a high level of interpersonal distance also distinctly encoded in anterior cingulate gyrus and anterior insula.

A – 44
THE ROLE OF GDNF IN BIPOLAR DISORDER: A SYSTEMATIC LITERATURE REVIEW

Robmarie Lopez-Soto – Ponce Health Sciences University; Fabian Vazquez – Ponce Health Sciences University; Janice Monteiro – Ponce Health Sciences University; Jose Pons – Ponce Health Sciences University

Introduction: Bipolar Disorder (BD) is a neuroprogressive illness in which recurrent mood episodes provoke sustained neurotoxic states associated with demyelination. Glial Cell-Line Derived Neurotrophic Factor (GDNF) is known to

influence the development and survival of both glial cells and neurons (Tunca et al., 2014), particularly those within the dopaminergic system, which is compromised during mania. Assessing the role of GDNF in BD would further insight into the mechanisms that underlie manic switch and reward sensitivity in BD. Method: A search was conducted on EBSCOHost, PubMed and Google Scholar, using the terms "gdnf" AND "bdnf" AND "mania" OR "bipolar disorder". Selection was limited to peer-reviewed studies published in English or Spanish. Literature reviews, prospective studies, chapters and magazines were excluded. 196 articles were selected on the basis of relevance to the topic of GDNF levels in subjects with BD. Repeated results, studies that did not assess BD or which assessed GDNF levels in animal models were excluded. Seven studies were ultimately selected, assessed for methodology and reviewed for results. Results: 5/7 studies found significantly higher levels of serum GDNF during mania; one study found higher plasma levels of GDNF in euthymic subjects. Higher peripheral levels of GDNF were also found in subjects with early onset BD (<19 yrs.), and those with BD-II. While lithium appears to exert significant regulatory influence, dose and duration of treatment does not predict GDNF levels during euthymia. Conclusion: Increased GDNF levels during mania appear to reflect impaired glial function in BD and warrant further study.

A – 45
DYADIC REGULATION OF REST AND MEDITATION: AN EEG INVESTIGATION

Erin L. Maresh – University of Virginia; James A. Coan – University of Virginia
Many studies have sought to identify neural correlates of meditative states. Yet, while meditation is often practiced with others, few, if any, studies have investigated neural activity during meditation in a social context. We recruited 46 novice (<1 year) meditators and 67 meditation-naïve control participants to come to the lab in pairs. Participants were assigned to be either alone or in the same room together as they underwent 6 minutes of rest followed by 10 minutes of a breath-focused task while EEG was recorded using 14-channel Emotiv headsets. Alpha power and frontal alpha asymmetry scores were examined. Frontal and parietal-occipital alpha were greater for all participants during the breath-focused task compared to rest, but within rest, alpha was higher for participants who were together compared to alone. For participants who were together, meditators showed greater right frontal activity during rest but greater left frontal activity during the task, whereas controls showed greater left frontal activity during rest but greater right frontal activity during the task; no asymmetry differences between conditions were observed in participants who were alone. Further, across all participants, trait anxiety and rumination predicted greater left frontal activity at rest but greater right frontal activity during the breath-focused task, suggesting differential roles for alpha asymmetry depending on the task (e.g., anxious apprehension vs. positive approach). In sum, being with another person impacts the EEG correlates of both rest and a breath-focused task. The possible roles of social proximity, trait moderators, and neurophysiological measurement are discussed.

A – 46
SUBJECTIVE BELONGING, DEHUMANISATION, AND STRESS HORMONES IN ENCAMPED SYRIAN REFUGEES

Michael C. Niconchuk – University College London; Lasana T. Harris – University College London; Ana Guinote – University College London
This study interrogated the role of subjective group belonging as a possible moderator of a hypothesised relationship between powerlessness and victimhood, on the one hand, and aggression and dehumanisation, on the other, among male Syrian refugees living in a refugee camp on the Jordanian-Syrian border (N=41; ages 22-32). Furthermore, we assessed the relationship between refugees' stress hormone levels, specifically cortisol (n=36), and testosterone (n=32), and perceptions of belonging, reported aggression, and the dehumanisation of specific in- and out-groups relevant to their experience of forced displacement. We found a significant relationship between victimhood, powerlessness and components of aggression, but found no significant relationships between victimhood, powerlessness, and dehumanisation. Results also indicate that subjective belonging is associated with a higher sense of social power, as well as greater humanisation of certain sociocultural groups, though trait physical aggression may moderate the belonging-humanisation relationship. Results also suggest a neuroendocrine footprint of subjective belonging, and a link between testosterone and dehumanisation among refugees, that merits further investigation. The study has far-reaching implications for future research at the nexus of social neuroendocrinology, trauma and stress studies, and social cognition, as well as for individuals and institutions working in refugee relief and integration.

A – 47
MULTIDIMENSIONAL EMOTION CONCEPT REPRESENTATIONS DEVELOP FROM CHILDHOOD TO ADULTHOOD AND SCAFFOLD ON GENERAL VOCABULARY DEVELOPMENT

Erik C. Nook – Harvard University; Stephanie F. Sasse – Harvard University; Hilary K. Lambert – University of Washington; Katie A. McLaughlin – University of Washington; Leah H. Somerville – Harvard University
The impact of neural development on social and affective processes is a central focus of psychological research.

Although substantial evidence demonstrates that adults typically understand emotions as multidimensional—with valence (positive—negative) and arousal (activating—deactivating) as two primary dimensions—we know little about how this representation develops. Given prior work on the development of emotion perception, we hypothesized that (unlike adults) children primarily understand emotion concepts in terms of valence and learn to separate them based on arousal as they age. We tested this hypothesis and also investigated mechanisms that could underlie emotion concept development. Participants (N=203) aged 4 to 25 completed tasks assessing emotion concept representation in which they i) sorted emotion words into piles based on similarity and ii) rated the similarities of 10 emotion words. To investigate underlying mechanisms, we assessed participants' verbal ability and their capacity to perceive two dimensions simultaneously (rating similarities of circles that varied on two perceptual dimensions). Multidimensional scaling analyses revealed that emotion concept representation shifted across age. As hypothesized, focus on the valence dimension of emotions decreased with age, whereas focus on the arousal dimension increased with age. This shift was not explained by developments in the general ability to perceive two dimensions simultaneously. However, a mediation analysis demonstrated that increased verbal knowledge explained increases in arousal focus across development. These results reveal the dynamic pathways through which emotion understanding develops and suggest that complex emotion understanding scaffolds on expanding verbal knowledge across development.

A – 48
NEUROPHYSIOLOGICAL EVIDENCE FOR THE EFFECTS OF ENVIRONMENTAL ACHIEVEMENT GOALS ON FEEDBACK-BASED LEARNING IN A CHALLENGING GENERAL KNOWLEDGE TASK

Yuliya Ochakovskaya – The Graduate Center (CUNY); Jennifer Mangels – Baruch College (CUNY)
To motivate students toward academic success, instructors may instill classroom (environmental) achievement goals that emphasize either information mastery (mastery goals) or performing better than others (performance goals). Although environmental mastery goals have been associated with greater intrinsic motivation to learn, direct effects on learning outcomes are mixed, and the mechanisms by which these goals act are largely unexplored. We propose that environmental performance and mastery goals facilitate attention to goal-congruent information, which will be evidenced by enhancement of event-related potentials (ERPs) to performance and learning-relevant information, respectively. In the present study, participants generated responses to general knowledge questions under instructional framing that emphasized either performance or mastery goals. After each response, participants received accuracy feedback followed by learning feedback (correct answer). To measure the extent to which intrinsic interest in learning was moderated by goals, surprise retests were administered the day of and a week later. Emphasis on performance goals resulted in greater sustained attention (500-1000 ms) to positive compared to negative accuracy feedback, as indexed by the late positive potential (LPP). However, for learning feedback, emphasizing mastery goals led to a stronger relationship between memory-related activity and learning outcomes at frontal sites (500-1500ms). No goal-related differences emerged for memory-related activity at temporoparietal sites. Mastery goals were also associated with better error correction on both retests, suggesting that sustained frontal activity supported elaborative processing that strengthened question-answer associations. These results suggest that mastery goals support more sustained engagement with learning-relevant information, while performance goals increase sensitivity to accuracy feedback.

A – 49
COMPUTATIONAL ANALYSIS OF MORAL CHOICES BETWEEN RACIAL IN- AND OUTGROUP MEMBERS

Philip Pärnamets – Karolinska Institutet; Tove Henlser – Karolinska Institutet; Andreas Olsson – Karolinska Institutet
Assigning moral value to an action typically involves evaluating both the action and the agent committing the action. We have previously shown that evaluations of moral actions exhibit regularities in choice and response times that are explained using simple computational models of choice. Here, we extend this approach to investigate if the decision process underlying moral evaluations was altered when the agents belonged to a different (outgroup) as compared to the same (ingroup) race as the participants. We adopted a simple value-based decision-making task. Participants first rated a number of moral transgressions for blameworthiness. They then made forced choices between pairs of agents represented by outgroup and ingroup faces each paired with one of the previously rated moral transgressions. Participants were instructed to choose the agent they thought had behaved worst. We compared choices between two Same-group agents and two Different-group agents. We found that both choice and response-time patterns differed in the Different compared to the Same conditions. When the underlying valuations of the transgressions were the same, participants preferred to blame the ingroup member, but took longer time to do so compared to when blaming an outgroup member, suggesting that outgroup blame in these cases is the results of fast errors rather than biased processing. Indeed, results can be explained through shifts in both drift and threshold parameters of a drift-diffusion model. Our findings have implications for understanding the computational underpinning of moral decision-making, and for how social cognition affects moral cognition in the moment of choice.

A – 50
THE NEURAL BASIS OF EMPATHIC BLAME

Indrajeet Patil – Harvard University; Marta Calò – University of Trieste; Federico Fornasier – University of Trieste; Fiery Cushman – Harvard University; Giorgia Silani – University of Vienna

Mature moral judgments rely both on a perpetrator's intent to cause harm, and also on the actual harm caused—even when unintended. Much prior research asks how intent information is neurally represented, but little asks how even unintended harms influence judgment. We interrogate the psychological and neural basis of this process, focusing especially on the role of empathy for the victim of a harmful act. Using fMRI, we found that- (a) the 'empathy for pain' network was involved in encoding harmful outcomes and (b) integrating harmfulness information for different types of moral judgments, and (c) individual differences in the extent to which this network was active during integration of harmfulness information determined severity of moral judgments. Additionally, activity in the network was down-regulated for acceptability, but not blame, judgments for accidental harm condition, suggesting that these two types of moral evaluations are neurobiologically dissociable. These results support a model of "empathic blame", whereby the perceived suffering of a victim colors moral judgment of an accidental harmdoer.

A – 51
INTIMATE PARTNER VIOLENCE, ANXIETY, AND DEPRESSION IN UNIVERSITY STUDENTS: PRELIMINARY FINDINGS OF A CROSS-SECTIONAL STUDY

Arif Pendi – University of California, Irvine; Danny Lee – Virginia Commonwealth University; Alfonso J. Valdez – University of California, Irvine; Jose L. Aguilar – University of California, Riverside; Kate B. Wolitzky-Taylor – University of California, Los Angeles; Joshua Lee – University of California, Los Angeles; Kasim Pendi – University of California, Riverside; Safani David – University of California, Irvine

Introduction: Intimate partner violence has been known to lead to mental health consequences. Among university students, the link between intimate partner abuse and depressive or anxiety disorders remains tenuous. Given the large burden of depression and anxiety in university students, the relationship between intimate partner violence and these illnesses has significant implications for preventative and screening efforts. Methods: A link to an anonymous online survey was disseminated to professors to forward to their students at a large university in the United States. The instrument consisted of a socio-demographic questionnaire, HITS Domestic Violence Screening Tool, Generalized Anxiety Scale 7 (GAS-7), and Patient Health Questionnaire 9 (PHQ-9). Responses were considered positive or negative for intimate partner violence based on score on HITS. The aforementioned groups were then compared in terms of scores on the GAS-7 and PHQ-9 scales for generalized anxiety and depression, respectively. Results: Preliminary findings indicate that of 396 respondents, 18 screened positive for intimate partner violence. This group exhibited more anxiety (10.83±5.711 versus 6.23±5.355; p=0.003) and depression (12.06±6.384 versus 7.34±6.266; p=0.007) compared to respondents that screened negative for intimate partner violence. Conclusions: Intimate partner violence was significantly associated with both generalized anxiety and depression in a sample of American university students. These preliminary results underscore a need to potentially screen for anxiety and depression in students that have experienced intimate partner abuse.

A – 52
EFFECTS OF PREFRONTAL CORTEX DAMAGE ON EMOTION UNDERSTANDING: EEG AND BEHAVIORAL EVIDENCE

Anat Perry – University of California, Berkeley; Samantha Saunders – University of California, Berkeley; Jennifer Stiso – University of California, Berkeley; Callum Dewar – University of California, Berkeley; Jamie Lubell – Universitetet i Oslo; Torstein Meling – Oslo Universitetssykehus; Tor Endestad – Oslo University Hospital; Anne-Kristin Sobakk – Universitetet i Oslo, Universitetssykehus, Helgeland Hospital; Robert Knight – University of California, Berkeley

Humans are highly social beings, and are considered experts in identifying others' actions and inferring their intentions, thoughts and feelings. One of the major theories accounting for this ability assumes that the understanding of social signals is based on a primordial tendency to simulate observed actions by activating a mirror neuron system (MNS). If the MNS is important for action and emotion recognition, damage to regions in this network should lead to deficits in these domains. In the current behavioral and EEG study, we focused on the lateral prefrontal cortex (LPFC) and utilized a series of task paradigms, each measuring a different aspect of recognizing others actions or emotions from body cues. We examined 17 patients with lesions including (N=8) or not including (N=9) the inferior frontal gyrus (IFG), a core MNS region, and compared their performance to matched healthy controls (N=18), in behavioral tasks and in an EEG task measuring mu suppression. Our results provide support for the role of the LPFC in understanding others, by showing that even unilateral lesions result in deficits in both accuracy and reaction time in tasks involving the recognition of others' emotions, with only an increase in reaction time for action recognition. In tasks involving the recognition of actions, patients showed a general increase in reaction time, but not a reduction in accuracy. Deficits in emotion recognition can be seen by either direct damage to the IFG, or via damage to LPFC regions, resulting in deteriorated performance and less EEG mu suppression.

A – 53
THE ROLE OF PUPIL SIZE AND PUPIL MIMICRY IN TRUST: FMRI STUDY

Eliska Prochazkova – Leiden University; Luisa Prochazkova – Leiden University; Carsten KW De Dreu – Leiden University; Steven Scholte – University of Amsterdam; Mariska E. Kret – Leiden University

In order to decide whether to trust someone or not, people generally make eye contact. During this process, pupils of interacting partners tend to align, aiding this decision. Interestingly, previous research shows that if both partners' pupils synchronously dilate, pupil-synchronization promotes trust. The function and neural mechanisms of pupil-synchronization are thus far unknown but two hypotheses are at stake: A) As pupil dilation might indicate arousal, it is possible that pupil-synchronization helps people to recognize socially arousing or 'threatening' situations or, alternatively, B) it enhances the ability to understand others' emotions - a theory of mind (TOM) hypothesis. To test these hypotheses, we conducted a functional magnetic resonance imaging (fMRI) study where we tested the effect of (virtual) partner's pupil size changes and own pupillary responses on subject's trust decisions during incentive trust games. In line with the second hypothesis, results showed that the mimicry of partners' dilating pupils was associated with higher trust levels and increased neural activity in the TOM network (precuneus, temporo-parietal junction, medial prefrontal cortex and superior temporal sulcus). These findings indicate that pupil mimicry is involved in higher level social cognition as opposed to simply being a threat-processing mechanism restricted to subcortical structures (amygdala, hippocampus). Apart from contributing to the field of emotional contagion, by examining the neural mechanisms of pupil mimicry, the current study is the first to provide a neurocognitive link between pupil mimicry and trust decisions.

A – 54
CULTURE MODULATES THE NEURAL MECHANISMS UNDERLYING RISKY EXPLORATION

Yang Qu – Stanford University; Lynda Lin – University of North Carolina at Chapel Hill; Eva Telzer – University of North Carolina at Chapel Hill

Cross-cultural developmental research suggests that real-life risk taking (e.g., stealing and substance use) may differ across cultures. For example, risk taking is more common among American than Chinese youth (Greenberger et al., 2000). Although recent neuroimaging studies provide valuable insights into neural basis of risk taking, they mainly focus on Western samples. To address this issue, the current study examined cultural similarities and differences in neural processes underlying risk taking. 46 American and Chinese participants underwent an fMRI scan while completing the Balloon Analogue Risk Task, a widely used risk-taking task (Lejuez et al., 2003). Although American and Chinese participants did not differ in overall risk taking on the task, American participants showed significant greater risky exploration, as indicated by greater within-person variation of risk taking, compared with their Chinese counterparts. At the neural level, across the two cultures, participants showed heightened activation in the medial prefrontal cortex, anterior cingulate, ventral striatum, and insula when they took increasing risks. Cross-cultural comparisons indicated that compared with their Chinese counterparts, American participants showed greater activation in the ventral striatum, a neural region involved in reward processing, when they took increasing risks. Such neural activation in the ventral striatum was positively associated with participants' risky exploration. Taken together, despite some shared neural processes underlying risk taking in American and Chinese individuals, they also show distinct neural processing. American (vs. Chinese) participants show more reward-related activation when they take greater risks, suggesting that culture plays a role in modulating neural basis of risky exploration.

A – 55
PROBING THE NEURAL CORRELATES OF SADNESS INTROSPECTION: A NEW VARIATION OF A FACE-EMOTION FMRI TASK

Shawn A. Rhoads – University of California, Davis; Veronika Vilgis – University of California, Davis; Erika E. Forbes – University of Pittsburgh; Alison E. Hipwell – University of Pittsburgh; Kate Keenan – University of Chicago; Amanda E. Guyer – University of California, Davis

Social interactions often involve processing others' emotions gleaned from their facial expressions. FMRI tasks have been widely-used to understand what functions and under which conditions the brain operates during face processing. The current study presents a new variation of a face-emotion task designed to have participants reflect upon their subjectively experienced sadness (i.e., sadness introspection) when viewing others' emotions, given known deficits in sadness regulation associated with depression. Recruited from the Pittsburgh Girls Study, 117 girls (16-years-old) underwent functional neuroimaging while viewing 48 facial expressions (12 sad, 12 angry, 12 happy, 12 neutral) and rated each while judging "How sad does this face make you feel?" and "How wide is the nose?" (1=not at all to 5=very much). To verify and compare neural activation between conditions, a whole-brain analysis was conducted using a 2 (Attention) x 4 (Emotion) repeated-measures analysis of variance with a flexible factorial design. Consistent with neuroimaging literature on mentalizing and emotion introspection, a main effect of attention revealed greater activation in bilateral superior temporal sulcus, bilateral intraparietal sulcus, medial prefrontal cortex, and left anterior insula for sadness introspection vs. nose-width, $F(1,812)=23.13$, FWE-corr. $p<0.001$. Greater

activation emerged in face and visual processing regions for nose-width vs. sadness introspection. The main effect of emotion and emotion X attention interaction effect were non-significant. The task effectively engaged key neural regions implicated in introspection and socioemotional processing in typical and clinical samples, and holds promise for identifying perturbed patterns of brain function related to sadness introspection and adolescent depression.

A – 56
LEARNING BIASES RENDER ADOLESCENTS VULNERABLE TO DROP IN SELF-ESTEEM FOLLOWING PEER EVALUATION

Alexandra M. Rodman – Harvard University; Katherine E. Powers – Harvard University; Erik K. Kastman – Harvard University; Leah H. Somerville – Harvard University

Adolescence is a phase of the lifespan characterized by drops in self-esteem, although the mechanisms underlying this shift are poorly understood. This study examines whether biases in feedback-based learning contributes to adolescents' shifting self-views. 107 participants aged 9-23 completed an fMRI experimental task that involved receiving positive and negative peer evaluation that was consistent or inconsistent with the participant's expectations. Following the scan, participants were given a surprise memory test to evaluate biases in learning. Data analyses tested for developmental differences in predicted rates of positive vs. negative feedback, memory for feedback types, and post-pre task shifts in self-esteem. Adolescent-specific differences were observed on all three measures. Younger participants predicted that peers would like them less frequently. Adolescents demonstrated biased learning in the face of social rejection. When examining whether the social evaluation would lead to downstream changes in self-esteem, we found that early adolescents exhibited a unique drop in self-esteem as a result of the task. Future analyses will probe whether corticostriatal functioning supports these learning biases and associated changes in self-views during adolescence. This work will extend theoretical models of development, and identify a mechanism that links peer rejection with alterations in self-esteem.

A – 57
MOTIVATIONAL INFLUENCES ON PERCEPTUAL JUDGMENTS: WHAT WE WANT CHANGES WHAT WE SEE

Deshawn Sambrano – California State University, Fullerton; Yuan Chang Leong – Stanford University; Jamil Zaki – Stanford University

People tend to think of perception as a veridical representation of the physical world. However, previous work suggests that goals and desires can bias what people see. In this study, we investigated how financial incentives biased participants' perceptual judgments. Participants were presented with videos of moving dots, in which a proportion of dots were moving in a coherent direction, and were rewarded for correctly indicating the motion direction of these "signal dots". The remaining dots moved randomly. We manipulated the difficulty on each trial by varying the proportion of signal dots. On a subset of the trials, we paired participants with a partner, who placed a bet on the direction of signal dots for the following trial. If the bet is correct, the participant wins an additional bonus. If the bet is incorrect, the participant loses money. As such, participants were motivated to see the motion direction consistent with the bet. However, to earn the maximum reward, participants should ignore the bet and indicate the motion direction as accurately as possible. Nevertheless, we found that participants were biased to see the motion direction they were motivated to see. Furthermore, participants were slower to make motivationally inconsistent judgments, suggesting greater decision conflict on these trials. Our findings suggest that motivational forces can bias perceptual judgments, and the old adage of 'seeing is believing' should be taken with circumspect and caution. Future work will use mouse-tracking to examine the trajectory of this bias at a finer temporal scale.

A – 58
QUANTIFYING AND COMPARING THE SELFISH AND PRO-SOCIAL CONFORMITY

Bo Shen – Peking University; Binxu Wang – Peking University; Hongbo Yu – Peking University; Xiaolin Zhou – Peking University

In the current study we appealed to reinforcement learning model to quantify social conformity behavior. Participants were separated into cohorts and played a public money taking game. In each trial, participants in the same cohort were given the same amount of money from a public pool, and took any amount for him/herself. At the same time, they could observe taken money of one randomly chosen other participant. Money left by this cohort was then allocated to participants in subsequent cohorts. Even though payoffs in the same cohorts were independent, taken money of others (MO) had significant Granger Causal influence on taken money of self (MS). Participants learned to be selfish when observing MO > MS, and learned to be pro-social when observing MO < MS. Social conformity behavior was then compared to reinforcement learning process, and fitted by a selfish/pro-social learning model to predict MS in each trial using MO. The learning model revealed that selfish learning rate α was greater than pro-social learning rate β. Post-experiment questionnaire results showed that participants' shame-withdraw scores correlated negatively with α and positively with β, suggesting that participants with stronger shame-withdraw tendencies were less likely to be influenced by others' selfish behavior and more likely to be influenced by others' altruistic behavior.

By using computational modeling, the current study showed that individuals are more likely to conform to others' selfish behavior than to pro-social behavior. Moreover, moral sentiments may have strong influence on individuals' social conformity rates.

A – 59
THE DYNAMICS OF MIXED EMOTIONS IN MUSIC AND MOVEMENT

Beau Sievers – Dartmouth College; Thalia Wheatley – Dartmouth College
Dynamics, the change in a stimulus over time, powerfully predict emotion perception. Most studies of mixed emotion use naturalistic stimuli that include both dynamics and context-dependent semantic content. We assess whether mixed emotions can be expressed and perceived based on dynamics alone, and whether the same dynamics express the same emotions across modalities. We designed a computer program for generating examples of music and movement based on a small set of crossmodally matched dynamic features: rate, jitter (regularity of rate), direction, step size, and dissonance/visual spikiness. We split participants into two groups, a music group and a movement group. Participants (n=50) used our program to express five emotions: Angry, Happy, Peaceful, Sad, and Scared. We extrapolated from these data to create many examples of each emotion, as well as every possible mix of two emotions, interpolated at 25%, 50% and 75%. We asked a separate group of participants (n=72) to rate these music and movement stimuli on the five emotion dimensions independently. We tested which mixed emotions in music and movement are perceptible based on dynamics alone, without additional context or semantic information. Finally, we presented prototypical and mixed emotions in music and movement to participants undergoing functional magnetic resonance imaging (n=20). Searchlight classification and representational similarity analyses were used find brain areas that distinguish mixed from prototypical emotions.

A – 60
FROM AGENTS TO ACTIONS TO INTERACTIONS: UNCOVERING MULTIPLE SOCIAL NETWORKS IN THE PRIMATE BRAIN

Julia Sliwa – The Rockefeller University; Winrich A. Freiwald – The Rockefeller University
Primates continuously decode the complex visual scenes unwinding in front of them into physical entities, such as agents and objects, and their flow of interactions. Understanding interactions is a core cognitive component in primates and is particularly vulnerable to social pathologies. Neural representations of faces, bodies, objects, and their movement have been found in and around the superior temporal sulcus (STS). However, little is known about the brain regions that analyze social and physical interactions. Here we show, using whole brain functional magnetic resonance imaging in rhesus monkeys, that interaction observation engages three major brain systems in functionally distinct ways: First, when agents and objects are combined into evocative scenes of interactions, they change early visual representations of individuals and objects in the STS. Second, passive observation of both physical and social interactions automatically engages two motor planning areas, in posterior parietal and premotor cortex that co-localize with the mirror neuron system (MNS), suggesting a general role of the MNS for social and physical world understanding. Finally, social interactions selectively recruit an additional extensive system of distributed brain areas comprised of the medial-prefrontal cortex, ventro-lateral prefrontal cortex, inferior parietal lobule (7a), and temporal pole – in a way functionally similar to the Default Mode Network in humans and overlapping with areas that in humans subserve Theory of Mind. The existence of multiple networks for interactions processing in the primate brain shows the cognitive importance and computational challenges of interaction analysis in revealing the hidden intricacies of a primate's world.

A – 61
SOCIAL REWARD AND ALPHA ASYMMETRY IN ASD

Katherine KM Stavropoulos – University of California, Riverside; Leslie J. Carver – University of California, San Diego
The social motivation hypothesis posits that individuals with autism spectrum disorder (ASD) are less motivated to socially engage because they find interactions less rewarding than their typically developing (TD) peers. The current investigation measured alpha asymmetry (8-12Hz) and theta activity (4-7Hz) during reward anticipation. We performed novel EEG analyses in children with and without ASD (Stavropoulos & Carver, 2013). Children were presented with reward indicators accompanied by face or non-face (arrow) stimuli. Participants were 6-8 year-old children with (n = 20) and without (n = 20) ASD. In the alpha band, a significant Condition x Group interaction was observed (p = .053). Follow-up tests revealed (1) marginal effect of condition in the ASD group (p = .058); (2) marginal effect of the face condition between groups (p = .066). A significant correlation was observed between alpha asymmetry in the arrow condition and ADOS severity (p= .01) such that children who evidenced more alpha asymmetry had more severe symptoms of ASD. No effects were observed in the theta band. We provide novel evidence that alpha activity during reward anticipation is different in children with and without ASD. Children with ASD evidenced more left-dominant activation when anticipating rewards accompanied by arrows compared to rewards accompanied by faces. TD children evidenced more left-dominant activation when anticipating faces

compared to children with ASD. The findings support the social motivation hypothesis, and extend it by suggesting that children with ASD may have too much non-social motivation, which comes at the expense of social motivation.

A – 62
GENERATIVE MODELING OF WEIGHTED BRAIN NETWORKS

Paul E. Stillman – Ohio State University; James D. Wilson – San Francisco University; Matthew J. Denny – Penn State University; Bruce Desmarais – Penn State University; Shankar Bhamidi – University of North Carolina at Chapel Hill; Skyler Cranmer – Ohio State University; Zhong-Lin Lu – Ohio State University

There has been a recent explosion in research using graph theory to investigate how networks of brain regions interact to produce cognition and behavior. However, most available modeling techniques adopt a descriptive rather than generative modeling approach, and the majority of contemporary methods (and all contemporary generative methods) require researchers to threshold weighted correlation networks into binary networks, discarding a large amount of potentially critical information. The present research integrates recent advances from network science and neuroscience to address these issues. Specifically, we develop the correlation Generalized Exponential Random Graph Model (cGERGM) – a generative modeling approach that uses local processes in the network to capture the emergent functional organization of the brain without any loss of information. We demonstrate the potential of using the cGERGM to quantify brain networks using connectivity data from the default mode network. In particular, we show that the connectivity of the default mode network exhibits heightened triadic closure (a measure of clustering), and lower preferential attachment (a measure of hub use) than would be expected by chance. We further find that Euclidean distance between nodes has no effect on the connectivity between nodes. Finally, we show that the cGERGM both produces excellent fit to real brain data, and simulates realistic brain networks, making it a powerful and fully-featured model for studying weighted brain networks.

A – 63
NEURAL AND BEHAVIORAL CORRELATES OF ALTRUISM IN ADOLESCENTS

Sarah M. Tashjian – University of California, Los Angeles; David Weissman – University of California, Davis; Amanda E. Guyer – University of California, Davis; Adriana Galván – University of California, Los Angeles

Altruistic behavior is related to psychosocial benefits including happiness (Aknin et al., 2013), peer acceptance (Layous et al., 2012), self-esteem (Bandura et al., 2001), and lower depression (Telzer et al., 2014). Extant research suggests altruism develops with age but adolescent altruism has received considerably less attention than negative outcomes such as adolescent antisocial behavior. Given ties to well-being and emerging literature suggesting adolescence may be a period for positive development, we seek to investigate the correlates of adolescent altruistic behavior. The aims are to determine (1) whether evaluating others behaving altruistically influences adolescents' willingness to act altruistically themselves (behavioral phase, 60 adolescents/young adults ages 13-22), (2) the neural correlates of evaluating altruism and whether differences predict behavior (fMRI phase, 20 adolescents ages 13-18). Data collection will be completed February 2017. In both phases, participants evaluate images of altruistic, social, and neutral behavior (independently validated for interpretation/valence) and have the opportunity to donate to a youth charity. Preliminary analyses with a modest sample size (N = 32) reveal a trend in the expected direction; participants who viewed the stimuli prior to donation donated more than those who viewed the stimuli after donating. All fMRI participants will view images prior to donation. We anticipate greater ventral striatum and greater anterior prefrontal activation while viewing altruistic images compared to neutral/social will relate to increased donations. Analyses will include reaction time, image rating, and survey measures of altruistic and prosocial tendencies. Results will help address the gap in knowledge regarding altruistic behavior during adolescence.

A – 64
NEURAL REPRESENTATIONS OF OTHERS' MENTAL STATES GROW LESS DISTINCT WITH PSYCHOLOGICAL DISTANCE

Mark A. Thornton – Harvard University; Miriam E. Weaverdyck – Princeton University; Diana I. Tamir – Princeton University

To successfully navigate the social world, one must understand other people's mental states. What principles guide the way people think about others' minds? One likely candidate is psychological distance: how close one feels to the person in question. In the present study, we examined the possibility that psychological distance acts on social perception much like physical distance acts on visual perception: by making the objects of perception fuzzier and less distinct. Specifically, we tested the hypothesis that people have highly distinct neural representations of their own mental states, but that these representations become less distinct when considering increasingly psychologically distant people. To test this hypothesis, we used functional magnetic resonance imaging to scan the brains of participants while they judged the mental states of three targets: the self, a similar friend, and a dissimilar stranger. Using representational similarity searchlight analysis, we examined the distinctiveness of state-specific activity patterns for each target. Within a network of regions associated with social cognition – including medial prefrontal

and parietal cortices and the temporoparietal junction – we found that increasing psychological distance resulted in less distinct activity patterns for different mental states. Thus, for example, one's own self-consciousness was quite distinct from one's own earnestness, but when a stranger experienced these states, they actually seemed quite similar. This neural effect converged with behavioral findings from a separate group of participants who explicitly rated mental states to be more similar when considering those states in the minds of psychologically distant targets.

A – 65
SOCIAL CONTEXT MODERATES NEURAL PROCESSING OF CHOICE INFORMATION
Steven Tompson – University of Pennsylvania; Sarah Huff – University of Michigan; Carolyn Yoon – University of Michigan; Anthony King – University of Michigan; Israel Liberzon – University of Michigan; Emily B. Falk – University of Pennsylvania; Danielle S. Bassett – University of Pennsylvania; Shinobu Kitayama – University of Michigan
Decision-making often requires integrating complex information about the choice. Recent work suggests that cognitive judgments and working memory performance is facilitated by dynamic flexibility of networks of brain regions and connectivity between regions in these networks. It is therefore possible that these networks are also important for processing complex information about decisions. Moreover, research has shown that these judgments and decisions are influenced by social context, but it is unknown whether these same social processes (e.g., culture, social network size, etc.) directly influence brain networks underlying judgments and decision-making. Using brain data from individuals who evaluated choice options before and after making difficult choices either for the self or a close friend, we examined how patterns of activation within brain regions as well as patterns of activation across networks of brain regions are associated with processing and representing choice information. We found that European Americans represented choice outcome (chosen versus rejected) in medial prefrontal cortex (mPFC), whereas East Asians represented choice outcome in temporoparietal junction (TPJ). Both European Americans and East Asians represented choice target (self versus friend) in mPFC and TPJ. This research suggests that these brain regions might represent and process different types of information for people from different cultural contexts. Implications for how social context moderates brain regions and brain networks involved in decision-making will be discussed.

A – 66
DIFFERENTIAL EFFECTS OF FEEDBACK ON WORKING MEMORY PERFORMANCE
Nancy Tsai – University of California, Irvine; Susanne Jaeggi – University of California, Irvine
Working memory (WM) varies greatly amongst individuals. Such variance in WM may reflect differences in conditions that tax the system such as affect. The use of feedback can induce affective changes and is one of the mostly widely applied psychological interventions aimed to improve performance. However, there is growing evidence that feedback yields variable effects on performance. In our study, participants from the US and China were presented fictitious positive or negative feedback during a visual N-Back task. The results indicate that participants in the US and China were differentially affected by feedback in their N-Back performance: In the US, positive feedback improved accuracy while negative feedback impaired accuracy. In China, positive feedback improved reaction time while negative feedback impaired reaction time. Measurements of affect, stress, motivation, locus of control, theories of cognitive abilities, as well as other mindset differences were included for exploratory purposes.

A – 67
FUNCTIONAL CONNECTIVITY IN THE HUMAN BRAIN PREDICTS ENDOGENOUS VARIATION IN MORAL PHENOTYPE
Jeroen M. van Baar – Radboud University; Luke J. Chang – Dartmouth College; Alan G. Sanfey – Radboud University
Why do people often behave kindly to one other, even when this comes at a personal cost? Several different motivations have been suggested to explain these prosocial decisions. Here we propose that the particular mix of motives driving one's social decisions, or 'moral phenotype', varies endogenously in the population. We use a novel economic game to demonstrate stable variation in moral phenotype for reciprocity, capture individual differences using computational modeling, and show that our Motivational Mix Model better explains observed behavior than previously proposed models. Next, we elucidate the neural correlates of moral phenotype using functional MRI. We demonstrate that functional connectivity from right temporoparietal junction and right dorsolateral prefrontal cortex to the rest of the brain is predictive of moral phenotype. These findings provide a new avenue into the study of moral decision-making.

A – 68
RESTING STATE FUNCTIONAL CONNECTIVITY AND COSTLY ALTRUISM: A GRAPH THEORETICAL APPROACH
Kruti M. Vekaria – Georgetown University; Charles J. Lynch – Georgetown University; Kristin M. Brethel-Haurwitz – Georgetown University; Elise M. Cardinale – Georgetown University; Abigail A. Marsh – Georgetown University

Costly altruism involves taking significant risks to benefit another person. When that person is a stranger, dominant theories cannot easily explain the occurrence of such behavior; identifying neural mechanisms that support extraordinary altruism may be illuminating. Task-based fMRI studies implicate increased volume and heightened sensitivity to distress cues in the amygdalas of altruists relative to controls. The amygdala has been described as a hub of affective processing networks due to its extensive connectivity with brain regions associated with emotion, motivation, and executive function. Recent work has found differences in network-based resting state functional connectivity (rsFC) among individuals who score higher on laboratory-based measures of cooperation. However, no research has yet examined how rsFC corresponds to real-world costly altruism. To investigate this, we collected 7 minutes of resting state fMRI data in a sample of altruistic kidney donors (n=19) and matched controls (n=20). Following preprocessing, cortical surfaces were generated in Freesurfer and the denoised fMRI time-series data was mapped onto the midthickness surface. We selected an independent parcellation of the human brain as our regions-of-interest and computed the temporal correlation between each parcel, resulting in parcel-by-parcel functional connectivity matrices across a range of thresholds (.90-.99). Betweenness centrality (BC), a graph theory metric reflecting the centrality ("hubness") of a region in a network, was computed using each binarized matrix. Results of an independent samples t-test show decreased average BC of right amygdala in altruists relative to controls, suggesting that in altruists this region is more segregated in its network connectivity.

A – 69
EXPERIENTIAL EMOTION REGULATION VERSUS COGNITIVE REAPPRAISAL: EFFECTS ON AFFECT AFTER STRESS AND FOLLOW-UP SLEEP PHYSIOLOGY

Yulin Wang – Vrije Universiteit Brussel & University of Gent; Iris Vantieghem – Vrije Universiteit Brussel; Jenny Kestemont – Vrije Universiteit Brussel; Luis Carlo Bulnes – Vrije Universiteit Brussel & Université Libre de Bruxelles; Marie Vandekerckhove – Vrije Universiteit Brussel

The interesting idea that emotion regulation (ER) plays a key role in modulating effects of stress on sleep, however, has received few research attention. In the current study, we compared the impact of an 'experiential ER' versus a 'cognitive reappraisal' on subjective affect after stress and the following sleep physiology. 43 participants are recruited and randomly assigned to 3 groups: 15, 13, 15 for experiential, reappraisal and neutral non-specific regulation respectively. 20-Item Toronto Alexithymia and Emotional Approach Coping Scale are used to address the individual difference. All participants spend 3 nights (adaption, baseline and experimental night) in the sleep lab (8h). An emotional failure induction was used to trigger stress, followed by ER two times. Subject negative affect were obtained by PANAS. We found Subjective Negative affect (NA) after the failure task is significantly higher than that after movie (t (43) =-4.70, p<.01); but no difference in NA between experiential and reappraisal group (F (2, 34) =1.08, p=. 35; F (2, 34)=1.70, p=0.20). Latency to S1 depending on ER types: reappraisal versus experiential: t (26) = -2.98, p<.01; Experiential versus neutral: t (28) =1.80, p=.08. % REM-sleep tendency was found to be more rigid in individuals scoring higher on alexithymia. Higher REM-latency for individuals scoring higher on alexithymia (F (1,32)=4.46, p=.04). Longer Total Sleep Time for individuals scoring moderately on EAC in the experiential condition (F (6,30)=3.22, p=.02). Our results indicated the difference between ´experiential approach´ and ´cognitive approach´ strategy in decreasing the detrmental effect of stress on sleep.

A – 70
LOOMING THREATS AND ANIMACY: REDUCED RESPONSIVENESS IN YOUTH WITH DISRUPTIVE BEHAVIOR DISORDERS

Stuart F. White – Boys Town National Research Hospital; Laura C. Thornton – Boys Town National Research Hospital; Joseph Leshin – University of North Carolina, Chapel Hill; Roberta Clanton – University of Birmingham; Stephen Sinclair – National Institute of Mental Health; Dionne S. Coker-Appiah – Georgetown University School of Medicine; Harma Meffert – Boys Town National Research Hospital; Soonjo Hwang – University of Nebraska Medical Center; James R. Blair – Boys Town National Research Hospital

Atypical responses in threat circuitry (amygdala, periaqueductal gray [PAG]) have been implicated in the development of Disruptive Behavior Disorders (DBDs; Conduct Disorder/Oppositional Defiant Disorder). However, relatively little neuro-imaging work has examined the extent to which Callous-Unemotional (CU) Traits modulate this responsiveness or whether disrupted responsiveness is seen for animate and inanimate threats. 31 youth with DBDs and 27 typically developing youth, matched for IQ, age and gender, completed a threat paradigm during fMRI. The paradigm involved the presentation of (i) threatening and animate (e.g. snarling dogs); (ii) threatening and inanimate (e.g. pointed gun); (iii) neutral and animate (e.g. sitting rabbit); or neutral and inanimate (e.g. a mug) images which loomed towards or receded from the participant. Youth with DBDs showed reduced responsiveness to threat information within basic threat circuitry and particularly to animate (relative to inanimate) threat stimuli within inferior frontal gyrus, middle frontal gyrus and inferior parietal cortex. CU traits did not modulate responsiveness to threat information within basic threat circuitry, but were inversely associated with: (i) response to mid-level threat stimuli within frontal cortex, superior temporal gyrus and inferior parietal cortex; and (ii) animate stimuli within

posterior cingulate cortex. Youth with DBDs show generally reduced threat responsiveness that was only modulated by level of CU traits in cortical regions, not basic threat systems.

A – 71
THE ROLE OF THE VENTROLATERAL PREFRONTAL CORTEX AND ITS NEURAL NETWORKS IN SEXUAL RISK: EVIDENCE FROM AN EROTIC GO/NOGO TASK AND REAL-LIFE RISK TAKING

Feng Xue – University of Southern California; Emily E. Barkeley-Levenson – Hofstra University; Vita Droutman – University of Southern California; Benjamin J. Smith – University of Southern California; Gui Xue – Beijing Normal University; Zhong-Lin Lu – Ohio State University; Antoine Bechara – University of Southern California; Lynn C. Miller – University of Southern California; Stephen J. Read – University of Southern California

We tested the hypothesis that individual differences in neural correlates of response inhibition would be most strongly related to real-world risk taking when people have to inhibit responses to highly motivationally relevant stimuli. Gay participants performed an erotic go/nogo task when being scanned in an MRI scanner. Participants' real-world risk taking was correlated with their gray matter density and neural activity during the task. These analyses identified a common area in the ventrolateral prefrontal cortex (vlPFC). We found gray mater density and neural activity in the common vlPFC were both negatively correlated with participants' real-world risk taking. Finally, neural network centered in vlPFC and relationship with participants' real-world risk taking were demonstrated in a series of generalized form of context-dependent psychophysiological interactions analyses. Our results extend the literature by demonstrating the vlPFC as an important locus of risky decision-making and its possible role in response inhibition.

A – 72
DIFFERENTIAL INVOLVEMENT OF FRONTOPOLAR CORTICAL SUBREGIONS IN UTILIZING SOCIAL FEEDBACK HISTORY WHEN EVALUATING OTHERS

Leehyun Yoon – Korea University; Hackjin Kim – Korea University

Critical for survival is the capacity to accurately assess how well one is doing and adaptively change one's behavior based on such information. The present study investigated how our brain keeps the record of previous social feedbacks and integrates them to guide our on-going social decisions. 60 participants between the ages of 10 and 25 years were instructed to make simple but creative artworks in the first session of the study. After two weeks, they ostensibly evaluated each other's works reciprocally while being scanned. In the first phase of each trial, participants received fictitious feedback regarding the creativity of their own works from partners with similar age. In the second phase, they evaluated the creativity of the same partners' works. Behavioral results revealed a robust interaction between feedback history type and age group. Specifically, two young age groups (i.e., children and early adolescents), late adolescents, and adults utilized a current feedback (1FB), accumulation of recent two feedbacks (2FB), and accumulation of all the feedbacks (AllFB), respectively, for evaluating their partners' works in a self-enhancing way. Parametric modulation analysis of the fMRI data using the parameters of 1FB, 2FB, and AllFB at the time of feedback receipt revealed that the medial, intermediate, and lateral subregions of the frontopolar cortex (FPC) encode 1FB, 2FB and AllFB, respectively. These results suggest that the distinctive subregions along the medial-to-lateral axis of the FPC are differentially involved in integrating previous social feedback history, potentially contributing to the developmental changes in social evaluative decision biases.

A – 73
AGE-RELATED CHANGES IN BRAIN NETWORKS INVOLVED IN PROCESSING EYE-GAZE AND EMOTIONAL CUES

Maryam Ziaei – University of Queensland; Hana Burianová – Swansea University; William von Hippel – University of Queensland; Natalie C. Ebner – University of Florida; Louise H. Phillips – University of Aberdeen; Julie D. Henry – University of Queensland

Ageing is associated with difficulties integrating important social cues to emotion, including facial affect and eye-gaze cues, but there is limited understanding of the neural substrates underpinning age-related differences in perceiving these cues. The primary aim of this study was to investigate age-related changes in brain activity during recognition of emotional expressions which differed in eye-gaze directions. In an fMRI experiment, younger and older adults were asked to identify happy, angry, and neutral facial expressions displayed either with direct or averted eye-gaze directions. While younger adults showed neural sensitivity to eye gaze during recognizing angry expressions, older adults demonstrated neural dedifferentiation to these stimuli. In contrast, older adults showed sensitivity to eye-gaze cues during recognition of happy expressions. Additionally, brain-behavior correlations were conducted to investigate how perceiving facial cues were related to higher social-cognitive functions such as theory of mind ability in both age groups. Older adults' insensitivity to eye gaze during recognition of angry expressions was related to the decreased recruitment of the main nodes of the mentalizing network, e.g. medial prefrontal cortex, where interpreting the intentions of the expresser is important; angry expressions with averted gaze. In contrast, younger adults' social-cognitive performance was differentially correlated with activation in two brain networks as a function of eye-gaze

directions during recognition of angry facial expressions. Our findings are the first to suggest that age-related differences in integration of facial cues may be related to engagement of the mentalizing network, which has important implications for social-cognitive functioning in late adulthood.

A – 74
HEARTBREAK ON MY MIND: AN EFFECT OF HEARTBREAK ON INCIDENTAL AUTOBIOGRAPHICAL MEMORY, BUT NOT GENERAL AFFECTIVE INFORMATION PROCESSING
Rachel Brenner – Iowa State University; Robert West – DePauw University
The experience of heartbreak following the end of a romantic relationship has been associated with poor mental health outcomes, including elevated levels of depression. Recent behavioral work reveals that the retrieval of both positive and negative autobiographical memories related to a previous romantic relationship may be associated with negative affect in heartbroken individuals. This is in contrast to the retrieval of positive memories related to other relationships that are associated with positive affect. In the current study, we sought to examine the neural basis the effect of heartbreak on autobiographical memory using event-related brain potentials (ERPs). In the study, women experiencing heartbreak (N=7) and women in a romantic relationship (N=14) performed a picture rating task wherein they saw normative pictures from the IAPS set and pictures related to a former or current romantic relationship, and rated how positive or negative each picture were in separate blocks of trials. The ERP data revealed that the neural correlates of affective information processing related to the IAPS pictures were similar in the two groups. In contrast, autobiographical memory was associated with different ERPs in the two groups over the frontal and posterior regions of the scalp. In the heartbreak group, autobiographical memories were contrasted with positive normative pictures. In the romantic control group, autobiographical memories were contrasted with negative normative pictures. These findings are consistent with the idea that the emergence or persistent of heartbreak is associated with an alteration in the experience of autobiographical memories related to the prior relationship.

Poster Session B

Friday, March 17, 3:30 – 5:00 PM

B – 1 **SANS Poster Award winner**
COMPARISON OF EMPATHY FOR PAIN AND EMPATHY FOR FEAR IN ANTERIOR INSULA IN EXTRAORDINARY ALTRUISTS
Kristin M. Brethel-Haurwitz – University of Pennsylvania; Elise M. Cardinale – Georgetown University; Kruti M. Vekaria – Georgetown University; Emily L. Robertson – Louisiana State University; John W. VanMeter – Georgetown University; Abigail A. Marsh – Georgetown University
The anterior insula (AI) is an integrative hub involved in processing both intra- and interpersonal emotions (Craig, 2009). Debate persists about the AI's role in empathy for pain versus other emotions (Krishnan et al., 2016; Corradi-Dell'Acqua et al., 2016). The current study examined the AI's role in empathy for fear versus pain in altruistic kidney donors and matched controls. In a matched empathy-for-pain paradigm, cues indicated safety or potential painful pressure to the right thumbnail, and pain cues were followed probabilistically by pressure. Participants watched a stranger undergo the paradigm, then experienced it themselves. Neural responses to first-hand and vicarious fear and pain were compared. Prior results showed that altruists have enhanced self-other correspondence in pain processing in left AI. Examining fearful anticipation of pain in this paradigm revealed that altruists also have greater bilateral AI self-other conjunction for fear. But, self-other covariation in left AI activation observed for pain was not observed for fear, suggesting greater neural simulation for pain than fear in AI in altruists. Group differences in functional connectivity of left AI during vicarious fear and pain were also explored, revealing both similarities (posterior AI, striatum) and differences (amygdala during fear) in enhanced connectivity in altruists across the two conditions. Higher activation in bilateral AI for pain than fear, both first-hand and vicarious, suggests that the AI may respond to distress generally, especially in altruists, but is particularly pain sensitive. Together, these results suggest both shared and distinct roles for AI in empathy for fear and pain.

B – 2 **SANS Poster Award winner**
ROUND-ROBIN NEURAL REPRESENTATIONS OF SELF AND OTHERS REVEAL MULTIVARIATE PATTERN CONSENSUS IN INTERPERSONAL PERCEPTION
Robert Chavez – The Ohio State University; Dylan Wagner – The Ohio State University
A classic finding from research on interpersonal perception is that there is a high degree of correspondence between a person's self-reported ratings of their own traits and other's ratings of that person's traits. This is particularly robust when aggregating across a group of familiar acquaintances, each of whom may know the target in a slightly different

way. If aggregated knowledge of familiar individuals increases the similarity between how people view themselves and how others view them, how might patterns of neural activity reflect this consensus? We investigated this question in a close-knit social network using a full round-robin design in which each participant was both the perceiver and a target for every other participant in the study. Neural responses to self and others were measured using functional magnetic resonance imaging while participants completed a round-robin version of a standard self/other trait-judgment task. Our results show that multi-voxel response patterns in the medial prefrontal cortex (MPFC) during self-referential processing are predicted by corresponding neural responses to perceptions of that same target when aggregated across individuals within their social network. Moreover, this neural self-other consensus in pattern similarity was associated with self-other consensus in trait judgments when measured behaviorally in a separate session. Taken together, these results demonstrate that agreement in self-other personality judgement reflects group-level consensus in patterns of neural responses to a given target within one's social network. These results further underscore the finding that person knowledge is supported by multivariate patterns of activity in the MPFC.

B – 3 *SANS Poster Award winner*
DECISION-CONFLICT IN THE TEMPORAL DISCOUNTING TASK: MIDFRONTAL THETA AND PUPIL DILATION TRACK SUBJECTIVE CONFLICT IN VALUE-BASED DECISIONS
Hause Lin – University of Toronto; Blair Saunders – University of Toronto; Cendri A. Hutcherson – University of Toronto; Michael Inzlicht – University of Toronto
People often experience decision conflict when choosing between competing options or responses, for example when deciding between a healthy yet bland snack versus an unhealthy but tasty one. Theta band neural oscillations (4–8 Hz) over the midfrontal cortex have been linked to objective conflict processing during cognitive control tasks (e.g., incongruent/high-conflict vs. congruent/low-conflict stimuli on Stroop task). Here we ask whether midfrontal theta also tracks subjective conflict, such as during value-guided decisions. We also test whether theta reflects conflict in a binary fashion or if it is sensitive to parametric changes in conflict. We further ask if pupil dilation—also associated with objective conflict processing—tracks subjective conflict. To manipulate subjective conflict, participants performed an intertemporal choice task. We parametrically varied the amount of conflict in different choice pairs by asking participants to choose between immediate ($15 today) and participant-specific delayed rewards (e.g., $19.23 in 10 days), which were generated based on each participant's idiosyncratic hyperbolic discount function. We observe strongest midfrontal theta power and largest pupil dilation when the immediate and delayed rewards are equally desirable (i.e., most conflicting choice). Crucially, both signals reflect different gradations of conflict: As one reward becomes increasingly more desirable than the other, theta power and pupil dilation decrease. We therefore provide evidence for neurophysiological signals that compare subjective values and reflect indecision. Midfrontal theta and pupil dilation may be relevant for understanding not just the neural implementations of value-based decision processes, but also phenomena such as attitudinal ambivalence.

B – 4 *SANS Poster Award winner*
AUTOMATIC STEREOTYPE ACTIVATION IN THE ANTERIOR TEMPORAL LOBE
Ryan M. Stolier – New York University; Jonathan B. Freeman – New York University
The automatic activation of stereotypes in response to other people is a central tenet in numerous models of social cognition. Despite an extensive behavioral literature examining this process, there is currently a lack of evidence for automatic stereotype activation in a context without task demands, and little understanding of its neural substrates. In this study, we sought evidence for the presence of race-based stereotype activation as participants passively viewed faces of category exemplars or mere race-category labels. In a series of ostensibly unrelated tasks during fMRI, participants first passively viewed Black and Asian stereotype traits (equated on valence), and subsequently faces and labels of the Black and Asian categories. In a searchlight procedure, we trained a classifier to distinguish voxel patterns of Asian and Black stereotypes, then tested where we could discriminate social categories (faces, labels) based upon their corresponding stereotype patterns. This analysis found that stereotype trait patterns could discriminate between target categories during face or label viewing in the left anterior temporal lobe (lATL). These results suggest that, when viewing a Black or Asian face or label, related stereotype traits were automatically activated and represented in the lATL. The findings implicate the lATL, often associated with the storage and retrieval of semantic associations and social concept representation, in representing associated stereotype information automatically during the perception and thought of social categories. This finding substantiates a core assumption of models of stereotyping and person perception and furthers our understanding of the lATL in social cognition.

B – 5
SUPPRESSING THE ENDOCRINE AND AUTONOMIC STRESS SYSTEMS DOES NOT IMPACT THE EMOTIONAL STRESS EXPERIENCE AFTER PSYCHOSOCIAL STRESS
Nida Ali – McGill University; Jonas P. Nitschke – McGill University; Cory Cooperman – McGill University; Jens C.

Pruessner – McGill University
Acute psychosocial stress activates the physiological and endocrine stress systems and increases the subjective emotional experience of stress. While considerable efforts have been made to link changes in the activity of the biological stress systems with changes in the emotional experience of stress, results so far have been mixed, at best. To investigate this association experimentally, we pharmacologically suppressed both the autonomic and the endocrine stress responses, and investigated the effects of acute psychosocial stress on the emotional stress experience. 46 healthy men and women received dexamethasone (2 mg) or placebo the day before, and propranolol (80 mg) or placebo one hour before psychosocial stress induction. Salivary cortisol, alpha-amylase and heart-rate responses were assessed before, during and after stress induction. Subjective stress, mood, and state self-esteem assessments were made before and after stress. In the pharmacological manipulation group, subjects demonstrated no increase in autonomic or endocrine stress response, after exposure to psychosocial stress. Despite these effects, the emotional stress experience was intact in this group and identical to the control group. Participants in the experimental group reported increased subjective stress, mood dysregulation, and lower state self-esteem following stress exposure, with the response magnitude comparable to the control group. Our findings demonstrate that during acute stress, the physiological stress arousal systems and the emotional experience of stress are dissociated. This raises important questions about the efficacy of our measurement of subjective stress, and the unique contributions of the autonomic and endocrine responses in the subjective stress experience.

B – 6
TRUMP VERSUS CLINTON: THE ROLE OF MORAL INTUITION NETWORKS IN PROCESSING POLITICAL ATTACK ADVERTISEMENTS

Ori Amir – University of California, Santa Barbara; Richard Huskey – The Ohio State University; James Michael Mangus – University of California, Santa Barbara; Reid Swanson – University of Southern California; Andrew Gordon – University of Southern California; Peter Khooshabeh – US Army Research Laboratory; Rene Weber – University of California, Santa Barbara
The Model of Intuitive Morality and Exemplars (MIME; Tamborini, 2012) builds on moral foundation theory (MFT, Haidt, 2001) to predict the attitudinal and behavioral effects of mass-media messages. Many of the MIME's predictions have been supported in behavioral studies, yet neuroscientific research on how specific networks in the brain are recruited to process messages' moral content is lacking. Here we use political advertisements as a test case for understanding the neurocognitive processes underlying MFT and the MIME. Recent research using a moral intuitionist perspective (Graham et al., 2009, 2012) suggests that liberals' morality fixates on "individualizing" moral concerns (i.e., on care, fairness, liberty). In contrast, conservatives tend to consider a wider spectrum of moral foundations, supplementing the individualizing foundations with additional "binding" moral concerns (loyalty, authority, sanctity-purity). A total of 60 participants (20 self-identified Democrats, Republicans, and Unaffiliated; 50% women) underwent fMRI. Participants first engaged in a validated moral intuition localizer task (Clifford et al., 2015) and subsequently evaluated 22 political Trump/Clinton attack ads used in the US 2016 presidential campaign. Preliminary analyses suggest that within localized moral intuition networks, participants of all political affiliations show greater activation for attack ads against Clinton relative to attack ads against Trump. In specific networks - for instance within the DMPFC - first results hint to an interaction between type of attack ad, political affiliation, and sex. Additional analyses presented at the SANS conference will reveal whether activation patterns in moral intuition networks can be used to predict ad perceptions and candidate preferences.

B – 7
NEGATIVITY SPREADS SOCIALLY: NEGATIVITY BIAS IN OPINION CHANGE IS ASSOCIATED WITH ACTIVITY IN THE BRAIN'S MENTALIZING SYSTEM

Elisa C. Baek – University of Pennsylvania; Christin Scholz – University of Pennsylvania; Matthew Brook O'Donnell – University of Pennsylvania; Emily B. Falk – University of Pennsylvania
Humans constantly share and receive recommendations with one another, yet little is known about how the valence (i.e., positivity or negativity) of recommendations influence the neurocognitive processes involved in the propagation of opinions. We used neuroimaging and natural language classifiers to test how valence of online recommendations can propagate, leading to opinion change. Recommendations higher in negativity were more influential in engaging processes in the brain associated with taking the perspective of others (i.e., 'mentalizing'), including subregions in MMPFC, DMPFC, bilateral TPJ, PC/PCC, and MTG, but not within limbic regions implicated in processing lower level affect, including the bilateral amygdala and ventral striatum. Further, increased neural activity in both amygdala and mentalizing systems were significant predictors of negative opinion change in the recipient. Broadly, these results highlight the importance of both lower level brain systems traditionally implicated in processing stimulus salience, as well as higher level cognitive systems implicated in understanding others' minds in opinion change. These results further provide new insight into how negative information spreads and the underlying psychological and neurocognitive processes involved.

B – 8

IMPLICIT AND EXPLICIT VISUAL PERSPECTIVE TAKING AS MEASURED BY FAST PERIODIC VISUAL STIMULATION (FPVS)

Alexy A. Beck – University of Louvain; Bruno Rossion – University of Louvain; Dana Samson – University of Louvain
The fast periodic visual stimulation (FPVS) approach has been successfully used to explore low-level vision, spatial and selective attention, and recently face perception. We extended the FPVS approach to explore social cognitive processing level i.e., the processes underpinning our ability to compute explicitly versus implicitly what is seen by someone else. We presented stimuli at a rapid rate of 2.5 images/second (2.5 Hz). All stimuli represented a human avatar (whose identity varied) in a room with an object on one of the walls. The identity and location of the object changed at each stimulation cycle. We presented 4 consecutive stimuli in which both, the participant and the avatar saw the object on the wall, while every 5th image showed a stimulus for which only the participant could see the object. In one condition, participants were asked to explicitly take the other person's perspective. In the other condition, participants were asked to make a judgment unrelated to perspective taking (implicit perspective-taking condition). We identified brain responses at exactly 0.5 Hz (2.5 Hz/5) which represents a clear visual perspective discrimination response between an object seen/unseen by the other person. We found that the brain response was stronger and more widespread across the scalp in the explicit compared to the implicit condition. Furthermore, there was no specific activation in the implicit condition compared to the explicit condition. Overall the results suggest that implicit perspective taking recruits the same processes as explicit perspective taking but that additional processes are recruited in the latter case.

B – 9

DIFFERENTIAL DEVELOPMENTAL IMPACTS OF ABUSE AND NEGLECT ON SYSTEMS ENGAGED IN TASK PERFORMANCE AND EMOTIONAL RESPONDING

Karina S. Blair – Boys Town National Research Hospital; Joseph Aloi – Boys Town National Research Hospital; Harma Meffert – Boys Town National Research Hospital; Stuart White – Boys Town National Research Hospital; Laura Thornton – Boys Town National Research Hospital; Patrick Taylor – Boys Town National Research Hospital; Alita Mobley – Boys Town National Research Hospital; Anna Erway – Boys Town National Research Hospital; Kayla Pope – Boys Town National Research Hospital; R. James Blair – Boys Town National Research Hospital
Exposure to prior maltreatment has been associated with detrimental developmental impacts. However, there have been recent suggestions that a differentiation should be made between the developmental impact of two different forms of maltreatment: abuse (physical, emotional and sexual) and neglect (physical and emotional). Abuse has been widely associated with increased threat responsiveness but the impact of neglect, and whether this is selective, is rather less clear. In this study, youth in a residential care facility and the surrounding community (N=117) who had experienced varying levels of prior maltreatment performed the affective Stroop task during fMRI. Increasing levels of prior abuse were associated with specific disruptions in the recruitment of regions implicated in subjective value representation including the amygdala, ventromedial frontal cortex and posterior cingulate cortex during task trials. In contrast, increasing levels of neglect were associated with a specific disruption in recruitment of bilateral regions of a relatively superior region of anterior insula cortex implicated in attentional processing in the context of threatening distracters. These data demonstrate the adverse developmental impacts of both abuse and neglect and reveal their developmental specificity for systems engaged in task performance and emotional responding.

B – 10

EMPATHIC MODULATION AS A FUNCTION OF COGNITIVE REAPPRAISAL AND FACIAL EXPRESSIONS

Karina C. Borja-Jimenez – Netherlands Institute for Neurosciences; Walter C. Williams – Stanford University; Jamil Zaki – Stanford University; Christian Keysers – Netherlands Institute for Neurosciences; Valeria Gazzola – Netherlands Institute for Neurosciences
Our ability to share the feelings of others can be tracked at the behavioral and at the neural level. However, we might feel empathy but not show it, or we can show empathy without necessarily 'feeling' it depending on our goals and social context. To capture this potential dissociation at the neural level, we asked participants to regulate their feelings or expressions of empathy during the observation of empathy eliciting images. Twenty-five young adults completed a functional magnetic imaging (fMRI) session with the false-belief that their facial responses were being recorded and assessed for legitimacy, and that their brain activity would be used to determine how well they modulated their feelings. We then compared brain activity during trials in which participants were modulating their facial expressions with that while modulating their feelings. Although a substantial network of brain regions was common to all forms of regulation, we identified two networks that were differentially involved. One network around the caudate was more involved in regulating feelings, and this was particularly active when participants were asked to up-regulate their feelings towards the emotions of others. The other network around the mid temporal and inferior frontal gyrus was more active while participants modulated their facial expressions, particularly towards comparatively neutral social stimuli. These results emphasize the importance to look at empathy and its facial

expressions as a motivated process, that participants can finely regulate by using partially distinct neural substrates to influence their feelings and social signalling (in forms of facial expressions), respectively.

B – 11
SOCIAL INFLUENCE ON ADOLESCENT AMBIGUOUS AND RISKY DECISION-MAKING

Barbara R. Braams – Harvard University; Juliet Y. Davidow – Harvard University; Leah H. Somerville – Harvard University

Adolescence is a life period associated with an increase in risk-taking behavior, especially in the context of peers. Risk-taking behavior can be expressed in many ways, such as drinking alcohol, reckless driving and risky sexual behavior. Two factors that are important for the propensity for risk-taking are attitudes towards ambiguity and risk. Ambiguity refers to decisions with unknown probabilities of outcome whereas risk is defined as decisions with known probabilities of outcome. Based on two recent studies, it appears that adolescents are more tolerant for ambiguity than adults (Tymula et al., 2012; Blankenstein et al., 2016). A critical question that remains unanswered is how the social context shapes risk-taking behavior in adolescence in risky and ambiguous decisions. In the current study we used an economic choice task to establish the effect of social context on risky and ambiguous economic decisions. Participants made a series of decisions between a safer and a riskier gamble. Decisions are made in two contexts, a solo context and a social context in which participants are informed about other participants' choices. Most real life decisions are ambiguous and we therefore hypothesize that adolescents are especially influenced by social context when making ambiguous decisions.

B – 12
AGE AND THE ROLE OF EXECUTIVE FUNCTION IN PERSPECTIVE-TAKING

Victoria EA Brunsdon – University of Kent; Elisabeth EF Bradford – University of Kent; Heather J. Ferguson – University of Kent

It has been suggested that, as we age, it is more difficult to take another person's perspective. In addition, an age-related decline in executive function has been reported. This study therefore investigated the age-related differences in perspective-taking and whether executive function may underlie reduced perspective-taking ability in older age. Younger, middle-aged and older adults completed a level-1 visual perspective-taking task (with eye-tracking), and a battery of executive function tasks to assess memory, planning, flexibility and inhibitory control. Older adults had poorer inhibitory control, flexibility, and working memory, but comparable planning ability, compared to younger adults. Reaction times in the visual perspective-taking task significantly increased from young, to middle-aged, to older adults. In addition, older adults were impaired when judging another's perspective when their own perspective differed, indicating a higher degree of egocentric bias in older adults. Statistical models examined how visual perspective-taking ability is related to individual differences in executive function across adulthood. Overall, there is a specific impairment in taking another's perspective when there is interference from our own perspective in late adulthood. This study therefore discusses how the decline in executive function may underlie difficulties in taking another's perspective in later life.

B – 13
TRAIT ANXIETY INFLUENCES SPONTANEOUS EMOTION REGULATION

Daisy A. Burr – Dartmouth College; Alison M. Mattek – Dartmouth College; Tracy C. d'Arbeloff – Dartmouth College; Paul J. Whalen – Dartmouth College

The ability to regulate emotion is an adaptive skill that fosters resilience. Much research has investigated the mechanisms and efficacy of instructed emotion regulation techniques such as cognitive reappraisal and suppression. This study aims to bridge the gap between instructed and spontaneous regulation by investigating individual differences associated with voluntarily choosing to regulate and the selected technique. Specifically, we examine the relationships among choice to regulate, preferred regulation technique, and trait personality differences. Participants (N=30) viewed negatively valenced IAPS images with no explicit regulation instructions and answered free-response questions that assessed what regulation techniques, if any, they spontaneously employed. Descriptively, 40% of the participants spontaneously reported using positive reappraisal, with females using positive reappraisal more frequently than males (58% of females; 11% of males). Participants endorsed other techniques as follows: negative reappraisal (30%), suppression (23%), gaze aversion (13%), and no regulation strategy (16%). In terms of our focus on trait anxiety, those who are more trait anxious are more likely to endorse suppression as a regulation technique (r(28)=-.37, p=.04). These data represent an initial exploration of spontaneous emotion regulation choices and their interactions with personality traits. To follow up, a new group of participants will view negatively valenced IAPS images in an fMRI scanner while regulating according to the strategies selected based upon these behavioral data.

B – 14

LOOKING THE PART (TO ME): EFFECTS OF RACIAL PROTOTYPICALITY ON RACE PERCEPTION VARY BY PREJUDICE

Brittany S. Cassidy – Indiana University Bloomington; Gregory T. Sprout – Indiana University Bloomington; Jonathan B. Freeman – New York University; Anne C. Krendl – Indiana University Bloomington

Less racially prototypic faces elicit more category competition during race categorization. Top-down factors (e.g., stereotypes), however, affect categorizations, suggesting racial prototypicality may enhance category competition in certain perceivers. Because individuals with higher levels of prejudice have more stereotypic visualizations of ethnic minorities, we examined how prejudice affects race category competition and stabilization when perceiving faces varying in racial prototypicality. When analyzing the motor trajectories of 194 White perceivers (Experiment 1), prototypically low versus high Black relative to White faces elicited more category competition and slower response latencies during categorizations, suggesting a pronounced racial prototypicality effect on minority race categorization. However, more prejudice predicted the increased category competition between prototypically low versus high Black faces. Suggesting a potential response conflict mechanism engaging more toward prototypically decreasing Black versus White faces, fMRI data from 30 White perceivers (Experiment 2) showed increased anterior cingulate cortex activity toward Black over White faces as faces decreased in racial prototypicality. Critically, prejudice positively predicted the extent of the racial prototypicality effect elicited in anterior cingulate activity. These findings extend the literatures on racial prototypicality and categorization by showing that relative prejudice tempers the extent of category competition and response conflict engaged when initially perceiving racial outgroup faces.

B – 15

ADOLESCENTS' BEHAVIORAL AND NEURAL RESPONSES TO E-CIGARETTE ADVERTISING

Yvonnes Chen – University of Kansas; Carina H. Fowler – University of North Carolina at Chapel Hill; Vlad B. Papa – University of Kansas Medical Center; Rebecca J. Lepping – University of Kansas Medical Center; Morgan G. Brucks – University of Kansas Medical Center; Andrew T. Fox – University of Kansas Medical Center; Laura E. Martin – University of Kansas Medical Center

Although adolescents are a group heavily targeted by the e-cigarette industry, research in cue-reactivity has not previously examined adolescents' behavioral and neural responses to e-cigarette advertising. This study addresses this gap through two experiments. In Experiment One, adult smokers (n=42) and nonsmokers (n=42) answered questions about e-cigarette and neutral advertising images. The 40 e-cigarette advertising images that most increased desire to smoke were matched to 40 neutral advertising images with similar content. In Experiment Two, the 80 advertising images selected in Experiment One were presented to adolescents of different smoking statuses (n = 30) during an fMRI brain scan. While only adolescent smokers self-reported that viewing the e-cigarette advertising images increased their desire to smoke, all participants showed significantly greater brain activation to e-cigarette advertisements in areas associated with cognitive control (left middle frontal gyrus), reward (right medial frontal gyrus), visual/attention (left lingual gyrus/fusiform gyrus, right inferior parietal lobule, left posterior cingulate, left angular gyrus), and memory (right parahippocampus, left insula). Further, adolescent smokers displayed significantly greater neural activation in response to e-cigarette versus neutral advertising images in the left inferior temporal gyrus/fusiform gyrus. Overall, neural responses to e-cigarette advertisements among adolescent smokers and nonsmokers suggest that e-cigarette advertising is particularly appealing to adolescents and may undermine efforts to control and reduce tobacco use in this group.

B – 16

NEUROCOMPUTATIONAL SUBSTRATES OF DECISION-MAKING UNDER SOCIAL INFLUENCE IN SUBSTANCE USERS

Dongil Chung – Virginia Tech Carilion Research Institute; Brooks King-Casas – Virginia Tech Carilion Research Institute; George I. Christopoulos – Nanyang Technological University; Thomas Newton – Baylor College of Medicine & Michael E. DeBakey VA Medical Center; Richard De La Garza – Baylor College of Medicine & Michael E. DeBakey VA Medical Center; Pearl H. Chiu – Virginia Tech Carilion Research Institute

Previous studies have highlighted the impact of social influence on preferences, especially under conditions of uncertainty. Social influence is of particular interest for substance-abusing individuals, since social factors are prominent influences on first use and relapse. The aim of the current study is to examine mechanisms of decision-making among social others, with a focus on how substance use affects decision-making where social and non-social information coexist. Thirty-two male cocaine dependent individuals and thirty matched controls participated in the current study. Participants made a series of forced choices between two gambles (one "risky" and one "safe"), alone and after viewing other players' decisions. Blood-oxygen-level-dependent (BOLD) responses during the presentation of others' choices were measured and analyzed. Using model-based fMRI analyses, this work shows that biased perceptions of risk probability contribute to cocaine dependent individuals' decisions under social influence. This bias was observed only among individuals with cocaine use disorder, and trial-by-trial subjective value adjusted by the

probability bias was parametrically correlated with vmPFC activity. We will discuss the implications of these data for understanding social influences on decision making in adolescents at risk for substance use disorders. Together, these data provide a neuromechanistic account of how social and non-social information are integrated and how these processes may be affected in substance users.

B – 17

INFORMATION INTEGRATION IN ECONOMIC VALUE JUDGMENTS: SHIFT FROM AFFECTIVE TO DELIBERATIVE DECISION NETWORK REGIONS

Lindsay Conner – University of Central Florida; Ian Dalton – University of Central Florida; Marilyn Horta – University of Florida; Desiree Gulliford – University of Florida; Ian Frazier – University of Florida; Natalie Ebner – University of Florida; Nichole Lighthall – University of Central Florida

Previous research indicates that two processing systems support decision making – the automatic/affective system and the controlled/deliberative system (e.g., Kahneman, 2003; Sanfey & Chang, 2008). Memory-based value judgments may depend on both systems, but it is presently unclear if one system is ideally suited to support judgments that rely on integrating recently learned affective information. The present fMRI study examined involvement of these two neural systems for value judgments requiring either simple retrieval of previously learned affective information or retrieval with information integration. Stimuli included product images with consumer review excerpts from an online shopping website. First, participants rated the emotional valence of consumer reviews. Products were presented with a single consumer review or with two different reviews on non-consecutive trials. Then, participants estimated the average consumer rating for each product the consumer reviews presented. Judgment accuracy was determined from the similarity between participants' average valence rating(s) for review comments and their estimations of the average consumer rating for each product. Results indicated that value judgments requiring information integration were associated with greater involvement of deliberative processing regions (e.g., dorsal attention and executive control regions) compared with judgments requiring simple memory retrieval. In contrast, a region in the affective network (vmPFC) supported high-accuracy judgments to a greater extent in the simple retrieval versus integration condition. These results suggest that when judgment-relevant past experiences are limited, retrieval of one additional piece of information can cause a shift in the effective decision network from ventral affective regions to dorsal executive control regions.

B – 18

YIELDING TO SOCIAL SUPPORT CORRESPONDS WITH DIMINISHED NEURAL RESPONSE TO SOCIAL THREAT WHILE ALONE

Andrea M. Coppola – University of Virginia; Marlen Z. Gonzalez – University of Virginia; James A. Coan – University of Virginia

Holding hands with a supportive partner is associated with attenuated neural response to threat of electric shock (Coan et al., 2006). The degree of attenuation varies by individual, but these individual differences are not well characterized. We speculate that the ability to benefit neurally from social support may be dispositional, in that it may be relatively stable across time and co-vary with other trait-like individual differences. In this study, we investigated whether the degree of social context dependent attenuation in threat-related neural activity (an effect we call "yielding") can predict neural response during a subsequent social exclusion task. Based on previous findings, we selected two regions of interest, the dorsolateral prefrontal cortex (dlPFC) and the dorsal anterior cingulate cortex (dACC). We operationalized yielding as the difference between activation during the alone and partner conditions in those regions (with a greater difference indicating more yielding). 76 participants underwent fMRI while alone, holding hands with a stranger, and holding hands with a partner during threat of shock. All participants then completed a social exclusion task while fMRI data was collected. We observed that higher yielding in the dlPFC and dACC during the handholding task corresponded with decreased activity during social exclusion in the lateral occipital cortex, precuneus, right dlPFC, vmPFC, and superior parietal lobule (cluster-extent corrected: $Z = 2.58$, $p = 0.05$). These results suggest 1) that yielding may vary in trait-like ways across individuals, and 2) that yielding may co-vary with sensitivity to, and self-regulation during, the threat of social exclusion.

B – 19

THE NEURAL SUBSTRATES OF PERSON EVALUATION BASED ON PERSON-KNOWLEDGE

Tzipporah P. Dang – University of Chicago; Jasmin Cloutier – University of Chicago; Jennifer T. Kubota – University of Chicago

Person evaluation can be based on perceptually available characteristics, such as attractiveness, or on knowledge specific to a person, such as their accomplishments. In the current event-related fMRI experiment, we aimed to identify neural substrates supporting evaluative judgments based on either perceptual characteristics or person-knowledge. To do so, we asked participants to perform attractiveness and likability based on body of work judgments on familiar faces (i.e., actors) and attractiveness judgments on unfamiliar faces (i.e., models). The results from 45

white, male participants reveal preferential neural activation in vmPFC during person evaluations based on person-knowledge in contrast to evaluations based on perceptual characteristics for both familiar and novel individuals. From these results, we discuss the implications for our understanding of the extended brain networks involved in person perception and elaborate on the differences between person evaluations of targets based on prior knowledge and impressions based on perceptual cues alone.

B – 20
"NOTHING IS FOREVER", IS THIS A HAPPY ENDING? NEURAL CORRELATES OF INTEROCEPTION AND MINDFUL ATTENTION

Sarah De Coninck – Vrije Universiteit Brussel; Elien Heleven – Vrije Universiteit Brussel; Frank Van Overwalle – Vrije Universiteit Brussel; Peter Mariën – Vrije Universiteit Brussel & ZNA Middelheim

Many studies have explored the neural correlates and emotional effects of mindfulness, but they rarely focused on its subcomponents and their effectiveness. This study investigates two components of a short mindfulness training: interoception (turning attention to bodily sensations) and mindful attention (observing these bodily sensations as transient mental events). Moreover, we took into account mindful disposition. All study participants (n=32) were trained in three emotion processing strategies: 1) immersion (control condition), 2) interoception alone and 3) mindful attention of interoceptive sensations. In the fMRI scanner participants viewed negative pictures while applying the strategies. After each picture, they rated subjective valence and arousal. Participants felt the most positive and least aroused in the mindful attention condition. The left amygdala was more active in the interoception condition compared to both the immersion and the mindful attention condition. Several other clusters of the mentalizing network showed a linear trend, being progressively more active in the interoception condition and the most in the mindful attention condition, compared to the immersion condition. In addition, the relationship between the conditions while applying the strategies and activity in the dorsomedial prefrontal cortex (dmPFC) and the insula was attenuated by mindful disposition. Taken together, the behavioral and neuroimaging data suggest that mindful attention adds to the beneficial effects of an interoceptive focus. Moreover, neural activation while applying the strategies, is modulated by mindful disposition.

B – 21
SMALLER AMYGDALA VOLUME AND INCREASED NEUROTICISM PREDICT ANXIETY, BUT NOT DEPRESSION SYMPTOMS, IN HEALTHY SUBJECTS: A VOLUMETRIC APPROACH USING MANUAL TRACING

Sanda Dolcos – University of Illinois at Urbana-Champaign; Yifan Hu – University of Illinois at Urbana-Champaign; Zachariah Bertels – University of Illinois at Urbana-Champaign; Benjamin Olivari – University of Illinois at Urbana-Champaign; Audra Chaves – University of Illinois at Urbana-Champaign; Matthew Moore – University of Illinois at Urbana-Champaign; Florin Dolcos – University of Illinois at Urbana-Champaign

Volumetric changes in the amygdala have been identified in affective disorders, and also in nonclinical populations with high anxiety and depression scores. However, the reported patterns of change (increase or decrease) have not been consistent in the literature, likely due to the employment of different methods to determine the amygdala volume (i.e., manual tracing, in psychiatric research vs. automated methods, in non-clinical research). Here, we employed precise assessments of amygdala volume using manual tracing, and examined a possible mediating role of neuroticism (a personality risk factor linked to vulnerability to affective disorders and associated with altered amygdala volume) in the relationship between amygdala and symptoms of affective dysregulation (anxiety and depression). Fifty-seven healthy participants underwent anatomical MRI scanning and completed questionnaires measuring neuroticism, anxiety, and depression. Our investigation yielded two main findings. First, smaller amygdala volume was linked to higher levels of neuroticism and trait anxiety. Second, neuroticism mediated the relationship between amygdala volume and trait anxiety. Importantly, these findings were specific to anxiety, as similar relationships were not identified for depression. Collectively, these findings advance our understanding of associations between amygdala volume and symptoms of affective dysregulation, and provide insight into dissociations among the related theoretical constructs of neuroticism, anxiety, and depression. These findings also provide support for a brain-personality-symptom framework of understanding affective dysregulation, which may help inform the development of prevention and intervention paradigms targeting preservation of amygdala volume and reduction of neuroticism, to protect against anxiety symptoms.

B – 22
AFFECTIVE MODULATION OF VISUAL PERCEPTION

Stephanie Dubal – ICM (Brain and Spine Institute); Mariam Chammat – ICM; Gwladys Rey – Geneva University; Kenneth Knoblauch – Stem-Cell and Brain Research Institute

We will present a series of experiments designed to explore how physical and affective properties interact in visual perception. We used a conjoint measurement model that allows the assessment of separate contributions of two (or

more) attributes to perceived differences in stimuli. Emotional and contrast levels of natural scenes were scaled to assess how judgment along one dimension is influenced by the level of the other. In a given session, observers judged either which image was of higher contrast or of higher emotion. Judgments were analyzed using Maximum Likelihood Conjoint Measurement (MLCM) the aim of which is to estimate scale values, whose additive combination best captures the observer's judgments of the perceptual difference between the stimuli in each pair. The results show that the contrast level and emotion level interact in determining perceived contrast but also that the contribution of emotion to contrast perception is additive. fMRI data further illustrate that emotion contribution to visual appearance occurs in the early visual cortex, and EEG data points out an early contribution around 100 ms post stimulus onset. Thus, the physical appearance of a stimulus is modulated by its affective content.

B – 23
THE NEURAL CORRELATES OF LEARNING A SOCIAL NETWORK

Sarah L. Dziura – George Mason University; James C. Thompson – George Mason University
Social functioning involves learning about the social networks in which we live; knowing not just our friends, but also about friends of our friends. In this study, we examined how we learn and represent these social relationships, using fMRI. Participants (N = 22) first implicitly learned the structure of two social networks by making arbitrary personality comparisons between pairs of network members, where the frequency of pair presentation reflected closeness within the network. Participants then reported network connections and closeness of each pair (d' = 1.2; correlation between true and reported network closeness mean r = 0.54, sd = 0.21). In a subsequent fMRI scanning session, participants were shown each face and 12 novel faces for one second in random order and detected repeats. Searchlight-based Representation Similarity Analysis (RSA) revealed that the accuracy of social network learning correlated with neural pattern similarity between faces in left temporoparietal junction and subcallosal cingulate (p < 0.05, permutation test, threshold-free cluster enhancement correction). That is, the closer the participants' recall of the closeness of each pair was to true network closeness, the more similar the neural patterns between each face pair. These findings indicate that these areas of the social brain not only process knowledge and understanding of others, but also support learning relations between individuals in groups.

B – 24
ARE YOU LOOKING AT ME? MU SUPPRESSION MODULATION BY FACIAL EXPRESSION DIRECTION

Noga S. Ensenberg – The Hebrew University of Jerusalem; Anat Perry – University of California; Hillel Aviezer –The Hebrew University of Jerusalem
Imagine you are walking down the street while encountering a stranger yelling angrily at you. Now imagine a similar situation with the stranger yelling at the person walking right beside you. Undeniably, the subjective experience of being the target of one's expression greatly differs yet the neural mechanisms underlying this distinction are largely unknown. Simulation Theory proposes that we understand others' minds by simulating their actions, possibly via mirror neurons (MNs), but is this system sensitive to the degree of social interaction and dynamic engagement? We measured EEG Mu rhythms' suppression as a manifestation of MNs activity while participants viewed video clips of dynamic facial expressions. Critically, the videos portrayed facial emotions which turned towards or away from the viewer, thus manipulating their degree of social relevance. Mirroring activity increased as a function of social relevance such that expressions turning toward the viewer resulted in increased sensorimotor activation (i.e., stronger mu suppression) compared to identical expressions turning away from the viewer. Additional analyses confirmed that expressions turning toward the viewer were perceived as more relevant and engaging than expressions turning away from the viewer, a finding not explained by perceived intensity or recognition accuracy. Mirror sensorimotor mechanisms may play a key role in determining the relevance of perceived facial expressions.

B – 25
READING POETRY INCREASES ADULTS' EMPATHETIC TRAITS AND MODERATES PHYSIOLOGICAL AROUSAL

Giulio Gabrieli – University of Trento; Mengyu Lim – Nanyang Technological University; Chiara Bolcato – University of Trento; Anna Truzzi – University of Trento & Brain Science Institute, RIKEN; Paola Rigo – Nanyang Technological University; Luca Onnis – Nanyang Technological University; Gianluca Esposito – University of Trento & Nanyang Technological University
Empathic abilities can be promoted by reading literary fiction, since understanding fictional narrative requires more authors' intentions interpretation than journalistic or academic writing. Here, we aimed to investigate whether reading a poem, which involves higher levels of interpretation than prose, increases trait empathy levels. In Study 1, 70 adults (Italy=30,Singapore=40) read either a poem or a non-poem over the same topic (family bonding). Trait empathy levels were measured before and after text presentation through self-reported questionnaires, while ECG recordings were taken during text presentation. To rule out attention modulation, in Study 2 EEG measurements were recorded from 45 participants (Italy=16,Singapore=24) who read both the poem and the non-poem. In both

studies participants' literary knowledge was assessed using the Authors' Recognition Test. Results from Study 1 indicate that the poem increases empathy trait levels, especially in individuals with a lower empathetic baseline, and physiological arousal, as highlighted by increased low frequencies and decreased variability in participants' heart rate, compared to the non-poem. EEG measurements revealed that the poem's effect was not due to attentional modulation since no difference in frontal areas' gamma waves was found. Rather, poem reading enhanced participants' relaxation as highlighted by alpha activity increase. Same results were obtained in both Western and Eastern populations, thus lending support to effects generalizability. Our findings suggest that reading poetry engages measurable physiological aspects of emotion interpretation and perspective-taking. As such, poetry exposure could be beneficial in helping people increase their empathetic behaviors.

B – 26
CONSTRUCTING GRATITUDE BY INTEGRATING SELF-BENEFIT AND OTHER-COST PROCESSING IN AN INTERPERSONAL CONTEXT
Xiaoxue Gao – Peking University; Hongbo Yu – University of Oxford; Xiaolin Zhou – Peking University
There are two determinant of interpersonal gratitude: benefit to the beneficiary (i.e. self-benefit) and cost of the benefactor (i.e. other-cost). However, it is unclear how the brain encodes and integrates these factors to give rise to gratitude. In the current fMRI study, we parametrically manipulated self-benefit and other-cost in an interactive task where a partner is given the choice to help participants avoid pain stimulation at his/her own cost. In each trial, participants were informed about the level of pain they would receive and the amount of money the partner would need to pay if he/she wished to cancel this pain stimulation. Then the partner's decision (Help or Not Help) was presented. After scanning, participants rated their gratitude for each condition. Self-benefit encoding was associated with reward-related areas such as ventral striatum (VS), whereas other-cost encoding involved mentalizing-related areas such as temporoparietal junction (TPJ). A regression model was used to separate the contributions of self-benefit and other-cost to gratitude, in which the regression coefficients for these two predictors reflected individual weight on self-benefit and other-cost in generating gratitude. To reveal the neural correlates underlying gratitude, we derived an index for trial-by-trial gratitude (i.e. constructed gratitude) by multiplying these coefficients with self-benefit and other-cost for each trial. The constructed gratitude positively correlated with signal in ventromedial prefrontal cortex (vmPFC). Dynamic causal modeling suggested that vmPFC functioned as a central node for the integration of self-benefit and other-cost. Our findings shed light on how the brain constructs gratitude in an interpersonal context.

B – 27
DEVELOPMENTAL PATTERNS OF HOT AND COOL EXECUTIVE FUNCTIONS IN CHILDREN
Joana Gonçalves – University of Porto; Fernando Barbosa – University of Porto
In the last years, the multidimensional construct of executive functioning has been conceptualized in two dimensions: (1) the cool cognitive aspects more associated with dorsolateral regions of prefrontal cortex, and (2) the hot affective aspects more associated with ventral and medial regions. This study examined the developmental patterns of both hot and cool executive functions from preschool children up to adolescence. A total of 70 participants clustered into seven age groups (5-6, 6-7, 7-8, 8-9, 9-10, 10-11, and 11-12) completed the Iowa Gambling Task for Children (IGT), and 4 subtests included in the Neuropsychological Assessment Battery (NEPSY-II): Affect Recognition (AR), Theory of Mind (TOM), Design Fluency (DF), and Auditory Attention (AA). Age-related improvements were found in all tasks, except in the IGT, which can be explained by children`s "myopia for the future", i.e., children`s insensitivity to future consequences and hypersensitivity to reward, opting for choices that yield high immediate gains in spite of higher future losses. Overall, the developmental pattern of cool executive functions was characterized by a rapid development in early childhood with significant differences between the 5-6 and 6-7 age groups, reaching a plateau approximately at 7-8 years, with only minor improvements after that. The hot executive functions presented an inconsistent developmental pattern, punctuated by advances and regressions, suggesting a protracted development possibly with improvements after adolescence. Partial correlations, controlling for age, showed significant associations between performance on Hot and Cool EF tasks, suggesting that they work in concert and may rely on the same mechanisms.

B – 28
THE ROLE OF PREFRONTAL CORTEX ACTIVITY IN EXPLAINING GENDER DIFFERENCES IN EMOTION REGULATION: EVIDENCE FROM TRANSCRANIAL DIRECT CURRENT STIMULATION
K. Elise Goubet – University of Kansas; Evangelia G. Chrysikou – University of Kansas
Gender differences in emotion regulation (ER) is a topic that remains largely unexplored within the cognitive and affective neuroscience literature. Previous research suggests that men and women regulate their emotions differently, both with regards to the strategies they use to regulate emotional responses and the neural regions associated with such regulation. For example, during a cognitive reappraisal task men exhibit lower increases in

prefrontal cortex activity and greater decreases in amygdala activity than women. Interestingly, gender differences do not necessarily characterize the effectiveness of ER processes. This suggests that men and women may engage in ER following different strategies that involve different neural circuits. However, the precise neural mechanisms underlying these differences are not fully understood. In this study, we examined gender differences in ER by using anodal (excitatory), cathodal (inhibitory), or sham transcranial direct current stimulation (tDCS) over the left dorsolateral prefrontal cortex (dlPFC) to investigate the effects of increased or decreased dlPFC excitability on cognitive reappraisal as measured by subjective emotional arousal ratings and skin conductance responses. Our results from both measures confirm past findings on gender differences in ER; they further suggest that these effects have their origins in baseline differences in dlPFC activity between males and females, which can be causally manipulated with tDCS. We discuss the implications of these results for theories of emotion regulation and dlPFC function.

B – 29
INSTRUMENTAL SOCIAL LEARNING ACROSS CONTEXTS
Leor M. Hackel – Stanford University; Peter Mende-Siedlecki – University of Delaware; Karin Foerde – Columbia University Medical Center; David M. Amodio – New York University
Human social relations take place in different contexts: a colleague who offers excellent advice in the office may struggle to read emotions at a party. To navigate the social world, people must learn about these stable yet context-specific characteristics of others. In a series of behavioral (combined N = 187) and functional MRI (N = 30) experiments, we examined how people learn from probabilistic reward feedback and trait feedback during instrumental social encounters in different contexts. Participants made choices to "hire" one of four partners who answered verbal and math GRE questions to win points worth money. Partners were associated with different levels of competence in verbal and math domains (defined as the proportion of available points partners earned), and different levels of reward in each domain (defined as the number of points partners, and therefore participants, earned). Computational modeling of behavior revealed that participants learned context-specific competencies through instrumental feedback, and relied more heavily on this information during decision-making than on context-specific rewards or global (cross-context) trait inferences of interaction partners. Competence prediction errors were associated with BOLD signal in ventral striatum, as well as with regions previously implicated in social impression updating (ventrolateral prefrontal cortex, inferior parietal lobule). Finally, when confronted with novel contexts, participants flexibly generalized instrumentally-learned trait knowledge depending on similarity to original learning contexts. These findings reveal a process whereby people form context-specific impressions, relying on neural regions linked both to reward learning and single-context impression updating, and use this knowledge flexibly in social decisions.

B – 30
OOH LA LA! THE SEXUAL RESPONSE IS A CANDIDATE BASIC EMOTION
Kate A. Hardwick – Macquarie University; Christian Keysers – Royal Netherlands Academy of Arts and Sciences; Mark A. Williams – Macquarie University
Pathogen disgust motivates behaviours geared toward avoiding disease threats and moral disgust motivates behaviours that aid in avoiding moral transgressors. A third type of disgust has been identified, sexual disgust, which motivates behaviours to avoid deleterious mating strategies. Discrete emotion theory suggests that each basic emotion shows distinct physiological and behavioural responses, and sub-categories of a basic emotion should typically share those responses. If these three types of disgust share avoidance strategies typical of the emotion 'disgust,' then humans should show similar responses in the same task. The emotional stroop task has been successfully used to investigate the cognitive effects of emotionally charged words, where reaction times tend to slow in response to emotional words compared with neutral words. We used the stroop paradigm to test the hypothesis that reaction times would slow differentially in response to the three types of disgust. Participants were presented with words in three disgust categories and two controls (one negative and one neutral) detecting the colour of the ink in which the words were presented. The results show that participants were slower at detecting the colour of words associated only with the sexual category. Additionally, a word recall task revealed that words associated with the sexual category were remembered more than any other category. This research provides evidence that 'sexual' as an emotion may be a candidate as a separate basic emotion in discrete emotion theory.

B – 31
CORE BODY TEMPERATURE MODERATES INTERGROUP BIAS IN FACE REPRESENTATIONS
Youngki Hong – University of California, Santa Barbara; Kyle G. Ratner – University of California, Santa Barbara
A recent study in our lab suggests that administration of acetaminophen, an antipyretic drug, to non-febrile individuals results in blunted intergroup bias in face representation. This finding inspired us to investigate the relationship between core body temperature and intergroup bias in face representations. In the current study, we

found that participants at the lower 20% of core body temperature distribution show less evaluative bias in mental representations of minimally defined ingroup and outgroup faces compared to participants at the middle and upper 20% of the distribution. Specifically, ingroup and outgroup faces generated by participants with low body temperature were evaluated equally on many positive and negative traits by the independent raters. In contrast, ingroup faces were evaluated more favorably than outgroup faces among participants with middle and high body temperature. The present work provides new insight into how physical warmth relates to intergroup bias.

B – 32
DIMINISHED SADNESS PHYSIOLOGICAL REACTIVITY IN SUBTYPES OF FRONTOTEMPORAL DEMENTIA

Alice Y. Hua – University of California, Berkeley; Sandy L. Lwi – University of California, Berkeley; James J. Casey – University of California, Berkeley; Kuan-Hua Chen – University of California, Berkeley; Casey L. Brown – University of California, Berkeley; Bruce L. Miller – University of California, San Francisco; Robert W. Levenson – University of California, Berkeley

Frontotemporal dementia (FTD) refers to a group of neurodegenerative diseases that target the frontal and anterior temporal lobes, regions that support emotion and social behavior. Previous work has focused on changes to emotional functioning in behavioral variant FTD (bvFTD), whereas few studies have examined emotional changes in the language variants of FTD, including non-fluent primary progressive aphasia (nfvPPA) and semantic variant primary progressive aphasia (svPPA). We assessed sadness reactivity in patients with bvFTD, nfvPPA, svPPA, and healthy controls (n = 25 in each group). Participants viewed a film clip that elicited sadness while peripheral physiology was recorded. Participants were asked about their subjective emotional experience after viewing the film clip, and emotional facial behavior was recorded and coded throughout the film with the Facial Action Coding System (FACS). Analyses (controlling for sex, age, disease severity, medication) revealed a main effect of diagnosis for physiological reactivity to the sad film (p <.001). No main effect of diagnosis was found for subjective emotional experience or emotional facial behavior. Follow-up analyses revealed that patients with bvFTD, nfvPPA, and svPPA had lower physiological reactivity compared to healthy controls. These findings suggest that reactivity for sadness is altered in all FTD subtypes (including language variants), likely due to atrophy in emotion-relevant neural systems that support a physiological response to sadness.

B – 33
COGNITIVE CONTROL ALLOCATION IS MODULATED BY LEVEL OF INTRINSIC REWARD: RESULTS FROM THREE BEHAVIORAL AND ONE FUNCTIONAL MAGNETIC RESONANCE IMAGING STUDIES

Richard Huskey – The Ohio State University; Britney Craighead – University of California, Santa Barbara; Michael B. Miller – University of California, Santa Barbara; Rene Weber – University of California, Santa Barbara

Cognitive control (Miller & Cohen, 2001) is an important framework for understanding the neuropsychological processes that underlie the successful completion of everyday tasks. Only recently has research in this area investigated motivational contributions to control allocation (Botvinick & Braver, 2014). An important gap in our understanding is the way in which intrinsic rewards associated with a task motivate the sustained allocation of control (Braver et al., 2014). In three behavioral (n = 122, 110, 87) and one functional magnetic resonance imaging (n = 18) studies, we use a naturalistic and open-sourced simulator to show that changes in the balance between task difficulty and an individual's ability to perform the task result in different levels of attentional engagement and intrinsic reward which motivates dynamic shifts between networked brain states. Brain-mapping and psychophysiological interaction analyses show that high levels of intrinsic reward associated with a balance between task difficulty and individual ability correspond with increased connectivity between cognitive control and reward networks. By comparison, a mismatch between task difficulty and individual ability is associated with lower levels of intrinsic reward and corresponds to increased activity within the default mode network. Insular activation suggests that motivational salience, as defined by the level of intrinsic reward, drives shifts between networked brain states associated with task engagement or disengagement. These results underscore recent theorizing suggesting that higher order cognitions and their resulting behaviors are not easily reducible to their lower-level constitute parts, especially when considering the relationship between cognition and motivation (Pessoa, 2008).

B – 34
HIGH STAKES ACCELERATE REINFORCEMENT LEARNING

Catherine Insel – Harvard University; Mia Charifson – Harvard University; Gina Falcone – Harvard University; Leah H. Somerville – Harvard University

Reinforcement learning comprises the process of incrementally updating value representations based on the receipt of feedback such as rewards and punishments. This incremental form of learning guides optimal decision making and future behavior, and allows humans to utilize cues in the environment to approach positive and avoid negative outcomes. But it remains unclear whether high and low stakes rewards and punishments differentially shape reinforcement learning over time. To test this question, 32 young adults completed a probabilistic reinforcement

learning task while undergoing fMRI. In this task, participants repeatedly selected between fractals in a pair and received probabilistic monetary outcomes based on their choices. There were four fractal pairings that represented different monetary stakes: high gain (+50¢/+0¢), low gain (+25¢/+0¢), high loss (-50¢/-0¢), and low loss (-25¢/-0¢). Performance analyses revealed a condition by time interaction, such that the speed of learning over time varied by motivational condition. Learning improved the fastest for high gain and high loss conditions. These findings reveal that high stakes rewards and punishments accelerate the learning of probabilistic contingencies. While prior work has shown that learning improves for gains compared to losses, we observed no effect of learning to approach gains versus avoid losses. These findings indicate that high value stakes have a greater influence on learning than contextual valence. Computational models will reveal how stakes and valence influence incremental updating to feedback on a trial-by-trial basis. Neuroimaging analyses will illuminate how stakes modulate prediction error responses to unexpected rewards and punishments in the mesolimbic dopamine circuit.

B – 35
NEURAL RESPONSE TO UNPREDICTABLE PEERS IN YOUTH AT-RISK FOR SOCIAL ANXIETY PREDICTS SOCIAL ANXIETY SYMPTOMS 2-YEARS LATER
Johanna M. Jarcho – Stony Brook University; Ashley R. Smith – National Institute of Mental Health; Stefanie Sequeira – University of Pittsburgh; Nathan A. Fox – University of Maryland; Heather Henderson – University of Waterloo; Ellen Leibenluft – National Institute of Mental Health; Daniel S. Pine – National Institute of Mental Health; Eric E. Nelson – Nationwide Children's Hospital
The neural mechanisms that promote adolescent onset of social anxiety remain poorly defined. This may be due to methodological challenges intrinsic to studying social interactions during fMRI, and a paucity of longitudinal data characterizing the transition from risk to social anxiety onset. To address these issues, 11-year olds at high (N=30) vs low (N=23) risk for social anxiety, based on longitudinally assessed childhood social reticence (SR), completed the Virtual School paradigm which models brain function during real-time, ongoing social interactions. Brain function was used to predict social anxiety at age 13. Participants learned they will interact with "Other Students" who have a reputation for being 'nice', 'unpredictable, or 'mean.' During fMRI, participants enter classrooms populated by Other Students. They are cued to anticipate social evaluation when "Typing..." appears above each Other Student. Anticipating unpredictable, relative to predictably mean or nice, evaluation was associated with heighted activity in bilateral insula and dorsal anterior cingulate (dACC) for high-vs-low SR youth (p<005; ke > 70 voxels). Although SR was unrelated to social anxiety at age 11, those with a history of high-vs-low SR had more symptoms at age 13, t=2.14, p<.05. Moreover, heightened engagement of bilateral insula and dACC at age 11 were associated with greater social anxiety symptoms at age 13 (r's > .39, p's<.05). Thus, during early adolescence, at-risk youth differentially engaged circuits implicated in a salience processing, depending on the type of social evaluation they anticipate. These alterations, in turn, predict the development of social anxiety symptoms in later adolescence.

B – 36
MVPA TESTING FOR CO-OPTED HIGHER-ORDER SOCIAL COGNITION IN AUTISM
Heejung Jung – University of Colorado Boulder; Maya G. Mosner – University of North Carolina at Chapel Hill; Edward McLaurin – Duke University; Shabnam Hakimi – Duke University; Jacob M. Parelman – University of Colorado Boulder; Jessica Kinard – University of North Carolina at Chapel Hill; Payal Chakraborty – Duke University; Gabriel S. Dichter – University of North Carolina at Chapel Hill; R. McKell Carter – University of Colorado
Individuals with autism spectrum disorders (ASDs) often have strong interests in non-social objects. The visual representation of these objects of interest may result in co-opting of social cognitive brain regions. In one individual with ASD, face responsive areas of cortex have shown to respond more strongly to a cartoon of interest than human faces. We predict that higher-order social cognitive regions in neurotypical individuals may be similarly co-opted to respond to restricted interests during strategic interactions in individuals with ASD. Individuals with ASD and matched neurotypical individuals played a simplified poker task with a computer opponent and live human opponent, while being scanned. Unique combinatorial performance (UCP) analysis, a multivariate pattern analysis technique, was implemented to isolate areas of the brain that uniquely predict the bet/fold decision only against the human opponent, providing evidence of social involvement of the region. Preliminary multivariate analyses of ASD and neurotypical groups indicate that UCP in the brains of neurotypical individuals' is better when interacting with a human opponent, while the opposite pattern was found for individuals with ASD. That is, multiple brain regions in neurotypical individuals provided more information that uniquely predicted bet/fold decisions against a human opponent than against a computer opponent. For individuals with ASD, multiple brain regions provided uniquely predictive information when playing against a computer opponent. Different patterns of UCP during strategic gameplay in individuals with ASD and neurotypical individuals provide early support for the co-opting of higher-order social cognitive areas of the brain.

B – 37

LOVINGKINDNESS MEDITATION ENGAGES NEURAL MARKERS OF SOCIAL COGNITION AND REDUCES INTERGROUP BIAS

Yoona Kang – University of Pennsylvania; Emily B. Falk – University of Pennsylvania

Prejudice against stigmatized outgroups arises in part from failures to perceive group members as fully human, and hence as social targets. For example, depictions of dehumanized outgroups, such as drug addicts and homeless people, do not elicit neural activity within the brain's social cognition regions whereas those of other groups do. This suggests that increasing social perception may be one path to bias reduction. In line with this idea, making positive wishes for others through lovingkindness meditation has been shown to decrease implicit bias against homeless people; however, the mechanisms of such effects remain unclear. The current study tested whether changes in social cognition may underlie the effect of lovingkindness meditation on bias reduction against drug addicts. Brain regions implicated in social cognition, including ventromedial prefrontal cortex (vmPFC) and right temporal parietal junction (rTPJ), were monitored during lovingkindness meditation using fMRI. Participants (n=67) were randomly assigned to complete a lovingkindness or control task, and each task was reinforced via daily text messages for a month. Participants' pre to post changes in implicit bias were assessed using an implicit association task. Lovingkindness meditation, compared to the control task, recruited greater activity within the vmPFC and rTPJ. In turn, those in the lovingkindness meditation condition went on to show decreases in implicit bias against drug addicts compared to controls over time. The current findings suggest that lovingkindness meditation may be one way to enhance consideration of others' minds and that this can help reduce deeply rooted automatic bias against stigmatized outgroup members.

B – 38

SOCIAL SKILLS RELATED TO MOTOR MOTOR SKILLS IN CHILDREN AND ADOLESCENTS WITH AUTISM SPECTRUM DISORDER

Emily Kilroy – University of Southern California; Laura Harrison – University of Southern California; Alyssa Concha – University of Southern California; Elizabeth Goo – University of Southern California; Christiana Butera – University of Southern California; Sharon Cermak – University of Southern California; Lisa Aziz-Zadeh – University of Southern California

While social deficits are the hallmark of Autism Spectrum Disorder (ASD), impaired performance of skilled gestures, referred to as dyspraxia, and coordination skills are consistently reported in children with ASD. There is some evidence to suggest motor impairment is related social impairment, however, the neurological basis for motor impairment in ASD is not yet well understood. The aim of this study is to understand the relationship between social and motor skills in ASD and typically developing (TD) children and adolescents. Social and motor skills data were collected on ten high-functioning children with ASD (6 males, 4 females; mean age 11y 2m [SD 9m], and 12 typically developing (TD) controls (8 males, 4 females; mean age 11y 6m [SD 1y 3m]. Motor skills measured by the Movement Assessment Battery for Children-2 (MABC) (Henderson, 2007) and social skills measured by Social Responsiveness Scale, 2nd Edition (SRS-2) (Aldridge, 2012) and the Interpersonal Reactivity Scale (IRI) (Davis, 1980) were correlated. The MABC-2 and SRS were correlated across all participants (R=-.61, p= .002) and the MABC-2 and IRI were significantly correlated in the ASD (R=.78, p=.002) group but not in the TD group (R=.78, p=.382). Results suggest that children and adolescents with weaker motor skills have greater deficits in empathy and that motor skills may be related to core features of ASD. Ongoing data collection and analysis will relate social and motor skills to blood oxygen level dependent changes in neural networks during rest related to motor and social processing.

B – 39

CORRELATIONS BETWEEN GRAY-WHITE MATTER BLURRING IN PREFRONTAL LOBE REGIONS AND COGNITIVE SET-SHIFTING IN HEALTHY ADULTS

Carl Kim – St. Paul's School; Joehyun Kim – Academy for Medical Science Technology; Sanford Kim – Horace Mann School

Humans have a unique capacity for higher-order cognition such as planning and multitasking. These abilities are collectively referred to as "executive functions." This study investigates cognitive set-shifting, a type of executive function that involves shifting from one task to another. Advances in neuroimaging have allowed for the structural integrity of specific frontal-lobe subregions to be probed with greater resolution. One such measure is the intensity contrast between cortical gray and white matter (GWC), with greater contrast indicating better development (Blackmon et al., 2011). This study tested whether GWC in 8 subregions of the Prefrontal Cortex (PFC) was associated with set-shifting abilities in 61 healthy controls. Set-shifting abilities were measured using two neuropsychology tests: Trail Making Test B (TMT-B) and Wisconsin Card Sorting Test-Perseverative Errors (WCST-PE), with a third test, the Boston Naming Test (BNT), used to determine the discriminant validity of set-shifting findings. Cognitive set-shifting was significantly correlated with GWC in the left ventrolateral PFC (Broca's area), the

left and right middle frontal gyri (dorsolateral PFC), and the left and right superior frontal gyri. These findings indicate that successful set-shifting relies on the structural integrity of ventrolateral and dorsolateral PFC but not the basal orbitofrontal regions.

B – 40
ALTERED NEURAL HABITUATION TO EMOTIONAL FACES IN PEDIATRIC AND ADULT BIPOLAR DISORDER

Maria E. Kryza-Lacombe – San Diego State University/University of California, San Diego, Joint Doctoral Program in Clinical Psychology; Jillian Lee Wiggins – Department of Psychology, San Diego State University; San Diego State University/University of California, San Diego, Joint Doctoral Program in Clinical Psychology; Melissa A. Brotman – Emotion Development Branch, National Institute of Mental Health; Jill Weisberg – San Diego State University; Carly Farrington – San Diego State University; Raechel Rodda – San Diego State University; Kenneth Towbin – Emotion Development Branch, National Institute of Mental Health; Daniel S. Pine – Emotion Development Branch, National Institute of Mental Health; Ellen Leibenluft – Emotion Development Branch, National Institute of Mental Health

Background: Failure to habituate to repeated presentation of emotional faces has been shown to contribute to socioemotional symptoms. Previous research indicates that children and adults with bipolar disorder (BD) show behavioral deficits in face emotion processing as well as abnormal amygdala and prefrontal activation to emotional faces. However, no study had yet examined neural habituation to emotional faces in BD. Moreover, despite evidence that BD differs across the lifespan, there has been little work comparing neural profiles of pediatric vs. adult BD.
Methods: Youths (n=24; mean age=16.5 years, SD=2.4) and adults (n=31, mean age=37.7 years, SD=11.0) with BD as well as healthy youths (n=29; mean age=15.1 years, SD=2.4) and adults (n=22; mean age=29.4 years, SD=7.2) performed a face emotion labeling task during functional magnetic resonance imaging acquisition.
Results: Whole brain analyses revealed Diagnosis x Age interactions predicting habituation of medial and lateral prefrontal cortex, including inferior frontal gyrus, to emotional faces. There was also a trend for Diagnosis x Age in the amygdala. Post-hoc comparisons revealed interactions were driven by differences between adults with BD and healthy adults. No such differences were apparent in healthy youths vs. youths with BD.
Conclusions: These findings demonstrate that altered habituation to faces may be involved in adult BD. The results furthermore suggest that adult and pediatric BD may involve different neural mechanisms or that altered habituation may be a consequence of experiencing BD. These results have implications for facilitating developmentally sensitive diagnosis and treatment for BD.

B – 41
EMOTION REGULATION OF EMOTIONALLY MALTREATING PARENTS

Iris Lavi – University of Haifa; Elizabeth C. Seibert – University of Southern California; Iris Manor-Binyamini – University of Haifa; James J. Gross – Stanford University

Child maltreatment is one of the most disheartening issues our society faces. The current study reviews the child maltreatment literature for evidence pertaining to emotion reactivity and emotion regulation of maltreating parents. In our review, we were able to find eight papers that compare levels of parental emotion reactivity and emotion regulation in emotionally maltreating families with these levels in non-maltreating families. We found several results delineating positive relations between emotional maltreatment and negative affect, depression, verbal aggression and anger, and negative relations between emotional maltreatment and emotional control, emotion regulation, and coping strategies. We outline theoretical and practical implications of these results, and emphasize how research into the etiology of child maltreatment may provide the basis for more effective prevention, screening and treatment practices. It is on these grounds that we welcome and encourage research contributions towards the eradication of this vastly complex social phenomenon.

B – 42
CONFLICT IMPACTS INTERGROUP EMPATHY

Yoni Levy – Gonda Multidisciplinary Brain Research Center, Bar-Ilan University; Abraham Goldstein – Gonda Multidisciplinary Brain Research Center, Bar-Ilan University & Department of Psychology, Bar-Ilan University; Moran Influs – Department of Psychology, Bar-Ilan University; Shafiq Masalha – Department of Psychology, Tel-Aviv University; Orna Zagoory-Sharon – Gonda Multidisciplinary Brain Research Center, Bar-Ilan University & Department of Psychology, Bar-Ilan University; Ruth Feldman – Gonda Multidisciplinary Brain Research Center, Bar-Ilan University, Department of Psychology, Bar-Ilan University & Yale University, Child Study Center

Adolescents' participation in intergroup conflicts comprises an imminent global risk, and understanding its neural underpinnings may open new perspectives. We assessed Jewish-Israeli and Arab-Palestinian adolescents for: brain response to the pain of ingroup/outgroup protagonists using magnetoencephalography, one-on-one positive and conflictual interactions with an outgroup member, compromising attitude toward intergroup conflict, and oxytocin levels. A neural marker of ingroup-biased empathy emerged as late alpha-band rebound (i.e., enhancement) in the

somatosensory cortex, presumably characterizing top-down processing. Adolescents' hostility during social interactions and low compromising attitude towards the conflict explained this neural marker. Furthermore, in the Jewish-Israeli majority, the neural marker was predicted by higher oxytocin plasma levels, whereas in the Arab-Palestinian minority, the ingroup-bias was neurally synchronized among participants. Findings suggest that in cases of intractable intergroup conflict, top-down control mechanisms block the brain's evolutionary-ancient resonance to outgroup pain, pinpointing adolescents' interpersonal and sociocognitive processes as targets for intervention.

B – 43

THE FIRST PUFF IS WITH THE EYES: REWARD CUE REACTIVITY IS ASSOCIATED WITH AN ATTENTIONAL BIAS TOWARDS TEMPTING ADVERTISEMENTS IN REAL-WORLD VISUAL SCENES

Allison M. Londerée –The Ohio State University; Megan E. Roberts – College of Public Health, The Ohio State University; Robert S. Chavez – The Ohio State University; Amy K. Ferketich – College of Public Health, The Ohio State University; Ellen Peters – The Ohio State University; Dylan D. Wagner – The Ohio State University

In both the physical environment and online, humans are continually exposed to advertisements that pair products with otherwise pleasant or appetitive visual cues. Prior research has demonstrated that adolescents may be particularly sensitive to appetitive environmental cues and may, therefore, be more susceptible to marketing that relies on such cues. In the present set of studies, we used eye-tracking to investigate whether adolescent non-smokers (n=46) demonstrate an attentional bias towards e-cigarette advertisements that use appetitive cues (i.e., tempting foods and flavors) as participants examined real-world scenes of convenience storefronts collected in the Columbus, Ohio region. In addition, we collected multi-modal neuroimaging data (fMRI and DTI) to test whether functional and structural correlates of reward sensitivity to appetitive cues could predict individual differences in attentional-bias towards advertisements in the eye-tracking study. Analysis of eye-tracking data revealed an attentional bias towards flavored e-cigarette advertisements compared to matched unflavored e-cigarette advertisements during real-world scene viewing. In addition, the magnitude of this bias was correlated with reward cue-related neural activity to flavored e-cigarette advertisements in the left orbital frontal cortex (OFC) collected during a separate neuroimaging session. Finally, the structural integrity of a white matter pathway between the lateral prefrontal cortex and the OFC was inversely correlated with cue-reactivity in the OFC, suggesting that individual differences in the structural correlates of self-regulation may temper adolescent reward sensitivity. Together, these findings suggest a neural mechanism for how marketing with appetitive cues can make inroads into adolescents' attention and potentially lead to initiation of unhealthy behaviors.

B – 44

A NEUROCULTURAL MODEL OF PAIN

Elizabeth R. Losin – University of Miami; Steven, R. Anderson – University of Miami

Those from minority groups typically report more pain than members of the majority, yet the neurobiological mechanisms underlying ethnic disparities in pain remain unknown. We propose a neurocultural model of pain that outlines and connects cultural and neurobiological mechanisms that may account for these group differences and review the literature that supports the connections between culture, pain, and the brain in each stage of our model. Our review revealed variability in cultural factors that may contribute to ethnic disparities in pain through each stage of pain perception outlined in our model, pain precursors, nociception, pain responses, and pain communication, and the neuroimaging literature suggested physiological and brain mechanisms that may connect this cultural variability to ethnic disparities in pain report. For example, cultural differences in stressful life experiences such as discrimination and stress modulating practices such as prayer may modulate pain through changes in pain precursors such as peripheral inflammation, regional genetic variation in single nucleotide polymorphisms related to pain sensitivity (e.g. OPRM1) may modulate pain through effects on ascending and descending neural pathways related to nociception, cultural variability in emotional response preferences may modulate pain through brain systems related to pain affect and emotional expression, and cultural variability in communication norms such as stoicism may contribute to ethnic disparities in pain report through brain systems underlying emotion regulation. Employing this neurocultural model of pain stands to broaden our understanding of the mechanisms underlying group differences in pain and inform culturally sensitive guidelines to improve pain treatment.

B – 45

EXTERNAL MOTIVATION TO RESPOND WITHOUT PREJUDICE DIFFERENTIALLY ALTERS NEURAL PROCESSING OF RACE AND SOCIAL STATUS

Bradley D. Mattan – University of Chicago; Jennifer T. Kubota – University of Chicago; Jasmin Cloutier – University of Chicago

White individuals are frequently perceived to hold higher status than members of other racial groups, even by perceivers who are otherwise committed to avoiding prejudice. This fMRI study (N=61) examined the neural correlates of impression formation as a function of both the target's race and SES and the perceiver's motivation to

avoid expressing prejudice. Participants formed general impressions of Black and White faces ascribed with high or low SES. ROI analyses focused on regions supporting race- and status-based reward (nucleus accumbens) and evaluation (VMPFC) as well as status differentiation (right IPS). Greater external motivation to respond without prejudice (EMS) predicted BOLD increases for White versus Black targets in the bilateral nucleus accumbens, potentially suggesting that forming impressions of White targets was more rewarding for individuals with high EMS. EMS also predicted BOLD decreases for high-status compared to low-status targets in the VMPFC. In other words, increases in EMS altered BOLD responses to the non-racial status dimension (i.e., SES). This change occurred in the VMPFC, an area associated with person evaluation, indicating that the evaluative consequences of non-racial dimensions (e.g., status) may decrease or reverse as a function of EMS. These effects remained significant even when controlling for internal motivation to respond without prejudice (IMS). In summary, EMS differentially altered the neural processing of race and non-racial dimensions (e.g., status) during impression formation.

B – 46
AMYGDALA RESPONSE TO DISTRESS CUES AND CALLOUS-UNEMOTIONAL PERSONALITY; MODERATION BY TRAUMA

Harma Meffert – Center for Neurobehavioral Research, Boys Town National Research Hospital; Patrick M. Tyler – Center for Neurobehavioral Research, Boys Town National Research Hospital; Mary L. Botkin – Center for Neurobehavioral Research, Boys Town National Research Hospital; Anna K. Erway – Center for Neurobehavioral Research, Boys Town National Research Hospital; Venkata Kolli – Center for Neurobehavioral Research, Boys Town National Research Hospital; Stuart F. White – Center for Neurobehavioral Research, Boys Town National Research Hospital; Kayla Pope – Center for Neurobehavioral Research, Boys Town National Research Hospital; James R. Blair – Center for Neurobehavioral Research, Boys Town National Research Hospital

Youth displaying disruptive behavior show amygdala hypo-responsiveness to fearful expressions as a function of a callous-unemotional (CU) personality (i.e., reduced guilt and empathy). This has been related to increased levels of goal-directed antisocial behavior and instrumental aggression. However, some research suggests that trauma exposure may moderate this relationship. Specifically, work has identified two groups of disruptive youth with equivalent high levels of CU-traits, but differing levels of anxiety and trauma exposure. The objective of the first of two studies was to examine whether trauma exposure influenced the neurobiology underlying fear expression processing in 72 youth with varying levels of disruptive behavior and trauma exposure. Participants performed a gender discrimination task while viewing morphed expressions (0%, 50%, 100%, 150% fear). A linear regression analysis on the BOLD data, using level of CU-traits and trauma exposure as covariates, showed a significant CU-traits-by-trauma exposure interaction within right amygdala; CU-traits were negatively associated with fear intensity modulated amygdala responses, but only in low trauma participants. The second study aimed at examining how the neurobiology underpinning fear expression processing predicted social behavior as a function of trauma exposure. Participants were invited back to complete a social goals task. Data suggest that stronger fear responsivity in the amygdala predicts prosocial behavior in low trauma youth, whereas stronger fear responsivity predicts non-social behavior (revenge) in high trauma youth. The current data suggest that the pathophysiology associated with CU-personality may depend on trauma exposure.

B – 47
ACUTE AND REPETITIVE FRONTO-CEREBELLAR TDCS STIMULATION IMPROVES MOOD IN NON-DEPRESSED PARTICIPANTS

Simon Newstead – Swansea University; Hayley Young – Swansea University; David Benton – Swansea University; Maria Andrade – Swansea University; Marc Clement – Swansea University; Frédéric Boy – Swansea University

Introduction: tDCS has previously demonstrated potential as a therapeutic intervention in the treatment of mood disorders. Prior studies have predominately focused on stimulation of the prefrontal-cortex, achieving varying degrees of success regarding elevation of positive mood in healthy individuals. However, the Cerebellum has an increasingly recognized role in emotion, affective state and the presentation of some psychopathologies. Here we expand upon the conventional PFC focused paradigms to investigate the influence of fronto-cerebellar stimulation upon mood. Method: We applied anodal stimulation to the left dorsolateral prefrontal cortex dlPFC in conjunction with cathodal stimulation to the right Cb in healthy participants (n = 51). Using a single blind, pre-test/post-test design, participants were assessed for changes in mood, heart rate (HR) and heart rate variability (HRV) in response to a single 12-minute stimulation. A number of participants (n = 25) continued with the trial, in total receiving 3 active or sham stimulations over 5 days, for which they were again assessed for changes in mood.
Results: Fronto-cerebellar stimulation elevated mood in the active condition for both single and repeated stimulations, of which the latter displayed a progressive elevation of mood, with a potentiated effect between stimulations 2 and 3. No change was noted in either single or repeated stimulations for the sham condition.
Conclusion: Fronto-cerebellar tDCS stimulation advantageously influences mood in healthy participants, with an accumulative and potentiated effect following successive stimulations. Fronto-cerebellar stimulation may provide a

novel therapeutic adjunctive or pre-emptive intervention in stress related disorders and certain psychopathologies.

B – 48
EFFECT OF SHORT TERM EXPERIENCES ON MIRROR NEURON SYSTEM ACTIVITY DIFFERS BETWEEN ELEMENTARY SCHOOL AND UNIVERSITY STUDENTS

Yuki Nishimura – Kyushu University; Yuki Ikeda – Kyushu University; Airi Suematsu – Kyushu University; Shigekazu Higuchi – Kyushu University

Human mirror neuron system (MNS) is one of the important brain functions to communicate each other easily for us. Children also have MNS. However, some recent studies have suggested that children's mirror system has different characteristics compared to adults. In this study, we aimed to reveal the effect of imitating experience on the MNS activity of two age groups and compared it between them. Fifty-three elementary school and university student's participated in this study after they provided written informed consent. The MNS activity was measured before and after the imitation (or control) phase using EEG mu-wave event-related oscillation in order to determine the effect of the experience. In the imitation phase, participants imitated the same finger movements which were presented during the EEG sessions by following the instructions given by a video clip of hands. Control group operated exactly the same movements with the other group, but the video clip expressed the finger movements with dots and arrows. As a result, we found that both adults and children group's MNS activity increased after imitating experience. Furthermore, children's MNS activity decreased by control condition and showed significant difference between conditions, while adults increased or at least sustained their activity and showed no significant difference between conditions. These results suggest that the ability and efficiency of integrating the experience into one's motor images, which is one of the major functions of MNS, differ between the two age groups.

B – 49
THE CONTRIBUTION OF RTPJ TO SOCIAL COGNITION: A COMBINED FMRI AND RTMS STUDY

Joakim Norberg – Uppsala University; Stephanie McMains – Harvard University; Jason Mitchell – Harvard University

Functional neuroimaging studies have associated social cognition with a number of brain regions, including the right temporoparietal junction (rTPJ). However, fMRI only provides correlational data. The present study used transcranial magnetic stimulation (TMS) to investigate the causal contribution of the rTPJ to social cognition. To do this, we used a double dissociation paradigm with a decision making task that included two conditions (social and nonsocial). Participants first performed the task during fMRI. Analyses showed relatively greater activation in rTPJ during the social condition and greater activation of the left middle frontal gyrus (lmFG) during the nonsocial condition. Individual functional data was subsequently used to guide TMS to the part of rTPJ that showed the strongest activation to the social condition, and to the part of lmFG that showed the strongest activation to the nonsocial condition. We used repetitive TMS for 30 minutes with 110% of motor threshold on two consecutive sessions (rTPJ and lmFG counterbalanced) followed by the task. Analyses showed no effect of rTMS on rTPJ, but a trend for rTMS on lmFG, such that participants committed more errors on the nonsocial than the social task. The results suggest that although the rTPJ was activated in the social condition, it might not have been involved in the decision making process or production of behavior.

B – 50
IDEAL AFFECT MATCH LOWERS NEURAL HURDLES TO GIVING

BoKyung Park – Stanford University; Elizabeth Blevins – Stanford University; Brian Knutson – Stanford University; Jeanne L. Tsai – Stanford University

Why do people give to others? We propose that people may give more to those whose emotional expressions match how they ideally want to feel ("ideal affect match"). Culture has been shown to shape ideal affect, such that European Americans want to feel excited and enthusiastic more and peaceful and serene less than East Asians. We asked European Americans and Koreans to play multiple trials of a Dictator Game with recipients who varied in emotional expression (excited, calm), race (White, Asian), and sex (male, female). Consistent with their culture's valued affect, European Americans gave more to recipients with an excited smile than those with a calm smile, whereas Koreans gave more to recipients with a calm smile than those with an excited smile. These findings held regardless of recipient race and sex. We then used fMRI to test possible affective and/or mentalizing mechanisms. Increased activity in the nucleus accumbens (NAcc; associated with reward anticipation) preceded giving, but so did decreased activity in the right temporo-parietal junction (rTPJ; associated with mentalizing). Ideal affect match enhanced giving selectively through decreased rTPJ activity, suggesting that people may give more to strangers who seem to share their affective values, and therefore invoke trust.

COMPUTATIONAL MECHANISMS UNDERLYING MORAL CHOICES ADJUSTMENT TO DESCRIPTIVE NORMS

Philip Parnamets* – Karolinska Institutet; Bjorn Lindstrom* – University of Zurich; Simon Jangard – Karolinska Institutet; Andreas Olsson – Karolinska Institutet

Moral choices are ideally underpinned by an agent's prescriptive norms. However, humans are also highly sensitive to social context and descriptive norms. Previous work has shown that participants, as third-party observers of public goods games (PGG), will adjust judgments of how moral a prosocial or selfish action is, depending on how many agents they see performing that action. Here we extend those findings to binary choices, and fit drift-diffusion models (DDM) to the choice and response time distributions. Participants saw an array of agents each having chosen either to invest (prosocial) or keep (selfish) their money in the PGG, and were then asked to decide if one of those agents had behaved morally correct or not. We found that participants' binary choices were affected by the amount of prosocial behaviours on display, being more likely to decide that the prosocial behaviour was moral when such behaviours were more common. Importantly, using DDM, we found that participants' choices were characterised by a bias towards approving selfish behaviours. The commonness of prosocial behaviours affected the drift-rate and decision bounds positively, meaning stronger descriptive prosocial norms led to more stringent decision criteria and higher prosocial evidence accumulation. We also found a framing effect when asking about selfish behaviours such that this shifted both bounds and drift rates. In other words, both the descriptive norms and the behaviour being judged strongly affect what moral choice is made. Our findings provide novel insights into the real-time negotiation of selfish and prosocial tendencies in moral choice.
*Denotes equal contributions to this work

NOVELTY, VALENCE AND TRAIT ANXIETY IN THE BED NUCLEUS OF THE STRIA TERMINALIS, AMYGDALA AND HIPPOCAMPUS: A HIGH RESOLUTION 7T FMRI STUDY

Walker S. Pedersen – University of Wisconsin Milwaukee; L. Tugan Muftuler – Medical College of Wisconsin; Christine L. Larson – University of Wisconsin Milwaukee

The hippocampus and amygdala exhibit novelty-sensitivity that is reduced in participants with inhibited temperament, a construct related to trait anxiety. Although the bed nucleus of the stria terminalis (BST) is highly connected to the amygdala and is implicated in anxiety, whether the BST responds to novelty remains unstudied, as well as how trait anxiety may modulate this response. Additionally how novelty, stimulus negativity and trait anxiety interact to affect activity in these areas is also unclear. To address these questions, we presented participants with novel and repeated, fearful and neutral faces, while measuring brain activity via fMRI, and also assessed participants' self-reported trait anxiety. As the small size of the BST makes assessing its activity at typical fMRI resolution difficult, we employed high resolution 7 Tesla scanning. Our results replicate findings of novelty-sensitivity that is independent of valence in the hippocampus and amygdala. We also found left amygdala sensitivity to stimulus negativity that was blunted for high trait anxiety participants. Our results also provide novel evidence for a BST novelty response toward neutral, but not fearful faces. We also found that the novelty responses exhibited by each of these ROIs was blunted in participants with high trait anxiety. These findings extend past research on the response to novel stimuli in the hippocampus and amygdala at high resolution, and are the first to demonstrate trait anxiety modulated novelty-sensitivity in the BST that is dependent on stimulus valence.

THE ASSOCIATION BETWEEN DEPRESSION SEVERITY AND STIGMATIZED BELIEFS IN EMIRATI UNIVERSITY STUDENTS: PRELIMINARY FINDINGS OF A CROSS-SECTIONAL STUDY

Arif Pendi – University of California, Irvine; Hajra Hussain – Amity University; Jahanzeb Ashraf – American University of the Caribbean; David A. Baron – University of Southern California

Introduction: Depression is commonly experienced by university students worldwide. Unfortunately, the stigma associated with mental illness has been known to inhibit help seeking behavior. Therefore, the relationship between stigmatized beliefs and depression severity has serious implications for mental healthcare utilization among students. We hypothesized that depression severity would be associated with greater personal and perceived stigma among university students in the United Arab Emirates. Methods: A survey consisting of socio-demographic questions, Patient Health Questionnaire-9 (PHQ-9), and Depression Stigma Scale (DSS) was sent via email to students in the United Arab Emirates. Respondents were classified as students with severe to moderate depression or those with mild depression to none and compared in terms of continuous scores on the DSS subscales for personal and perceived stigma via t-test. A series of linear regressions was used to identify predictors of stigmatized beliefs. Results: Approximately 39.5% of completed responses (n=129) met the criteria for moderate to severe depression severity. This group exhibited less personal (p=0.438) and perceived stigma (p=0.048). Heterosexuality (p=0.004) and non-Indian ethnicity were both predictors of greater perceived stigma (p=0.007). No predictors of personal

stigma were identified. Conclusions: Depression severity was associated with less perceived stigma in respondents, in contrast to our hypothesis and previous findings that depression severity was linked to greater perceived stigma in American undergraduate students. These findings indicate that the relationship between depression and stigmatized beliefs may not be consistent across cultures.

B – 54

CONSEQUENCES FOR PEERS DIFFERENTIALLY BIAS COMPUTATIONS ABOUT RISK FROM ADOLESCENCE TO ADULTHOOD

Katherine E. Powers – Harvard University; Gina Falcone – Harvard University; Gideon Yaffe – Yale University; Catherine A. Hartley – New York University; Juliet Y. Davidow – Harvard University; Hedy Kober – Yale University; Leah H. Somerville – Harvard University

Adolescents routinely take risks that impact the well-being of the friends they are with. However, the extent to which consequences for friends factor into decisions to take risks is unknown. Here we used an neuroeconomic decision-making task to test whether risky choices are guided by the positive and negative consequences they promise for their peers. We show that risky decision computations increasingly assimilate friends' outcomes throughout adolescence into adulthood, in an asymmetric manner that overemphasizes protecting friends from incurring loss. Whereas adults accommodated friend outcomes to a greater degree when the friend was present and witnessing these choices, adolescents did so regardless of whether a friend could witness their decisions, highlighting the fundamentality of adolescent social motivations. By demonstrating that outcomes for another individual can powerfully tune an actor's tolerance towards risk, these results identify a key factor underlying peer-related motivations for risky behavior, with implications for legal, risk prevention, and adolescent health policy initiatives.

B – 55

THE WILLIAMS SYNDROME PROSOCIALITY GENE GTF2I MEDIATES OXYTOCIN REACTIVITY AND SOCIAL ANXIETY IN A HEALTHY POPULATION

Tanya L. Procyshyn – Simon Fraser University; Jason Spence – Simon Fraser University; Silven Read – Simon Fraser University; Neil Watson – Simon Fraser University; Bernard J. Crespi – Simon Fraser University

The neurohormone oxytocin plays a central role in human social behaviour and cognition, and oxytocin dysregulation may contribute to psychiatric disorders. However, genetic factors influencing individual variation in the oxytocinergic system remain poorly understood. We genotyped 169 healthy adults for a functional polymorphism in GTF2I (general transcription factor II-I), a gene associated with high prosociality and reduced social anxiety in Williams syndrome, a condition reported to involve high oxytocin levels and reactivity. Participants' salivary oxytocin levels were measured before and after watching a validated empathy-inducing video. Oxytocin reactivity, defined as pre- to post-video percentage change in salivary oxytocin, varied substantially and significantly between individuals with different GTF2I genotypes, with a trend towards an interaction between genotype and sex. Individuals with more oxytocin-reactive genotypes also reported significantly lower social anxiety. These findings suggest a model whereby GTF2I has a continuum of effects on human sociality, from the extreme social phenotypes and oxytocin dysregulation associated with gene deletion in Williams syndrome, to individual differences in oxytocin reactivity and sociality associated with common polymorphisms in healthy populations.

B – 56

SEX-DIFFERENCES IN ORBITOFRONTAL CORTEX REPRESENTATION DURING EVALUATIONS OF FACIAL ATTRACTIVENESS

Kristina M. Rapuano – Dartmouth College; Todd F. Heatherton – Dartmouth College; William M. Kelley – Dartmouth College

Males and females equally depend on mate selection for reproductive success, yet sex-differences in mate selection criteria have been widely observed. Previous studies have shown activity within putative reward regions of the brain (e.g., the nucleus accumbens [NAcc]; orbitofrontal cortex [OFC]) to increase linearly with facial attractiveness ratings, and further report a sex difference in the OFC (Cloutier et al., 2008). An open question is whether this reflects a fundamental difference between the sexes or whether it reflects divergent evaluation strategies by males (e.g., sexual interest) and females (e.g., physical aesthetics) while evaluating attractiveness. Sixty-eight subjects (30 male) viewed opposite-sex faces during functional magnetic resonance imaging (fMRI). In order to equate cognitive strategies between sexes, subjects were instructed to explicitly evaluate either the attractiveness or sexual desirability of each face on a 1 ("Very attractive"; "Very desirable") to 3 ("Unattractive"; "Undesirable") scale. Consistent with our previous findings, both the NAcc and OFC correlated with participant ratings, but only OFC activity demonstrated a sex-difference. Here we extend these findings to show that this difference is eliminated when females are asked to judge sexual desirability. Further, the representational similarity (RSA) between tasks in the OFC was greater in males than in females. This relationship paralleled participants' behavioral ratings, which were more consistent between tasks in males. Taken together, this suggests that males and females utilize divergent

strategies while evaluating facial attractiveness, whereby males may be engaged in implicit sexual evaluations and females may be engaged in more overt evaluations of physical aesthetics.

B – 57

CONTEXT EFFECT MODULATES CENTRAL AND PERIPHERAL NERVOUS SYSTEM RESPONSE TO INFANT VOCALIZATIONS

Paola Rigo – Nanyang Technological University; Atiqah Azhari – Nanyang Technological University; Anna Truzzi – University of Trento & Brain Science Institute, RIKEN; Gianluca Esposito – Nanyang Technological University & University of Trento

The quality of a caregiver's care and attention towards an infant plays an imperative role in shaping the infant's early psychological and physiological development. However, attention towards salient stimuli is modulated by external contextual cues. Thus, it is essential to elucidate how contexts exert their influence on adults' physiological responses to infant vocalizations which includes infant cry (IC) and laugh (IL). Here, employing Near-infrared Spectroscopy (NIRS) and Electrocardiogram (ECG), we explore the effects of two contextual environments on adults' responses to infant vocalizations: domestic environment (DE) (self-referential settings that relates to personal life); outside the domestic environment (OE) (outside of personal life). To increase the personal relevance of the contextual stimuli, half of participants were asked to imagine "to be inside the visual scene" (TBI). NIRS and ECG were recorded from 33 and 59 adult participants respectively during the presentation of infant vocalizations and control sounds. Results showed that IC in OE activated the right dorsolateral prefrontal cortex (DLPFC) (Hbtot) more significantly than in DE, whereas IL in OE activated the left ventrolateral prefrontal cortex (VLPFC) only in non-TBI condition. Additionally, ECG results showed that IL in OE elicited greater parasympathetic nervous activity, as indicated by lower heart rate variability (RMSSD). Findings highlight the importance of contextual information in regulating physiological responses to salient stimuli from the infant, such as IC and IL. Therefore, contextual information should be assessed and taken into account in order to better understand the mechanisms underlying caregiver-infant interactions.

B – 58

ENHANCING POSITIVE AFFECT IN NEGATIVE CONTEXTS ENGAGES DISTINCT BRAIN ACTIVATION IN HEALTHY INDIVIDUALS AND PATIENTS WITH MAJOR DEPRESSIVE DISORDER

Odile Rodrik – Columbia University; Chelsea Boccagno – Columbia University; Bruce Doré – Columbia University; Tanya Singh – New York State Psychiatric Institute; Jochen Weber – Columbia University; Jeffrey Miller – New York State Psychiatric Institute; Maria Oquendo – New York State Psychiatric Institute; Barbara Stanley – New York State Psychiatric Institute; J. John Mann – New York State Psychiatric Institute; Kevin N. Ochsner – Columbia University

The capacity to create positive meaning from negative experiences is an adaptive regulation technique that has numerous physical and mental benefits, and is notably diminished in people with major depressive disorder (MDD). Though recent neuroimaging work has identified the brain regions underlying the transformation of a negative response to a positive one in healthy populations, the neural mechanisms underlying positive reappraisal (i.e., the up-regulation of positive affect) to negative stimuli in patients with MDD is unclear. The current study examined brain and behavioral responses to negative images in healthy individuals (N= 19) and patients with MDD (N = 20). While undergoing a functional magnetic resonance imaging scan, participants viewed negative images from the International Affective Picture System and were asked to reappraise or to look and respond naturally to the images. Participants then rated their positive and negative affect. Behaviorally, both healthy controls and those with MDD reported decreased negative affect and increased positive affect when reappraising relative to responding naturally. However, the brain regions recruited to reappraise successfully for these populations differ. Specifically, patients, but not controls, demonstrated increased precuneus (a region associated with attentional control and perspective taking) and insula (a region commonly implicated in emotion regulation) activation during reappraisal trials. Furthermore, precuneus activation tracked with negative reappraisal success. Controls, however, showed decreased insula activation during reappraisal trials. Overall, these results provide further insight into the mechanisms underlying positive reappraisal in healthy individuals, and illuminate the process of positive reappraisal in MDD.

B – 59

BEHAVIORAL AND NEURAL CORRELATES OF COGNITIVE CONTROL DURING OUT-GROUP ENCOUNTERS UNDER THREAT

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

The recent incidents of violence against unarmed men of color at the hands of police have prompted questions regarding what factors contribute to these outcomes. A key question is whether there is a relative loss in cognitive

control during interracial encounters under perceived threat. The current study used a novel fMRI paradigm to examine cognitive control during out-group encounters under threat in 31 Black and White adult participants (17 black, 16 female). Participants performed a variation of the Cognitive Control Under Emotional Influences (CCUE) task (Cohen et al. 2015) that consisted of neutral or fearful, Black and White faces as targets (go trials) and rare non-targets (no-go trials), under sustained neutral or threat states. Black and White participants performed equally well to neutral Black and White faces in the neutral state (p =.4). However, under conditions of perceived threat, both Black and White participants were more reactive to black faces (i.e., made more false alarms (p=.02)). Preliminary imaging results suggest both cognitive control and perceptual neural circuitry may be associated with the enhanced reactivity to Black faces under threatening conditions. Together these findings suggest a loss in impulse control, specific to the race of the stimulus rather than out-group interactions, that is modulated by perceived threat. This work may provide new insights into police-citizen interracial encounters under threat and offer new approaches for intervening.

B – 60
BRAIN CONNECTIVITY DYNAMICS DURING SOCIAL INTERACTION REFLECT SOCIAL NETWORK STRUCTURE

Ralf Schmaelzle – Michigan State University/University of Pennsylvania; Matthew Brook O'Donnell – University of Pennsylvania; Javier Garcia – U.S. Army Research Laboratory; Joseph Bayer – The Ohio State University; Christopher Cascio – University of Pennsylvania; Danielle Bassett – University of Pennsylvania; Jean Vettel – U.S. Army Research Laboratory; Emily Falk – University of Pennsylvania

Social ties are crucial for humans. Disruption of ties through social exclusion has a marked effect on our thoughts and feelings; however, such effects can be tempered by broader social network resources. Here, we use functional magnetic resonance imaging data acquired from 80 male adolescents to investigate how social exclusion modulates functional connectivity within and across brain networks involved in social pain and understanding the mental states of others (i.e., mentalizing). Furthermore, using objectively logged friendship network data, we examine how individual variability in brain reactivity to social exclusion might shape social network structures, as indexed by the density of friendship networks. We find that social exclusion prompts increased connectivity within a set of regions previously identified as a mentalizing system. These results are consistent across the regions of interest as well as a whole-brain analysis. Next, examining how social network characteristics are associated with task-based connectivity dynamics, participants who show greater changes in connectivity within the mentalizing system when socially excluded by peers had less dense friendship networks. This work provides novel insight to understand how distributed brain systems respond to social and emotional challenges, and how such brain dynamics may also shape broader social networks.

B – 61
THE IMPACT OF CLINICAL SYMPTOMS ON NEURAL REACTIVITY TO MONETARY REWARD IN THE SCHOOL-AGE OFFSPRING OF DEPRESSED PARENTS

Karen T. G. Schwartz – San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology; Maria Kryza-Lacombe – San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology; Ysabella Panggat – San Diego State University; Sophie Bills – San Diego State University; Phil Spechler – University of Maryland; Sarah Blankenship – University of Maryland; Lea Dougherty – University of Maryland; Jillian L. Wiggins – San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology

Identifying neural profiles that may predict psychopathology in at-risk individuals is important to efficiently direct preventive care. Alterations in reward processing may be a risk factor for depression. The current study characterized the neural substrates of reward processing in children at low- and high-risk for depression due to maternal depression. Children (N=46, 5.93-9.63 years) performed a monetary incentive delay task during fMRI acquisition. The whole brain analysis of the three-way interaction, Group (low-risk vs. high-risk) x Performance (hit vs. miss) x Condition (no reward vs. reward), yielded five significant clusters: dorsolateral prefrontal cortex (xyz=50,35,15; $F_{1,44}=20.01$, k=71), parahippocampal gyrus (xyz=5,-32,6; $F_{1,44}=14.88$, k=46), superior temporal sulcus (xyz=-44,-41,9; $F_{1,44}=14.76$, k=32), dorsal prefrontal cortex (xyz=29,20,42; $F_{1,44}=13.57$, k=25), and inferior temporal gyrus (xyz=59,-56,-4; $F_{1,44}=13.68$, k=21), all pcorrected<.05. All regions exhibited similar patterns, whereby the high versus low risk group showed blunted differences in activation between the no-reward and reward conditions when they hit the target, and differences in the opposite direction when they missed the target. Region-of-interest analyses indicated significant three-way interactions in the putamen (right: $F_{1,44}=4.10$, p=.049; left: $F_{1,44}=5.02$, p=.030), right nucleus accombens ($F_{1,44}=4.84$, p=.033), and left amygdala ($F_{1,44}=4.89$, p=.032). The pattern of results was similar to that observed in the whole brain analysis; however, post-hocs did not survive correction. Results suggest that children at high risk for depression are less able to flexibly and appropriately modulate their neural response to different reward task conditions. The final poster will explore how child clinical characteristics present at the time of

the scan impacted these findings.

B – 62
THE INSULA AND NEGATIVE URGENCY DURING SAFE SEX NEGOTIATION

Benjamin J. Smith – University of Southern California; Feng Xue – University of Southern California; Vita Droutman – University of Southern California; Emily Barkley-Levenson – University of Southern California; James A. Melrose – University of Southern California; Lynn C. Miller – University of Southern California; John R. Monterosso – University of Southern California; Antoine Bechara – University of Southern California; P. Robert Appleby – University of Southern California; Stephen J. Read – University of Southern California

HIV is most prevalent among men who have sex with men (MSM), and although most MSM use condoms consistently during casual sex, some take risks. To better understand the psychology of those risky decisions, we examined neural correlates of playing a virtual sexual "hook up" game in an fMRI scanner in MSM who had, in the past 90 days, previously been sexually risky (N=76) or safe (N=31). We found that during potentially risky sexual choices, previously risky MSM had more insula activity – typically associated with desire and proprioceptive urge – than previously safe MSM. Trait measures provided greater clarity. Real-life sexual risk within the population was related with trait negative urgency (rs=0.41). Activity in the region of the right posterior insula cortex that contrasts risky and safe MSM also correlates with negative urgency. A mediation analysis showed that the relationship between negative urgency and real-life risky sex was mediated by neural activity in an insular-centered network. Trait negative urgency could drive sexual risk by increasing the likelihood of taking a risk during safe sex negotiation.

B – 63
THE SOCIAL VALUE OF POSITIVE AUTOBIOGRAPHICAL MEMORY RETRIEVAL

Megan E. Speer – Rutgers University; Vivian Mai – Rutgers University; Mauricio R. Delgado – Rutgers University
Positive memory retrieval elicits pleasant feelings that can combat negative affective states and enhance well-being. However, not all positive memories are created equal. When thinking about our most treasured memories, they are likely experiences shared with other people (e.g., birthday party) rather than by oneself (e.g., receiving good grades). We explored whether the social context within a positive memory enhanced its subjective value and contributed to an individual's well-being. Participants (Study1; N=47) were asked how much they would be willing to pay to re-experience positive memories that occurred with socially close others (high-social), with acquaintances (low-social) or alone (nonsocial). When controlling for how positive each memory made them feel, participants were still willing to pay 2 times more for high-social than for low-social or nonsocial memories. Likewise, participants chose to reminisce about high-social memories more frequently (56% of the time) than less social ones of equal positive feeling (p=.025). During fMRI scanning (Study2; N=19), recalling social relative to nonsocial memories engaged the ventromedial PFC and posterior cingulate cortex, potentially related to increased social processing, even when controlling for positive feeling. Finally, we examined the benefit of social context by asking participants (Study3; N=20) to recall social and nonsocial memories after acute stress exposure. Participants whose memory recall included higher social context showed a greater dampening of the physiological stress response (i.e., cortisol). Taken together, these findings suggest that social context inherent in a positive memory enhances its value, providing a possible mechanism by which recalling positive memories aids stress coping.

B – 64
CAN BRAIN ACTIVITY PREDICT STOCK PRICES?

Mirre Stallen – Stanford University; Nicholas Borg – Stanford University; Parimarjan Negi; Brian Knutson
Functional magnetic resonance imaging (FMRI) activity in circuits associated with anticipatory affect (Knutson & Greer, 2008) has been used not only to predict trial-to-trial choice within subjects, but, more recently, aggregate choice as well (e.g., Venkatraman et al., 2015; Genevsky et al., 2015). Following these demonstrations, we sought to determine whether individual brain activity could inform predictions about changes in stock prices. While undergoing FMRI acquisition, participants (n=41) viewed trend lines reflecting updates of actual, anonymous, stock prices. For each price update, participants decided whether they wanted to invest (i.e. bet that the stock price would increase on the next day – if so they gained $1, but if not they lost $1) or not invest (i.e. not bet, in which case they received $0 for that round). Results showed that activity in the nucleus accumbens (NAcc) predicted choices to invest within subject. When examining whether group brain activity could forecast changes in stock prices on the next day, results demonstrated that activity in the NAcc predicted stock price above and beyond the effect of the participants' own choices. This result remained significant after including standard financial measures used to predict stock market performance, such as slope or volatility over the past days. By developing a novel and incentive-compatible stock investment choice task, we not only were able to replicate previous findings that NAcc activity can predict individual risky choice, but we also obtained preliminary data suggesting that brain activity may predict stock prices above and beyond choice.

B – 65

ENDOGENOUS OPIOID RECEPTOR BLOCKADE INHIBITS SOCIAL BONDING IN HUMANS: MAIN EFFECTS AND INDIVIDUAL DIFFERENCES

Kristina Tchalova – McGill University; Geoff MacDonald – University of Toronto

Non-human animal research has shown that endogenous opioid neurotransmission plays a critical role in mediating social reward and attachment formation. In the first investigation of opioid involvement in the emergence of human social bonds, we examined whether opioid blockade would inhibit intimacy-fostering behavior (self-disclosure) and feelings of social connection during an initial interpersonal encounter. Eighty pairs of previously unacquainted participants received either 50mg of the opioid receptor antagonist naltrexone or placebo prior to engaging in a closeness building exercise centered on escalating reciprocal self-disclosure. Multilevel analyses revealed that, compared to placebo dyads, naltrexone dyads reported engaging in less intimate self-disclosure, perceived their partners as less disclosing, and desired less interpersonal closeness with their partner. The naltrexone group did not report significantly lower feelings of connection relative to the placebo group; however, participants receiving naltrexone, unlike placebo participants, did not experience increases in positive affect after the social bonding task. Furthermore, several individual difference variables emerged as moderators in exploratory analyses. Specifically, the inhibitory effects of naltrexone on feelings of social connection were particularly pronounced for individuals scoring low on Openness to Experience; additionally, naltrexone attenuated the tendency of individuals high in attachment anxiety to seek more interpersonal closeness. These individual difference findings are discussed in terms of the reward-processing and anxiolytic functions of the endogenous opioid system. Altogether, these data have relevance for the study of conditions characterized by social deficits, as well as the social connection-physical health link. Additionally, implications for naltrexone treatment of addiction disorders will be discussed.

B – 66

DYSFUNCTION IN ANIMACY INFORMATION PROCESSING IN ADOLESCENTS WITH DISRUPTIVE BEHAVIOR DISORDERS AND CALLOUS-UNEMOTIONAL TRAITS: IMPLICATIONS FOR ASOCIAL BEHAVIOR

Laura C. Thornton – Boys Town National Research Hospital; Elizabeth A. Penner – Creighton University & University of Nebraska Medical Center; Zachary T. Nolan – Pennsylvania State University School of Medicine; Christopher J. Adalio – University of California, Berkeley; Stephen Sinclair – National Institute of Mental Health; Harma Meffert – Boys Town National Research Hospital; Soonjo Hwang – University of Nebraska Medical Center; R. James R. Blair – Boys Town National Research Hospital; Stuart F. White – Boys Town National Research Hospital

Amygdala dysfunction during emotion processing has been implicated in youth with Disruptive Behavior Disorders (DBD; Conduct Disorder/Oppositional Defiant Disorder), particularly those with callous-unemotional (CU) traits. Critically, the amygdala is not only responsive to emotional (including fear/distress) relative to neutral stimuli, but also to animate relative to inanimate stimuli. This responsiveness to social stimuli may relate to the asocial behavior shown by youth with DBDs – particularly those with CU traits. However, the processing of animacy information in youth with DBDs has not been previously investigated. 29 youth with DBD and 20 TD youth, matched for IQ, age (Mage=14.45, SD=2.052) and gender, completed a dot probe task during fMRI. Stimuli consisted of threatening/animate, threatening/inanimate, neutral/animate and neutral/inanimate images. Youth with DBDs failed to increased amygdala activation to animate relative to inanimate stimuli. Moreover, within youth with DBDs, CU traits were inversely associated with activation to animate relative to inanimate stimuli within the amygdala. Whole brain analyses found that youth with DBDs failed to show an appropriate increase in activation to animate relative to inanimate stimuli compared to TD youth in middle temporal gyrus and fusiform gyrus. These data suggest that youth with DBDs and high levels of CU traits exhibit dysfunction in animacy processing in the amygdala. Thus, reduced responsiveness to animacy stimuli may relate to reports of a lack of interest in social contact in youth with DBDs, particularly those with CU traits.

B – 67

SPACE, TIME, AND GAZE: HOW KINEMATIC MODULATION AND EYE-GAZE OPTIMIZE COMMUNICATIVE INTERACTIONS

James P. Trujillo – Radboud University; Irina Simanova – Radboud University; Harold Bekkering – Radboud University; Asli Özyürek – Radboud University & Max Planck Institute for Psycholinguistics

Actions may be used to directly act on the world around us, or as a means of communication, e.g. in a context of demonstration, teaching or request. Communication is supported by ostensive cues, but at the same time kinematic patterns of actions could be modulated by the intention to communicate. Here we investigate which kinematic and gaze features characterize communicative manual acts (actions and gestures), and how these features contribute to initializing and optimizing the interaction. In two studies, we addressed the following questions: Which features characterize communicative acts? What is the role of these features in signaling the intent to communicate? Do these features support recognition of a manual act? In the first (production) study, we asked participants to perform pairs

of object-directed actions and representational gestures in either a communicative or non-communicative context. The acts were video-recorded and kinematic features were extracted using motion capture technology (Kinect). In the second (comprehension) study, naïve participants rated the communicativeness of the acts and performed a semantic disambiguation task. We analyzed trial-by-trial correlations between kinematic/ostensive features and the ratings or task performance. We found that, during production, a communicative context optimizes the balance between time and visual semantic information presented and elicits increased eye-contact. Our second study found that while eye-contact is the primary cue for recognizing communicative intent, kinematic modulation enhances semantic recognition of the act. Our results indicate that eye-contact initiates the communicative interaction, while this interaction modulates the space-time dimensions of kinematics, optimizing semantic recognition for the addressee.

B – 68
EFFECTS OF AGENCY AND INTENTIONALITY ON AVERSIVE LEARNING FROM OTHERS

Irem Undeger – Karolinska Institute; Armita Golkar – Karolinska Institute; Philip Pärnamets – Karolinska Institute; Andreas Olsson – Karolinska Institute

Previous research shows that harms inflicted by others are influenced by attributions of intentionality and agency. For example, intentional, as compared to unintentional, harms are perceived as being more painful, less moral, and their impact is overestimated. Learning about the cause of harm is essential for our survival, but it is unknown how social information, such as the intentionality of the harm received, affects the learning of threat. Here, we used a modified Pavlovian fear-conditioning paradigm to investigate how this type of social information regulates aversive learning to categorical stimuli predictive of aversive events (mild-shocks). Two alleged co-participants delivered shocks to the participant either knowingly (intentionally), or unknowingly (unintentionally). Shocks were delivered after the co/participants chose between one out of two neutral stimuli. Intentionality of the co-participant affected both evaluations and psychophysiological responses: when shocks were perceived as intentionally versus unintentionally caused, participants reported greater anger, willingness to retaliate, and displayed greater pupil dilation throughout the course of learning. Our results shed light on how social emotional learning from and about others is regulated based on social context; namely the intentionality of the person causing harm. Importantly, our results goes beyond previous research on mens rea and moral judgments by describing how intentionality enhances basic aversive learning to neutral stimuli. Our findings will be discussed in light of their reliance on brain systems known to be involved in aversive learning and mentalizing.

B – 69
SOCIAL LEARNING AND ADAPTIVE RISK-TAKING IN ADOLESCENCE: EVIDENCE FROM BRAIN AND BEHAVIOR

Jorien Van Hoorn – University of North Carolina, Chapel Hill; Ethan M. McCormick – University of North Carolina, Chapel Hill; Eva H. Telzer – University of North Carolina, Chapel Hill

Adolescence is a time of increased social sensitivity, which is often related to heightened levels of health-risk behaviors. However, learning from social information may also support adaptive decisions in a risk-taking context. The present fMRI study sought to examine how social learning is related to adolescent risk-taking. Participants (age 12-16; N = 31) played the novel Social Analogue Risk Task (SART), which measures participant's willingness to knock on doors in order to earn points. With each knock the facial expression of the house's resident morphed from neutral to somewhat angrier. If the resident got too angry and slammed the door, all points were lost. Because the increments from neutral to angry were variable, learning from this social information is beneficial to make adaptive risky decisions (i.e., cash-out before a slam). We employed HLM to estimate how adolescents adjusted their risky choices based on social learning from varying anger increments and the outcome of the previous trial. Participants took more risks when resident's faces started out more neutral (B = 0.533, p < .001), and less risk if the previous trial was a slam (B = -0.654, p < .001). Empirical Bayes estimates of social learning were correlated with total points earned (r = .879, p < .001), indicating a relation with adaptive risky decisions. At the neural level, adolescents with higher social learning showed more activation in social brain areas, including dmPFC, IFG and pSTS, during decisions to cash-out. These findings are related to social experiences based on daily diaries.

B – 70
GLOBAL BRAIN DYNAMICS DURING SOCIAL EXCLUSION PREDICT SUBSEQUENT BEHAVIORAL CONFORMITY

Nick Wasylyshyn – US Army Research Labs; Brett Hemenway – University of Pennsylvania; Javier O. Garcia – US Army Research Labs; Christopher N. Cascio – University of Pennsylvania; Matthew B. O'Donnell – University of Pennsylvania; C. Raymond Bingham – University of Michigan; Bruce G. Simons-Morton – Eunice Kennedy Shriver National Institute of Child Health & Human Development; Jean M. Vettel – US Army Research Labs; Emily B. Falk – University of Pennsylvania

Individuals react differently to social experiences; for example, people who are more sensitive to negative social experiences, such as being excluded, may be more likely to adapt their behavior to fit in with others. We examined whether functional brain connectivity during social exclusion in the fMRI scanner can be used to predict subsequent conformity to peer norms. Adolescent males (N = 57) completed a two-part study on teen driving risk: a social exclusion task (Cyberball) during an fMRI session and a subsequent driving simulator session in which they drove alone and in the presence of a peer who expressed risk-averse or risk-accepting driving norms. We computed the difference in functional connectivity between social exclusion and social inclusion in two brain networks, one previously associated with mentalizing (medial prefrontal cortex, temporoparietal junction, precuneus, temporal pole) and another with social pain (anterior cingulate cortex, anterior insula). Using cross-validated machine learning, fMRI network connectivity during exclusion predicts the extent of conformity to peer pressure during driving in the subsequent experimental session. These findings extend our understanding of how global neural dynamics guide social behavior, revealing functional network activity that captures individual differences.

B – 71
NEURAL FREQUENCY ABNORMALITIES IN SOCIAL BRAIN REGIONS OF AUTISM SPECTRUM DISORDER

Sophie E. Wohltjen – Dartmouth College; Monika S. Mellem – National Institutes of Health; Stephen J. Gotts – National Institutes of Health; Avniel Ghuman – University of Pittsburgh; Alex Martin – National Institutes of Health
Autism Spectrum Disorders (ASD) are developmental disorders characterized by impairments in social and communication abilities. Recent MRI studies have found functional and structural differences in ASD in areas of the social network of the brain, such as anterior cingulate cortex, temporoparietal junction, and ventromedial prefrontal cortex (Patriquin, et al., 2016). However, it is not yet well understood how intrinsic rhythmic neural activity across a wide spectrum is affected within the social network in ASD. We investigated how the spatial organization of intrinsic frequencies compared between the ASD and typically developing (TD) brains. We examined spectral power between 1-50 Hz using source-localized, task-independent magnetoencephalography (MEG) recordings (ASD n=18, TD n=14). Standardized power maps computed separately for seven frequency bands (delta – gamma) delineated regions of peak power in each band. A 2x7 ANOVA was used to examine Group X Frequency Band comparisons at each brain region, FDR corrected (q=0.05). The results revealed crossover interactions (p<0.002) in regions implicated in social processing such that ASD and TD subjects differed most significantly in the low (delta, theta) and high (high beta, gamma) frequencies. This suggests that abnormal processing in these regions of the social network could be related to an intrinsic frequency imbalance in the ASD brain. References: Patriquin, M., DeRamus, T., Libero, L., Laird, A., & Kana, R. (2016). Neuroanatomical and neurofunctional markers of social cognition in autism spectrum disorder. Human Brain Mapping, 37(11), 3957-3978.

B – 72
THE ROLE OF THE DORSAL ANTERIOR INSULA IN SEXUAL RISK: EVIDENCE FROM AN EROTIC GO/NOGO TASK AND REAL-LIFE RISK TAKING

Feng Xue – University of Southern California; Vita Droutman – University of Southern California; Emily E. Barkeley-Levenson – Hofstra University; Benjamin J. Smith – University of Southern California; Gui Xue – Beijing Normal University; Zhong-Lin Lu – Ohio State University; Antoine Bechara – University of Southern California; Lynn C. Miller – University of Southern California; Stephen J. Read – University of Southern California
Background: The insula plays an important role in decision-making. Most relevant here, it has been proposed that the dorsal anterior insular cortex (dAIC) plays a central role in a salience network that is responsible for switching between the default mode network and the executive control network. However, the insula's role in risky sexual decision-making has not yet been studied. Purpose: To investigate the role of various subregions of the insula in the risky sexual decision-making process. We particularly focused on the role of dAIC in response inhibition and executive control. Methods: Eighty-five 18-30 year-old sexually active men who have sex with men (MSM) performed an erotic Go/NoGo task while in an MRI scanner. Participants' real-life sexual risk taking (frequency of condomless anal intercourse over the past 90 days) was then correlated with their neural activity during the task. Results: We found greater activity in bilateral anterior insular cortex (both dorsal and ventral) on contrasts with stronger motivational information (attractive naked male pictures versus pictures of clothed, middle-aged females) and on contrasts requiring greater response inhibition (NoGo versus Go). We also found that activity in the right dAIC was negatively correlated with participants' real-life sexual risk taking. Conclusions: The right dAIC has been proposed as a hub region that controls when the executive control system comes online. Decreased right dAIC activity may reduce the likelihood that the executive control network will come online when individuals are faced with situations requiring inhibitory control and thus lead them to make more risky choices.

Poster Session C

Saturday, March 18, 10:15 – 11:45 AM

C – 1 *SANS Poster Award winner*
A WINDOW INTO THE MIND: A COMPUTATIONAL APPROACH TO MEASURING EMOTIONS IN RESPONSE TO NATURALISTIC STIMULI

Jin Hyun Cheong – Dartmouth College; Eshin Jolly – Dartmouth College; Luke J. Chang – Dartmouth College
A fundamental limitation of emotion research is the lack of objective measures of feeling states. Self-report is currently the gold-standard, but introspective approaches can alter the nature of the emotional experience. Psychophysiological measures are neither sensitive nor specific to measuring a wide range of feeling states and manual coding of facial expressions has been virtually impossible for long temporal recordings. This has led emotion research to focus on controlled laboratory paradigms to ensure proper emotion elicitation. Consequently, we know very little about how emotions are experienced outside the laboratory. Here we use a computer vision algorithm to measure facial expressions in response to naturalistic stimuli (4 x 45 minute episodes of Friday Night Lights) using high-speed cameras (120 Hz). We use a dynamic measure of intersubject synchrony to identify when participants are experiencing similar emotions (e.g., joy, contempt, surprise, frustration, anger, etc.). This metric not only allows us to identify when groups of participants are having similar emotional experiences, but also allows us to predict individual affective impressions of individual characters or events. We used a linear model to transform average facial responses of joy to viewing each character into a single predicted affective rating. This approach was able to successfully recover the degree to which each participant liked and wanted to be friends with each character. We believe this technique will provide a paradigm shift into studying the dynamics of emotion using naturalistic stimuli.

C – 2 *SANS Poster Award winner*
NEGATIVE BIASES IN SOCIAL PROCESSING CORRELATE WITH CURRENT SELF-ESTEEM AND FUTURE CHANGES IN DEPRESSION

Alex W. daSilva – Dartmouth College; Jeremy F. Huckins – Dartmouth College; William M. Kelley – Dartmouth College; Todd F. Heatherton – Dartmouth College
Low self-esteem individuals tend to view themselves in a negative light, and in social contexts assume others form negative impressions of them. Moreover, a strong link exists between low self-esteem and depression. Little is known, however, regarding how differences in self-esteem relate to processing social cues. Accordingly, we conducted behavioral and neuroimaging studies to provide insight into how individual differences in processing of social material may manifest and contribute to future symptoms of depression. In the behavioral study (N=69), we used a memory paradigm and found a linear relationship between memory for negative social images and self-esteem; specifically, those with lower self-esteem remembered more negative social images. This effect was not observed for neutral or positive images. Given this unique relationship between self-esteem and negative social images, a separate but conceptually related imaging study was conducted in which participants (N=99) viewed a series of diverse naturalistic stimuli. Consistent with the behavioral study, the fMRI results identified a relationship between negative social images and self-esteem. Specifically, a region of the subgenual anterior cingulate cortex, a region implicated in social affect and depression, demonstrated a linear relationship between activity for negative social images and self-esteem. Furthermore, when controlling for levels of depression at time of scan, activity to negative social images predicted changes in depression scores over time. The overall pattern of results provides insight into how a bias toward negative social material may contribute to the relation between low self-esteem and depression and how that relation emerges over time.

C – 3 *SANS Poster Award winner*
NEURAL PREDICTION OF POPULATION INFORMATION SHARING BEHAVIOR RELATES TO DAILY LIFE INFORMATION SEEKING

Bruce P. Dore – University of Pennsylvania; Christin Scholz – University of Pennsylvania; Elisa Baek – University of Pennsylvania; Matthew B. O'Donnell – University of Pennsylvania; Emily B. Falk – University of Pennsylvania
The act of sharing information is fundamental to society, but our understanding of the neural mechanisms underlying information sharing is incomplete. We built hierarchical predictive models that used brain responses to news articles to predict sharing of these articles in the broader population of readers. We found 1) there were large person to person differences in the predictive capacity of brain valuation responses, and 2) these differences tracked with the rest of the brain, such that people with highly predictive ventromedial prefrontal cortex (vmPFC) responses tended to show predictive responses across a global brain network encompassing regions associated with valuation, self-relevance, social cognition, and controlled attention. In a test of the source of these differences, we saw 3) that vmPFC predictive capacity was related to engagement with similar articles in daily life, in that frequent readers

tended to show high ventromedial prefrontal cortex (vmPFC) responses across all articles, whereas infrequent readers tended to show high vmPFC only to articles that would be heavily shared. These results provide a model of variability in brain predictive capacity for population sharing behavior and identify person to person differences in domain familiarity as a psychological source of this variability.

C – 4 *SANS Poster Award winner*
HOW REAL-LIFE HEALTH MESSAGES ENGAGE OUR BRAINS: SHARED PROCESSING OF EFFECTIVE ANTI-ALCOHOL VIDEOS

Martin A. Imhof – University of Konstanz; Ralf Schmälzle – Michigan State University; Britta Renner – University of Konstanz; Harald T. Schupp – University of Konstanz
Health communication via mass media is an important strategy when targeting risky drinking, but many questions remain about how health messages are processed and how they unfold their effects within receivers. Here we examine how the brains of young adults - a key target group for alcohol prevention - 'tune in' to real-life health prevention messages about risky alcohol use. In a first study, a large sample of authentic public service announcements (PSAs) targeting the risks of alcohol was characterized using established measures of message effectiveness. In the main study, we used inter-subject correlation analysis of fMRI data to examine brain responses to more and less effective PSAs in a sample of young adults. We find that more effective messages command more similar responses within widespread brain regions, including the dorsomedial prefrontal cortex, insulae, and precuneus. In previous research these regions have been related to narrative engagement, self-relevance, and attention towards salient stimuli. The present study thus suggests that more effective health prevention messages have greater 'neural reach', i.e. they engage the brains of audience members' more widely. This work outlines a promising strategy for assessing the effects of health communication at a neural level.

C – 5 *SANS Poster Award winner*
INTERPERSONAL SYNCHRONISATION AS A MEDIATING MECHANISM IN VICARIOUS FEAR LEARNING

Philip Parnamets – Karolinska Institutet; Lisa Espinosa – Karolinska Institutet; Andreas Olsson – Karolinska Institutet
Vicarious fear learning (learning about threats by observing others) is a crucial survival-related adaptation in humans and other social species. Surprisingly little is known about its mediating mechanism, and no study has examined this learning during live interaction in dyads. Rather vicarious fear learning is typically studied by exposing observers to videos of a demonstrator receiving shocks to one of two stimuli. Here we extended the vicarious fear learning paradigm to include two naïve participants, each taking turns learning from the other about the value of novel, previously unseen, stimuli. Previous work has suggested the instructed empathy with a model can enhance the learning outcomes of the observer. We extended this work by investigating if physiological synchronisation would predict learning outcomes. We used recurrence quantification analysis to assess the degree of similarity in skin conductance signals between the observer and the model during the learning phase. First, we demonstrated the generalisation of the standard vicarious fear learning paradigm to a setting involving live observers and models. Second, importantly, we found that degree of synchronisation positively predicted the strength of the conditioned fear response of the observer during the subsequent testing phase. Our results suggest that actively modelling the physiological responses of another might be an important path towards successful learning outcomes, and that interpersonal synchrony may function as embodied empathy in vicarious fear learning.

C – 6 *SANS Poster Award winner*
USING BRAIN CONNECTIVITY PATTERNS TO INVESTIGATE REGULATORY MECHANISMS UNDERLYING POSITIVE ILLUSIONS

Michael H. Parrish – University of California, Los Angeles; Janine M. Dutcher – Carnegie Mellon University; Keely M. Muscatell – University of North Carolina, Chapel Hill; Tristen K. Inagaki – University of Pittsburgh; Michael R. Irwin – University of California, Los Angeles; Naomi I. Eisenberger – University of California, Los Angeles
Healthy adults possess positive illusions or biased positive evaluations of themselves, whereas depressed individuals hold more-realistic self-views. Although behavioral evidence has established this basic relationship, much less research has explored the underlying neural mechanisms that may contribute to these positive illusions. Additionally, little research has examined the early-life variables, such as maternal care, that could shape these underlying neurocognitive strategies resulting in biased perceptions. To examine the neural mechanisms that might underlie positive illusions, we scanned individuals (N = 50) receiving social evaluative feedback and examined a regulatory mechanism that might play a role in amplifying the reward value of positive feedback. Specifically, we explored functional connectivity between two regions—the VLPFC, involved in affective regulation, and the VS, involved in reward processing—which together might be involved in amplifying reward signals in response to feedback. Results demonstrated that individuals lower in self-reported depression showed increased connectivity between VLPFC and VS during evaluation, particularly in response to positive and neutral feedback. This suggests that non-depressed individuals may be naturally enhancing reward-related activity to positive and neutral feedback—one possible

mechanism underlying positive illusions. Interestingly, individuals higher in maternal care also showed increased connectivity between VLPFC and VS during evaluation, particularly in response to positive and neutral feedback. This highlights a possible early-life mechanism that may shape the tendency to enhance reward-related activity to positive feedback. These results highlight a potential regulatory mechanism instantiated in neural connectivity patterns and point to an ontogenetic basis for sustained positive illusions across the lifespan.

C – 7 *SANS Poster Award winner*
A NEURAL PROPAGATION SYSTEM: NEUROCOGNITIVE AND PREFERENCE SYNCHRONY IN INFORMATION SHARERS AND THEIR RECEIVERS

Christin Scholz – University of Pennsylvania; Elisa C. Baek – University of Pennsylvania; Bruce Dore – University of Pennsylvania; Matthew B. O'Donnell – University of Pennsylvania; Emily B. Falk – University of Pennsylvania
Interpersonal communication shapes and catalyzes the spread of information through populations. We propose that propagation between information sharers and receivers is driven by neural synchrony in brain systems associated with valuation, self-reflection, and social cognition. Here, we used fMRI to measure neural activity as well as content-related preferences in information sharers while they were exposed to news articles and in receivers exposed to sharer-composed messages about the same articles. We observed significant neurocognitive sharer-receiver synchrony within the hypothesized regions of interest, but not within other brain areas associated with saliency and attention. This effect held irrespective of the news article content, sharer, and receiver characteristics, suggesting that synchrony is a characteristic of human communication rather than a by-product of the situation in which the interaction occurs. We further show that the observed synchrony is not explained by exposure to identical content such as when sharers transmit a preview of the original content together with a personal message. Specifically, we observed synchrony only for communication partners, not randomly paired individuals who were exposed to the same content but did not interact. Finally, the extent of neurocognitive synchrony covaried with the successful propagation of content-related preferences. Together, our findings suggest that sharer-receiver synchrony, in a neural propagation system consisting of regions associated with valuation, self-reflection, and social cognition, supports the interpersonal transmission of information and preferences across contexts. These findings highlight both core neurocognitive processes relevant to social influence and the spread of ideas, and more fundamental elements of human communication.

C – 8 *SANS Poster Award winner*
EXPLORING THE CONCEPTUAL AND VISUAL BASES OF WEAPONS BIAS

Benjamin S. Stillerman – New York University; Ryan M. Stolier – New York University; David M. Amodio – New York University; Jonathan B. Freeman – New York University
Past research on implicit bias reveals a persistent stereotypic association between Blacks and crime, one that is borne out in racially disparate criminal justice outcomes for Blacks. In the Weapon Identification Task (WIT), a common priming paradigm, subjects classify target objects as tools or guns after being primed by Black and White faces, and subjects typically misclassify tools as guns when they are preceded by Black faces. However, the mechanism by which the race of the prime influences responses is still debated, and has implications for developing bias reduction interventions. The traditional view is that conceptual associations between Blacks and crime directly facilitate stereotype-congruent responses. Alternatively, this may be mediated by perceptual processes, such that those conceptual associations bias the visual representation of a tool to be more similar to that of a gun when preceded by a Black face. To address this, in a preliminary fMRI sample (N = 22), subjects passively viewed guns and tools in isolation and subsequently completed the WIT. Using multi-voxel pattern analysis, we observed greater neural-pattern similarity between Black-primed tools and isolated guns than between White-primed tools and isolated guns. We observed this effect in the left orbitofrontal cortex, a region implicated in top-down visual predictions (including stereotype-based expectations) that modulate the ventral-visual stream, suggesting a possible interplay of conceptual and visual contributions to weapon bias effects. Theoretical implications for models of social cognition, stereotyping, and the emerging field of social vision are discussed.

C – 9 *SANS Poster Award winner*
TRIPLE THREAT: BEHAVIORAL INHIBITION, FRONTAL EEG ASYMMETRY, AND ATTENTION BIAS TO THREAT AS A HIGH-RISK MARKER PROFILE FOR SOCIAL ANXIETY

Alicia Vallorani – The Pennsylvania State University; Nhi K. Thai – The Pennsylvania State University; Bradley C. Taber-Thomas – The Pennsylvania State University; Leigha A. MacNeill – The Pennsylvania State University; Koraly Pérez-Edgar – The Pennsylvania State University
Social anxiety in childhood has been independently linked to temperament, physiology and attention biases. In particular, behavioral inhibition (BI) (Schwartz et al., 1999), right frontal EEG asymmetry (Smith et al., 2010) and attention bias to threat (ABT) (Bar-Haim et al., 2007) all have been linked to increased anxiety. Although research has shown relationships between BI and asymmetry (Fox et al., 1994), BI and ABT (Pérez-Edgar et al., 2011) and

ABT and asymmetry (Pérez-Edgar et al., 2013), no study has investigated how all three risk markers may interact to affect socioemotional profiles. The current study assesses the relations of these risk markers with social anxiety. As part of an ongoing study, 123 children (ages 9 to 12) screened for BI status (over-sampled such that 42% were high BI) completed the dot-probe task to assess ABT and provided asymmetry at rest. Both children and parents completed the DISC-IV, providing information about the child's level of social anxiety. Results indicated that both higher levels of BI, $F(1, 115) = 18.05$, $p < .001$, and asymmetry, $F(1, 115) = 8.13$, $p = .005$, were associated with greater social anxiety levels. Conversely, ABT alone did not predict higher levels of social anxiety. A three-way interaction between BI, asymmetry, and ABT revealed that children who were high in BI, right frontal asymmetry, and ABT showed the highest levels of social anxiety, $F(1, 115) = 8.85$, $p = .004$, suggesting that together these three risk markers may create or designate a particularly high-risk profile.

C – 10
RESTING-STATE CONNECTIVITY OF THE BED NUCLEUS OF THE STRIA TERMINALIS IN CLINICAL ANXIETY

Gabriella Alvarez – National Institute of Mental Health; Salvatore Torrisi – National Institute of Mental Health; Christian Grillon – National Institute of Mental Health; Monique Ernst – National Institute of Mental Health

Basic studies in animals implicate the bed nucleus of the stria terminalis (BNST) in anxiety. Little is known about the contribution of the BNST to anxiety in humans. The paucity of work stems from the small size of this structure, which has prevented its valid examination with standard imaging tools. Prior work in our group utilized high resolution imaging at 7 Tesla to map the resting state functional connectivity (rsFC) of the BNST in healthy subjects. Results confirmed and extended structural findings in the literature. Assuming a role for the BNST in anxiety, we expect to identify distinct patterns of BNST rsFC between healthy controls and anxiety patients in this follow-up study. 12 patients with anxiety diagnoses (generalized anxiety and/or social anxiety) and twelve matched healthy subjects participated in this preliminary analysis of a 10-minute resting state scan. Data collection is ongoing with total N=50 by SANS. We used our publically-available BNST masks to extract averaged time series. Within-group analyses replicated previous findings showing strong BNST connectivity with the medial PFC, dorsal amygdala, medial head of caudate and precuneus in both groups. The between-group t-test analysis revealed that patients displayed greater connectivity of the BNST with the left frontal pole, thalamus and subgenual anterior cingulate. Patients also displayed weaker rsFC between the BNST and regions of visual cortex. These preliminary findings suggest deviant resting state BNST connectivity in patients with anxiety in prefrontal and visual cortical regions, which suggests differential changes in sensory (stimuli-driven) processes vs. self-referential (internally driven) processes.

C – 11
MORAL INTUITIONS ELICIT DISSOCIABLE CORTICAL ACTIVATION

Ori Amir – University of California, Santa Barbara; Richard Huskey – The Ohio State University; James Michael Mangus – University of California, Santa Barbara; Reed Swanson – University of Southern California; Andrew Gordon – University of Southern California; Peter Khooshabeh – US Army Research Laboratory; Rene Weber – University of California, Santa Barbara

Moral Foundation Theory (MFT; Graham, et al., 2012) holds that moral judgments are primarily driven by a collection of distinct intuitions about the significance of particular types of moral information. Broadly speaking, moral intuitions can be divided into individualizing (care, fairness, liberty) and binding (loyalty, authority, purity) domains. Past neuroimaging studies typically focus on a single moral foundation (e.g. harm) or otherwise treat morality as a uniform, foundation-general faculty (e.g., Greene et al., 2001; Moll, et al. 2001). Among studies that do consider different types of moral content, these differences rarely map onto the particular set of intuitive foundations proposed by MFT (e.g. Shenhav & Greene, 2014). A total of 60 participants (20 self-identified Democrats, Republicans, Unaffiliated) underwent fMRI with a multi-band accelerated EPI sequence (http://www.cmrr.umn.edu/multiband/) while evaluating recently-validated single-sentence vignettes about individuals acting immorally (Clifford et al., 2015). Using the advanced pulse sequence and optimized stimuli, first analyses provide strong evidence that different moral intuitions elicit neural activity in dissociable networks. Specifically, networks consisting of the temporoparietal junction, temporal pole, precuneus, posterior cingulate cortex, ventromedial prefrontal cortex, dorsomedial prefrontal cortex, and dorsolateral prefrontal cortex are selectively recruited when contrasting binding versus individualizing domains. MVPA analyses and group comparisons presented at the SANS conference provide further insights into whether morality is, as predicted by MFT, processed by foundation-specific networks in the brain (Parkinson et al., 2011) and to what extent Clifford's et al. (2015) vignettes can be considered a localizer for moral intuition networks.

C – 12
THE EFFECTS OF POSITIVE EMOTION ON FEAR CONDITIONING

Kathryn Bach – University of Denver; Daniel S. Lumian – University of Denver; Christian Waugh – Wake Forest

University; Amber Swaim – University of Denver; Detre Godinez – University of Denver; Lisa Correia – University of Denver; Daniel Garcia – University of Denver; Kateri McRae – University of Denver
Fear conditioning has been extensively utilized to understand the mechanisms of associative learning during fear acquisition, extinction and retention (here, after a 24-hour delay). Previous research provides evidence that positive emotion is a successful tool for regulating stress. However, research has not yet investigated whether the advantageous effects of positive emotion can be observed in a fear-conditioning paradigm (during extinction and retention). Forty-three participants underwent fear conditioning using an electric stimulation as the US and four colored shapes as CS's. To manipulate positive emotion during extinction and retention, shapes were superimposed on either positive (beaches, mountains) or neutral (rooftops, alleys) background photos. Galvanic skin response (GSR) was collected to index fear responses during acquisition, extinction and retention. A 2 x 2 factorial design resulted in four conditions of interest: CS+P (reinforced at 80% with a positive background), CS+N (reinforced at 80% with a neutral background), CS-P (not reinforced with a positive background) and CS-N (not reinforced with a neutral background). Preliminary analyses indicate successful conditioning (greater anticipatory GSR for both CS+ compared with CS-) during acquisition and extinction. In addition, a main effect of valence (greater GSR for neutral than positive conditions) was observed during acquisition and extinction. Therefore, both conditioning and valence impacted expression of fear during extinction, whereas only valence impacted expression of fear after a 24-hour delay.

C – 13
AROUSAL AND ATTRACTION: A NEUROBIOLOGICAL APPROACH

Lane Beckes – Bradley University; Danielle Lewis – Bradley University; Casey Grage – Bradley University; Anthony Le – Bradley University

Arousal-attraction links first gained widespread attention when Dutton and Aron (1974) found that fear-based arousal increased attraction to a confederate. This effect was alternatively explained as misattribution of the arousal, facilitation of the dominant response, and negative reinforcement learning. Contrary to negative reinforcement explanations, high intensity exercise also produces this effect (Allen, et al., 1989) indicating no need for a threatening or punishing stimulus. Neurobiology may offer a different explanation. Anaerobic exercise releases endogenous opioids, which reduce pain and increase feelings of reward (e.g., Le Merrer, et al., 2009). Thus, the natural release of opioids is an alternative explanation that should be investigated. In this study, pain threshold and heart rate were taken at baseline and after running. Participants ran at either a high intensity or moderate intensity and heart rate and pain threshold were re-measured at variable intervals after running to tease out the physiological response curves of each. Heart rate corresponds to arousal, whereas pain threshold corresponds to endogenous opioid activity. It was predicted that pain threshold would significantly predict attractiveness ratings in the high intensity condition, but not in the low intensity condition, whereas heart rate would not predict attractiveness ratings in either condition. An ANCOVA and follow-up analyses supported the opioid hypotheses over the arousal hypothesis. This challenges the classic explanations for the link between arousal and attraction. Understanding neurobiology may lead to reinterpretations of classic social psychological findings and lead to new understandings of social behavior.

C – 14
THE EFFECTS OF SOCIAL STATUS ON HONESTY: GENDER MAKES A DIFFERENCE

Philip R. Blue – Peking University; Jie Hu – Peking University; Lusha Zhu – Peking University; Xiaolin Zhou – Peking University

Previous research on the effects of social status on ethical behavior is divided: one line of research suggests that high status individuals are more likely to engage in unethical behavior, whereas a second line of research suggests the opposite. Given the strong effect of gender on both status-seeking behavior and unethical behavior such as dishonesty, here we attempt to bridge the gap in previous literature by systematically testing the effects of gender and social status on honesty behavior. To do so, participant social status was manipulated using rankings from a math competition (i.e., status-inducing task), after which participants were paired with partners of different social status before playing several rounds of the Dictator Game (i.e., DG; baseline social preference) and the Message Game (i.e., MG; honesty concerns). While both male and female participants evidenced equal baseline social preferences for low and high status partners, male participants were less honest with high status than low status partners, whereas female participants were equally honest with high and low status partners. Computational modeling showed that males were more self-interested when playing MG with high status than low status partners. Post-experiment questionnaire also suggested that male participants' dishonesty with high status partners was both strategic and intentional. In general, these findings suggest that gender may play a crucial role in the effects of social status on honesty and, in particular, that males are more willing to act in ways that increase their own status at the cost of higher ranked others.

C – 15

REGULATION OF CRAVING AND WEIGHT LOSS IN BARIATRIC SURGERY PATIENTS

Rebecca G. Boswell – Yale University; Godfrey Pearlson – Yale University & Hartford Hospital Interdisciplinary Center on Obesity Research; Michael Stevens – Hartford Hospital Interdisciplinary Center on Obesity Research; Pavlos Papasavas – Hartford Hospital Interdisciplinary Center on Obesity Research; Darren Tishler – Hartford Hospital Interdisciplinary Center on Obesity Research; Janet Ng – Hartford Hospital Interdisciplinary Center on Obesity Research; Andrea Stone – Hartford Hospital Interdisciplinary Center on Obesity Research; Kasey O'Neil – Hartford Hospital Interdisciplinary Center on Obesity Research; Hedy Kober – Yale University

Bariatric surgery, which alters the stomach, is the most effective treatment for severe obesity. Although some patients lose ~80% of their excess weight, ~80% regain weight 1-year post-surgery, and little is known about predictors of post-surgical weight loss. One candidate is cognitive regulation of craving, which attenuates neural responses to food- and drug-related cues, and predicts successful treatment outcomes for addictions. However, no previous work has investigated obese individuals' regulation of craving in response to food cues and/or whether it might be associated with weight loss. We investigated changes in neural activity from pre- to 1-year post-bariatric surgery using the Regulation of Craving (ROC) task (N=60). On each trial, participants were presented with photographs of high-calorie foods and instructed to (1) LOOK: "respond naturally," or (2) LATER: "think of long-term negative consequences of consuming the food." Then, they rated their craving. Imaging data were collected using multi-band acquisition sequence on a Siemens Skyra wide-bore 3T scanner (TR=475ms, 3x3x3voxels). Preliminary analyses show that during regulation (LATERPOST>LATERPRE; BMIPRE=45.12±6.43; BMIPOST=32.92±5.68), there was greater recruitment of the inferior frontal gyrus (IFG) after bariatric surgery compared to pre-surgery. Whole brain correlations revealed that those with the greatest increase in IFG activation during regulation (LATERPOST>LATERPRE) and the greatest decrease in striatal activation while simply looking at pictures (LOOKPOST>LOOKPRE) lost the most weight at 1-year-follow-up. These results demonstrate that neural activity during regulation of craving is associated with bariatric surgery outcomes. Our findings have important clinical and public health implications and applications.

C – 16

THE RELATIONSHIP BETWEEN THEORY OF MIND AND EXECUTIVE FUNCTIONING ACROSS THE LIFESPAN

Elisabeth E.F. Bradford – University of Kent; Victoria E.A. Brunsdon – University of Kent; Heather Ferguson – University of Kent

To successfully interact with other people, it is important to be able to infer information about their mental states – what they may know, believe, or think at any given time. This ability is often referred to as possession of a 'Theory of Mind' (ToM). Prior research has demonstrated a strong relationship between ToM abilities and Executive Functioning (EF), particularly in young children. However, less is known about the relationship between ToM and EF in adulthood, although it has been shown that during healthy ageing, a decline in both social cognition and EF abilities is often reported. The research presented here sought to explore how the relationship between ToM and EF may change across the lifespan, and how different EF components may be particularly important for successful engagement of ToM at different ages. Participants aged 18-80 years-old completed a battery of ToM tasks assessing different aspects of ToM (such as perspective-taking and emotion recognition) and EF abilities (including inhibition, cognitive flexibility, working memory, and planning). Results revealed differences in how younger and older participants utilize their ToM abilities; older adults were significantly slower in their response times in ToM tasks compared to younger adults. Additionally, older adults made significantly more errors in their responses than younger adults, suggesting difficulty in spontaneously and efficiently computing the mental states of other people. Results highlighted a key role of inhibition and working memory in predicting successful engagement in higher-level ToM, suggesting a critical relationship between ToM and EF continues across the lifespan.

C – 17

THE SOUND AND THE FURY: LATE POSITIVE POTENTIAL IS SENSITIVE TO SOUND AFFECT

Darin R. Brown – University of New Mexico; James F. Cavanagh – University of New Mexico

Emotion is an emergent construct of multiple primitive sub-processes. EEG is uniquely sensitive to real-time neural computations, and thus is an excellent tool to study the construction of emotion. This series of studies aimed to probe the mechanistic contribution of the Late Positive Potential (LPP) to multi-modal emotion perception. Experiment 1 revealed valence differences in the LPP time range for affective sound processing, as well as valence differences in the early LPP time range for visual images paired with sounds. Experiment 2 manipulated this audio-visual enhancement by altering the valence pairings with congruent (e.g. positive audio + positive visual) or conflicting emotional pairs (e.g. positive audio + negative visual). Negative visual stimuli evoked larger early LPP amplitudes than positive visual stimuli, regardless of sound pairing. However, time frequency analyses revealed significant midfrontal theta-band power differences between conflicting and congruent stimuli pairs suggesting very

early (~500ms) realization of thematic fidelity violations. Interestingly, LPP modulations were reflective of the congruency of the stimuli pairs, whereby LPPs for positive pictures are attenuated by the pairing with a negative sound. Together, these findings suggest that enhanced parietal activity for affective valence is modality-independent and sensitive to complex affective processes. Furthermore, these findings suggest that altered neural activities for affective visual stimuli are enhanced by concurrent affective sounds, paving the way towards an understanding of the construction of multi-modal affective experience.

C – 18
THE MIRROR NEURON SYSTEM ACROSS THE LIFESPAN AND ITS ROLE IN SOCIAL COGNITION

Victoria EA Brunsdon – University of Kent; Elisabeth EF Bradford – University of Kent; Heather J. Ferguson – University of Kent

The human mirror neuron system may have an important role in social cognition. Difficulties in social cognitive abilities have been reported with increasing age. However, the mirror neuron system and its relationship with social cognitive abilities have not yet been investigated in healthy aging. The current study used sensorimotor mu desynchronization (composed of alpha and low beta activity) as an EEG marker of the human mirror neuron system. Participants aged 18 to 86-years-old completed a hand movement observation task during EEG recording. Firstly, participants completed a 2-minute resting-state EEG as a reference period and, secondly, watched different video clips that depicted either a static hand or various hand actions, such as locking a door or clicking fingers. To measure social cognitive abilities, participants completed a self-other perspective-taking task, a theory of mind task and an empathy task. Sensorimotor mu desynchronization across the pre-motor cortex, motor cortex and supplementary motor area was correlated with age. In addition, statistical models examined how sensorimotor mu desynchronization is related to individual differences in self-other perspective-taking, theory of mind and empathy abilities. Therefore, this study reports the relationship between the mirror neuron system and social cognitive abilities in healthy aging.

C – 19
COGNITIVE CONTROL AS A BRIDGE BETWEEN BRAIN AND BEHAVIOR: LINKING NEUROTRANSMITTER-MEDIATED INDIVIDUAL DIFFERENCES IN COGNITIVE CONTROL TO REAL-WORLD ACADEMIC GOAL PURSUIT

Rebecca Calcott – University of Oregon; Jason Hubbard – University of Oregon; Elliot T. Berkman – University of Oregon

Linking real-world behaviors with their underlying neural mechanisms is challenging because the two are studied using vastly different methods. Cognitive control is a useful construct for bridging this brain-behavior gap, because its neural mechanisms are well-characterized and it has clear relevance for real-world behaviors. We investigated the real-world consequences of stable versus flexible cognitive control, which are mediated by neural levels of dopamine (DA) and norepinephrine (NE), by testing whether DA- and NE-mediated influences on cognitive control predict performance on both a lab task and academic behavior. Subjects (target N=100) completed an attention shifting task to measure individual differences in the stability/flexibility of cognitive control while pupil size and eye blink rate (EBR), indices of NE and striatal DA respectively, were collected. Next, subjects completed an internet search task to assess flexibility (switching between subtasks) and distractibility (i.e. instability; phone checking, off-task website visits). Subjects then completed daily questionnaires measuring flexibility, distractibility, and task completion as they pursued academic goals. A pilot study (N=61) found a negative relationship between EBR and flexibility on the attention shifting task, suggesting that lower tonic DA levels are related to increased flexibility. Planned analyses will determine whether neurotransmitter-mediated individual differences on this task predict flexibility/distractibility on the internet search task, and whether this relationship mediates the connection between cognitive control and real-world goal pursuit behaviors. This study will clarify the role of DA and NE in cognitive control and establish a framework that leverages cognitive control to link low-level neural mechanisms with real-world behaviors.

C – 20
ROLE OF THE AMYGDALA IN DECEPTION DETECTION

Elizabeth Castle – University of California, Los Angeles; Saskia Giebl – University of California, Los Angeles; Matthew D. Lieberman – University of California, Los Angeles; Shelley E. Taylor – University of California, Los Angeles

Previous neuroscience research has demonstrated an association between the amygdala and trait-level evaluations of other's un/trustworthiness (Adolphs, Tranel, & Damasio, 1998) (Todorov, Baron, & Oosterhof, 2008). It is less clear however, whether this relationship extends beyond the trait-level to offer any advantage in discerning real-time untrustworthy behavior (Castle, Eisenberger, Seeman, Moons, Boggero, Grinblatt, & Taylor, 2012). To more directly address this question, we had participants view short video clips of live investment pitches involving real money, and were asked to judge whether video-targets had been truthful or deceptive in their promise to return their partner's investment. Based on our a priori hypothesis regarding the involvement of the amygdala in deception detection, we began by conducting a preliminary region of interest (ROI) analysis to address this question using an anatomically

defined bilateral amygdala ROI. We conducted a hierarchical regression analysis using percent signal change extracted from an anatomically defined amygdala ROI to see if task-related amygdala activity predicted average deception detection accuracy. For the right amygdala, the results show that our model explained a significant amount of the variance in deception detection accuracy, $(F(2,18)=4.395, p=.028, R^2=.328, R^2$ adjusted=.253), and that right amygdala activation during the investment task predicted average deception detection accuracy (Beta=.437, t(20)=2.2, p=.041), over and above the non-social control task (Beta=.279, t(20)=1.4, ns). There was no effect present in the left amydala. These promising preliminary analyses suggest that right amygdala activation may serve as an internal cue to the deceptive behavior of others.

C – 21
AWARENESS OF THE WEIGHT CONTROL GOAL MODULATES FOOD-CUE REACTIVITY IN DIETERS

Pin-Hao A. Chen – Dartmouth College; William M. Kelley – Dartmouth College; Todd F. Heatherton – Dartmouth College

To be successful in self-regulation, individuals need to bring their behaviors in line with their long-term goals (Heatherton, 2011). For dieters, their long-term goal is to control weight. While dieters are motivated to lose weight, only few of them achieve this goal or maintain weight loss over the long term (Mann et al., 2007). One factor influencing dieting success might be the relative activation of weight loss goals. For successful dieters, their weight loss goals are activated when they are exposed to food cues. In contrast, when unsuccessful dieters are exposed to food cues, eating enjoyment goals are activated (Stroebe, van Koningsbruggen, Papies, & Aarts, 2013). This study investigated whether increasing dieters' awareness of their weight control goal could modulate food-cue reactivity in brain executive (i.e., frontoparietal) or reward networks. Thirty dieters were randomly assigned to an awareness group or non-awareness group. Dieters in the awareness group were weighed on a scale and filled out three questionnaires related to eating behaviors. Those in the non-awareness group filled out three questionnaires irrelevant to eating behaviors. Both groups then underwent two runs of food-cue reactivity task in the scanner. The result showed that the awareness group had greater food-cue reactivity than the non-awareness group in the frontoparietal network, t(28) = 2.987, P = 0.005, but not in the reward network, t(28) = 1.707, P = 0.099. Our findings suggest that heightening awareness of weight loss goals may boost neural responsivity of brain executive systems, allowing dieters to stay in control.

C – 22
ALLEGIANCE AND FLEXIBILITY IN NEURAL NETWORKS FORECAST RESPONSES TO HEALTH MESSAGING

Nicole Cooper – University of Pennsylvania & U.S. Army Research Laboratory; Javier O. Garcia – U.S. Army Research Laboratory; Steven Tompson – University of Pennsylvania; Matthew B. O'Donnell – University of Pennsylvania; Jean M. Vettel – U.S. Army Research Laboratory & University of Pennsylvania & University of California; Emily B. Falk – University of Pennsylvania

Recent work has demonstrated that neuroimaging can predict the effectiveness of persuasive messaging using functional activation within individual brain regions. We extend this research by examining functional dynamics within and between brain networks during exposure to antismoking messaging. Forty-five adult smokers underwent functional magnetic resonance imaging while viewing 80 antismoking images. Participants reported their smoking behavior and intentions to quit or reduce their smoking at two timepoints, before the scan and one month later. Utilizing a community detection algorithm, our analysis examined whether sets of brain regions formed consistent subnetworks (measured as allegiance among regions) or whether regions frequently changed their subnetwork community (measured as flexibility). We examined allegiance within and between four networks: the default mode, fronto-parietal control, salience, and subcortical networks. Smokers who showed a larger proportional change in smoking intentions also demonstrated two changes in network allegiance during message exposure: reduced allegiance among regions within the default mode network and the fronto-parietal control network. These reductions in allegiance may reflect differential recruitment of regions in these networks, several nodes of which have been previously related to behavior change. Finally, flexibility within the whole brain, on average, predicts increased intention change. These data highlight the value in considering brain network dynamics for understanding message effectiveness and social processes more broadly.

C – 23
MUDDYING THE WATERS: DOES AUTONOMOUS CHOICE REDUCE CRAVING REGULATION EFFICACY?

Danielle Cosme – University of Oregon; Arian Mobasser – University of Oregon; Dasa Zeithamova – University of Oregon; Elliot T. Berkman – University of Oregon; Jennifer H. Pfeifer – University of Oregon

The ability to control appetitive urges, such as food cravings, is critical for health and well-being. Cognitive reappraisal reduces cravings, but the way reappraisal is typically studied in the lab ignores potentially important factors, such as the choice to regulate. To get closer to how regulation occurs in real life, we conducted an fMRI

study in which 30 participants completed a craving reappraisal task that included a choice to regulate prior to reappraisal. Participants either actively viewed images of personally-desired foods (look) or reappraised their food craving (regulate). Participants were told to look or reappraise on half the trials (low autonomy), and freely chose to look or reappraise on the other half (high autonomy). Unexpectedly, self-reported craving regulation efficacy was reduced following autonomous choice, even though neural data revealed that it resulted in relatively greater BOLD signal in regions associated with attention and cognitive control (e.g., ACC, dlPFC, PPC). While seemingly at odds, these results suggest that making a choice may tax limited attentional and control resources, leaving fewer resources available for allocation during task implementation (looking or regulating). We will test this hypothesis using MVPA to classify look and regulate trials and compare classification accuracy for low and high autonomy. If autonomous choice disrupts resource allocation during implementation, then look and regulate trials should be less robustly differentiable in the high autonomy condition than in the low autonomy condition. These results extend our understanding of how autonomous choice affects regulation and have implications for interventions to improve appetitive regulation.

C – 24
TAKING HYPERSCANNING OUT OF THE LAB: EVIDENCE FROM EEG RESEARCH ON 1400 DYADS DURING FACE-TO-FACE INTERACTION

Suzanne Dikker – Utrecht University & New York University; Georgios Michalareas – Max Planck Institute for Empirical Aesthetics; Matthias Oostrik; Hasibe M. Kahraman – New York University & Hunter College; Imke Kruitwagen – Utrecht University; Shaista Dhanesar – Washington University in St. Louis; Marijn E. Struiksma – Utrecht University; David Poeppel – Max Planck Institute for Empirical Aesthetics

What does it mean to be 'on the same wavelength' with another person? When we feel connected or engaged, are our brains in fact 'in sync' in a formal, quantifiable sense? To address this question, we collected EEG and questionnaire data from 2800 participants at eight different sites (museums and galleries). During the experiment, pairs of people interacted face-to-face for 7-10 minutes inside The Mutual Wave Machine, an interactive neurofeedback art/science installation that collects, compares, and visualizes brain-to-brain synchrony between two people in real time (light patterns reflect moving-window correlations between the two EEG signals; Scientific American Mind, November/December 2016). The large dataset allowed us to explore the relationship between brain-to-brain synchrony and character/relationship traits as well as emotional states. Findings from 700 EEG recordings, matched for experimental parameters and context, show that pairs with more empathetic personalities (Interpersonal Reactivity Index, Davis 1980) also exhibited higher brain-to-brain synchrony, and the same was true for pairs who felt more connected to each other. Further, brain-to-brain synchrony increased throughout the recording session - but only if dyads were explicitly told that the light patterns they saw reflected their brain-to-brain synchrony, or if pairs reported to be more focused at the end of their session. These findings support an account whereby brain-to-brain synchrony is a possible biomarker for successful social interaction, as measured via factors like empathy, focus, and connectedness. Our interdisciplinary 'crowdsourcing neuroscience' approach may provide a promising new avenue to collect rich datasets pertaining to real-life face-to-face interactions.

C – 25
MULTIMODAL INVESTIGATION OF NEUROBEHAVIORAL DYNAMICS – MINDS – IN EMOTION-COGNITION INTERACTIONS

Florin Dolcos – University of Illinois at Urbana-Champaign; Matthew Moore – University of Illinois at Urbana-Champaign; Alexandru Iordan – University of Michigan; Ryan Larsen – University of Illinois at Urbana-Champaign; Edward Maclin – University of Illinois at Urbana-Champaign; Anthony Singhal – University of Alberta; Brad Sutton – University of Illinois at Urbana-Champaign; Andrew Bagshaw – University of Birmingham; Monica Fabiani – University of Illinois at Urbana-Champaign; Gabriele Gratton – University of Illinois at Urbana-Champaign

This presentation will introduce a novel method for simultaneous tri-modal brain imaging, which is a World Premiere in the study of brain function. The link between spatial (where) and temporal (when) aspects of the neural correlates of most psychological phenomena is not clear. Elucidation of this relation requires integration across multiple imaging modalities and tasks that reliably modulate the engagement of brain networks of interest. Here, we illustrate such an integration across 3 imaging modalities: one with great spatial resolution (fMRI), one with extraordinary temporal resolution (ERP), and one combining the spatio-temporal properties of the first two (event-related optical signals, EROS). Executive tasks with emotional distraction were used, because such dual-task designs can dissociate between large-scale networks sensitive to cognitive and affective processing. Data from an emotional odd-ball task provided initial validation of simultaneous bi-modal fMRI-EEG and EEG-EROS recordings, and identified brain responses consistent with unimodal spatial and temporal evidence. Additional data extended these results to a combined working memory-emotion regulation (WM-ER) task with emotional distraction, and showed further spatio-temporal dissociations convergent across the 3 modalities, as a function of WM load (high vs. low), source of distraction (external vs. internal) and type of ER (spontaneous vs. instructed). Moreover, joint multi-modal analyses identified

cross-modal links between electrical and hemodynamic responses when coping with emotional distraction. Finally, further supporting the value of multimodal imaging integration to study brain function, data from simultaneous fMRI-ERP-EROS recordings validated the feasibility of using EROS as a bridging tool in this tri-modal combination investigating emotion-cognition interactions.

C – 26
EVALUATING RISK: NEURAL DIFFERENCES IN SEXUALLY RISKY METH USERS DURING GAMBLING TASK.

Vita Droutman – University of Southern California; Feng Xue – University of Southern California; Emily Barkley-Levenson – Hofstra University; Ben Smith – University of Southern California; Stephen Read – University of Southern California

We examined the differences in neural processing between methamphetamine users and non-users in a financial gambling task. 162 men who have sex with men (MSM) participated in this study as part of a larger investigation of neural correlates of risky sexual decision-making. All participants reported active participation in non-monogamous sexual relationships. Self-reported number of risky sex occurrences in the past 3 months and substance use history in prescreening allowed us to recruit participants into 3 groups: safe (51), risky no-meth users (66) and risky meth users (45). While in an fMRI scanner participants performed the CUPS task, where they had to decide to accept or refuse a series of mixed gambles. Half of the gambles were risk-equivalent, the other half were split between risk-advantageous and risk-disadvantageous. The task was specifically designed to disentangle activation during gamble evaluation/decision, action, and feedback phases. Behaviorally we found that meth-users took more risk on risk-equivalent gambles than non-users. During gamble evaluation we found reduced BOLD response in meth-users (compared to safe and risky non-users) in 3 systems involved in decision-making: Impulsive: amygdala, striatum, Reflective: OFC, ACC, and Insula. Contrasting risky meth users with risky non-meth users yielded similar results: bilateral insula, OFC, striatum, amygdala, frontal pole. During feedback phase meth-users had reduced activation in left hippocampus, thalamus, precuneus, lateral occipital cortex, angular gyrus, supramarginal gyrus and in right posterior cingulate, superior parietal lobule, precentral gyrus. Functional connectivity differences between meth-users and non-users was also examined.

C – 27
STRESS INCREASES NEURAL SENSITIVITY TO MONETARY AND PROSOCIAL REWARDS

Janine M. Dutcher – Carnegie Mellon University; Julienne E. Bower – University of California, Los Angeles; Naomi I. Eisenberger – University of California, Los Angeles

Evidence for the relationship between stress and reward sensitivity is mixed, suggesting both inhibitory and enhancing relationships. However, there is evidence that stress can enhance reward sensitivity for different reward types. Chronically stressed rats show a stronger anticipatory response to a basic reward, sucrose, than non-stressed rats (van der Harst et al., 2003). The tend-and-befriend model suggests that individuals under stress, particularly women, will often care for and affiliate with others (Taylor et al., 2000). Thus, we conducted an fMRI study to investigate the relationship between perceived stress and neural sensitivity to two different reward types: monetary reward and charitable giving. 21 female participants (average age=55.5 years) reported their perceived stress levels over the prior 4 weeks and completed a reward task in the scanner. In the reward task, participants completed 3 trial types: the opportunity to receive money, the opportunity to donate money to a charity, and control trials in which no money was exchanged. We then completed ROI analyses on the ventral striatum (VS), a key region in the neural reward network. Results show that the charitable condition (vs. control) and the monetary reward condition (vs. control) led to greater neural activity in the VS. Moreover, those who reported higher perceived stress showed greater VS activity to monetary reward (vs. control) and charitable giving (vs. control). These findings suggest that, in women, higher perceived stress levels are associated with greater neural reward sensitivity to both prosocial and monetary rewards, suggesting implications for understanding how stress affects behavior.

C – 28
ASSOCIATION BETWEEN SCHIZOPHRENIA POLYGENIC RISK AND NEURAL CIRCUITRY DURING EMOTION PERCEPTION

Ilvana Dzafic – The University of Queensland; Hana Burianova – Swansea University; Sathish Periyasamy – The University of Queensland; Bryan Mowry – The University of Queensland

In this study, we investigated the association of schizophrenia polygenic risk on functional brain networks during a dynamic emotion perception task. The neural networks recruited during emotion perception have previously been shown to be altered in schizophrenia patients, which may reflect genetic susceptibility. We created schizophrenia polygenic risk scores (PRS) using summary data from the Psychiatric Genetic Consortium of 34,241 schizophrenia cases and 45,604 controls, for our target sample of twenty-eight healthy individuals. We explored associations between brain activity during perception of angry, happy and neutral expressions that were either congruent or

incongruent with prior expectations. Task based Partial Least Squares (PLS) was used to analyze regional brain activity, with results identifying an association between schizophrenia PRS and activity in emotion regulation neural correlates. Next, seed based PLS was used to assess functional connectivity of the right anterior insula (rAI) seed, identified in the task-based PLS. Results demonstrated functional connectivity between the rAI and regions previously implicated in implicit emotion regulation. The functional network was associated with better performance during threat and ambiguous emotion perception in those with greater schizophrenia PRS. Our results suggest that the common risk variants, which increase susceptibility to schizophrenia, are associated with higher activity in the implicit emotion regulation network, possibly reflecting inefficiency. This inefficiency during emotion perception when combined with other pathological factors may increase risk for psychosis. The findings in this study have implications for understanding the neurophysiological biomarkers relevant for schizophrenia, and open up translational pathways for effective psychosocial interventions.

C – 29
INVESTIGATING THE NEURAL BASIS OF SHARED PREFERENCES AND AFFILIATION

Harry Farmer – University College London; Antonia Hamilton – University College London
Similarity to the self is a key factor in our judgement of others with people showing greater feelings of affiliation towards those they perceive as being more similar to themselves. We aimed to investigate the neural basis of this phenomena using an fMRI. In this study participants were required to choose which of two paintings they preferred and then observed the choices of two confederates one of whom chose the same picture as them 75% of the time while the other only chose the same 25% of the time. Behaviourally we found that participants showed greater liking to the similar confederate compared to the dissimilar confederate replicating the previous evidence for a similarity liking link. BOLD activation showed that observing the different confederate's choice led to greater activation in both the ventrolateral prefrontal cortex, which is implicated in response switching and has previously been linked to social influence. The dissimilar confederate's choice also led to greater activation in the dorsomedial prefrontal cortex a region heavily implicated in processing information about others. We also found that viewing one's own chosen stimuli after seeing the choices of both confederates led to increased activation in regions involved in self processing and in social cognition including the temporal-parietal junction, the mid cingulate and the precuneus. Our findings suggest that associations between shared preference and affiliation involves brain areas that are involved in learning about other preferences and also regions involved in the processing of value similarity between self and others.

C – 30
COGNITIVE CONTROL ACTIVITY DURING FOOD CRAVING REGULATION PREDICTS THE EFFECT OF A VALUES-BASED HEALTHY EATING INTERVENTION

Nicole R. Giuliani – University of Oregon; Lauren E. Kahn – University of Oregon; Junaid Merchant – University of Oregon; Bryce Dirks – University of Oregon; Elliot T. Berkman – University of Oregon
Unhealthy eating can be reduced by decreasing reactivity to unhealthy foods as well as by increasing the regulation of that desire. Seventy-four overweight (BMI 25-35) adults aged 35-45 performed a food craving regulation task during fMRI, where they saw pictures of their most and least craved unhealthy foods with instructions to either look or regulate. Reactivity (look craved > not craved) recruited the mesolimbic dopamine system, while regulation (regulate > look craved) recruited the cognitive control network (e.g., right inferior frontal gyrus; rIFG). Post-scanning, half of the participants performed a healthy eating intervention by writing messages to themselves that aligned healthy eating with their core values, and half wrote about general healthy eating (control). All participants then returned to the lab after 28 days of receiving either their messages or control messages containing standard healthy eating information. We measured self-reported consumption of known unhealthy (e.g., processed meat, sweets) and healthy (e.g., green vegetables) foods at both time points. Results revealed a significant interaction by group (p=.003) such that the control group demonstrated a positive correlation between rIFG activity and consumption, whereas the intervention group showed a negative correlation. In other words, greater engagement of the cognitive control network during food craving regulation predicts an increase in unhealthy food consumption, a relationship which is reversed among individuals receiving self-authored value-based messages about healthy eating. These results are specific to the rIFG and unhealthy foods, and suggest a distinct mechanism by which core values motivation may improve eating patterns in at-risk individuals.

C – 31
INFANTS EMOTIONAL PROCESSING: VALENCE, AROUSAL AND MOTHER-INFANT RELATIONSHIP

Joana Gonçalves – University of Porto; Susana Silva – University of Porto; Pedro Lopes-dos-Santos – University of Porto; Marina Fuertes – University of Porto; Fernando Ferreira-Santos – University of Porto; Ana Loureiro – University of Porto
The emotional information conveyed through facial expressions is crucial to early social interactions. However, infant`s categorical discrimination proficiency, as well as valence and arousal modulation effects on face processing

are poorly understood. In this study, angry and happy faces were selected from the Nim Stim face stimuli set, according to 4 conditions: High Happy (HiHA), Low Happy (LoHA), High Angry (HiHA), and Low Angry (LoAN). Thus, categories of valence, arousal and valence + arousal were included. A total of thirty 12-month-old infants participated in a Visual-Paired Comparison Task. In this protocol first a LoHA face was presented (habituation) followed by 6 trials composed of two contrasting emotional faces (one new and the other was the one used in habituation). Data was collected using an eye-tracking system. Infants' attachment was also evaluated using the strange situation procedure. We found a significantly higher fixation time for the new face when compared with the habituation face, suggesting that 12-month-old infants are able to discriminate different emotional faces. Moreover, differences of fixation time were significant for the arousal but nor for the valence contrast. We also found a statistically significant effect of infant's attachment classification on infant's emotional discrimination, specifically in the arousal contrast. Particularly, resistant-ambivalent infants showed a preference for HiHA (high arousal, happy) compared to LoHa (low arousal, happy), while avoidant infants showed the reverse pattern (LoHA>HiHA). Our findings support the notion that early social-emotional experiences with the mother are related to infants social information processing.

C – 32
FEAR IN THE MIND'S EYE: MENTAL IMAGERY OF A FEAR CONDITIONED STIMULUS PRODUCES A DETECTABLE YET ATTENUATED FEAR RESPONSE
Steven G. Greening – Louisiana State University; Tae-Ho Lee – University of North Carolina; Rachel Millin – University of Washington; Mara Mather – University of Southern California; Jonas T. Kaplan – University of Southern California
In this study, we investigated the ability of mental imagery to evoke emotion. This can occur when we generate a mental representation "in the mind's eye" of an emotion-eliciting or emotion-relevant visual percept. Specifically, we predicted that mental imagery of a previously fear-conditioned visual stimulus (CS+), compared to imagery of a neutral stimulus (CS-), would produce a discernible yet attenuated fear response. We had 12 participants complete our fear conditioning and mental imagery task while undergoing concurrent fMRI and psychophysiological recordings of the skin conductance response (SCR). Behaviorally, we found a main effect of CS-type, such that viewing or imagining the CS+ was associated greater self-reported fear than when viewing or imaging the CS- (p<.01); and an interaction indicating that self-reported fear is greater when viewing compared to imagining the CS+ (p<.05). Consistent with the behavioral effects, we observed a similar main effect in the SCR data, such that participants had a greater SCR to CS+ relative to CS- stimuli irrespective of viewing versus imagining (p<.05). A preliminary univariate analysis of the fMRI data suggests a similar pattern of results in the anterior insula during viewing versus imagining the CS+ compared to the CS-. These effects can not be explained by differences in self-reported imagery vividness nor imagery effort, as there were no significant differences for the CS+ compared to the CS- in either. These preliminary results indicate that generating a mental image of a fear conditioned stimulus produces a detectable, though attenuated, behavioral, physiological, and neural fear response.

C – 33
READING PICTURE-INDUCED POSITIVE AND NEGATIVE EMOTIONS USING FACIAL EXPRESSIONS AND MACHINE LEARNING
Nathaniel B. Haines – The Ohio State University; Matthew W. Southward – The Ohio State University; Jennifer S. Cheavens – The Ohio State University; Woo-Young Ahn – The Ohio State University
Recognizing facial expressions (FEs) of emotion is crucial for our well-being, social interaction, and survival. Most emotion recognition research has focused on manual coding of FEs: human raters are trained to code FEs, and then watch and rate numerous videos/images. Rigorous training can achieve high accuracy and reliability, but it is inefficient and does not provide a mechanistic understanding of how ratings are generated. Here, we demonstrate that computer vision technology and machine learning can yield automatic coding of FEs and provide insights into how humans generate emotion ratings. Participants (N=112) viewed 42 IAPS images while their FEs were video recorded. Three independent coders rated each recording for participants' positive and negative emotion intensity. A computer vision tool (FACET) was used to generate time-series of evidence for 20 FEs (a.k.a. action units). Data in the training set (66%) were used to train machine learning models with the goal of predicting human ratings. Predictive accuracy of each model was tested on unseen data. With the best-performing machine learning model (Random Forest), mean correlations between predicted and actual ratings were .85 and .73 for positive and negative emotions, respectively. While multivariate patterns of predictive FEs were similar across all coders, we found distinctive facial patterns for predicting positive and negative emotion. In summary, our results shed light on the mechanism of emotion recognition from facial expressions. This line of research may provide objective and automated measures of emotion recognition and point the way to real-world applications and future research.

C – 34

REGULATING RESPONSES TO NEGATIVE SOCIAL STIMULI ACROSS DEVELOPMENT

Chelsea A. Helion – Columbia University; Jennifer A. Silvers – University of California, Los Angeles; Alisa Powers – Long Island University; Michael Dreyfuss – Weill Cornell Medical College; Katie Insel – Harvard University; Peter Franz – Harvard University; Jochen Weber – Columbia University; Walter Mischel – Columbia University; BJ Casey – Yale University; Kevin Ochsner – Columbia University

There are many times in life when we must successfully regulate our emotions in order to achieve our goals. One need only look at the actors who have just lost the Oscar, the runner-up for Miss America, or second-place Olympic medalists to see extremely successful (or terribly failed) acts of emotion regulation. In this research, we explore how two types of affective regulation—cognitive reappraisal and impulse control—impact the influence of affective responding on behavior across a wide developmental age group (6-25). To examine this question, we collected behavioral and fMRI data from 72 participants who completed two tasks: 1) a task wherein regulating one's negative affect is the primary goal of the task (Cognitive Reappraisal), and 2) a task wherein individuals must exercise impulse control in order to inhibit responses to negative affective stimuli (Emotional Go/No-Go). We found a relationship between behavior across the tasks: participants who were more successful at regulating their negative emotions using reappraisal were also better at inhibiting their responses to negative stimuli in the emotional go/no-go task across the development age range. We also found neural overlap across both tasks, such that regulation involved greater recruitment of prefrontal regions and dampening of activity in the right amygdala. Connectivity analyses indicated age-related differences in the recruitment of lateral prefrontal regions when modulating amygdala activity based on the type of regulation being implemented.

C – 35

PREPARED SAFETY STIMULI AND FEAR LEARNING: EXAMINING THE EFFECT OF SOCIAL SUPPORT ON FEAR ACQUISITION AND FEAR EXTINCTION

Erica Hornstein – University of California, Los Angeles; Naomi Eisenberger – University of California, Los Angeles

Previous research has demonstrated that social support is one category of prepared safety stimuli. The current work builds on these findings by examining the impact of social support on the fear learning process. First, in a study evaluating the impact of social support on fear acquisition, participants underwent a fear acquisition procedure in which neutral stimuli were paired with either a social support figure's image or a stranger's image. Results showed that while fear was associated with stimuli paired with images of strangers, none was associated with those paired with images of social support figures. Next, in a study evaluating the impact of social support on fear extinction, participants were first trained to associate fear with two neutral stimuli and then underwent a fear extinction procedure in which those stimuli were paired with either a social support figure's image or a stranger's image. Results showed that when presented alone post-procedure, stimuli previously paired with an image of a stranger continued to elicit a fear response, while those previously paired with an image of a social support figure did not, replicating previous findings. Additionally, this same pattern of results was viewed 24 hours later during a fear reinstatement test. These results demonstrate that social support reduces fear acquisition and enhances fear extinction, findings that are in contrast to what would be expected for learned safety signals. These opposing effects suggest that the safety category may be more complex than previously thought and that certain assumptions about this category must be revisited.

C – 36

RESTING-STATE FUNCTIONAL CONNECTIVITY OF THE AMYGDALA-VENTROMEDIAL PREFRONTAL CORTICAL NETWORK AND ANXIETY: MODERATING INFLUENCES OF SEX AND TIME

Jeremy F. Huckins – Dartmouth College; M. Justin Kim – Duke University; Todd F. Heatherton – Dartmouth College; Paul J. Whalen – Dartmouth College; William M. Kelley – Dartmouth College

Neuroimaging studies of anxiety have linked decreased functional and structural connectivity between the amygdala and the ventromedial prefrontal cortex (vmPFC) with elevated levels of self-reported anxiety. One way to further our understanding of the nature of this brain-anxiety relationship is to consider potential modulatory factors from datasets with sufficient power. To this end, we sought to replicate the inverse relationship between amygdala-vmPFC resting-state functional connectivity (RSFC) and anxiety (Kim et al., 2011) in a large-scale RSFC dataset (n=375) and test for potential moderators of this relationship. Consistent with previous RSFC studies of anxiety, an inverse correlation between right amygdala-vmPFC functional connectivity and trait anxiety (measured with the STAI) was observed ($r=-0.15$, $p<0.005$). The left amygdala did not show the same relationship. Moderator analysis revealed a significant effect of sex, such that males, compared to females, demonstrated a stronger inverse correlation between amygdala-vmPFC functional connectivity and trait anxiety ($p<0.05$). When taking into account the time between survey and scan we observe a significant relationship between left amygdala-vmPFC connectivity and STAI only in male subjects where the STAI was collected within two weeks of the RSFC scan ($p<0.05$). Behaviorally, test-retest reliability of STAI decreases over time (Nixon et al., 1977) and those decreases seem to be reflected in our ability to

an inverse relationship between STAI and vmPFC-amygdala connectivity. Overall, the current data replicate the previously identified relationship between vmPFC-amygdala connectivity and STAI but identify sex and time as key moderators.

C – 37
CAN'T FIGHT THIS FEELING: THE IMPACT OF EMOTIONAL FACES ON ADOLESCENTS' COGNITIVE CONTROL

Susannah L. Ivory – University of North Carolina, Chapel Hill; Ethan M. McCormick – University of North Carolina, Chapel Hill; Eva H. Telzer – University of North Carolina, Chapel Hill
Adolescence is a time of social reorientation towards friends and peers. Socioemotional context impacts adolescents' ability to engage in cognitive control, with adolescents showing impaired inhibition in response to both positive and negative social input. The present studies used a unique social stop signal task to examine cognitive control in the presence of social cues. In Study 1, 55 adolescents (12-14 years) and 51 adults (27-56 years) completed a behavioral social stop signal task, during which they had to inhibit a motor response in the presence of happy, angry, and neutral faces, which were age-matched for the two groups. Adolescents' cognitive control was significantly impaired in the presence of happy faces compared to neutral and angry faces, whereas no emotion effect was found in the adult sample. In Study 2, 59 adolescents completed the social stop signal task while undergoing an fMRI session. Behaviorally, we replicated the results of Study 1, finding that adolescents' cognitive control was significantly impaired in the presence of happy faces. At the neural level, adolescents demonstrated increased bilateral insula activation to happy faces on trials where they responded incorrectly compared to trails where they responded accurately. Furthermore, we found increased activation in the ventral striatum and medial prefrontal cortex to happy faces on trials where they responded correctly compared to trails where they responded incorrectly. These findings suggest that adolescents are particularly susceptible to positive social input from their environment during cognitively demanding activities, which is subserved by activation in the corticolimbic system.

C – 38
OXYTOCIN AND VASOPRESSIN MODIFIES SOCIAL ENCOUNTERS DIFFERENTLY IN MALE AND FEMALE MACAQUE MONKEYS

Yaoguang Jiang – University of Pennsylvania; Michael L. Platt – University of Pennsylvania
The neuropeptide oxytocin (OT) and Arginine-Vasopressin (AVP) are known to influence social functions in a wide array of mammals. In primates, OT delivered intranasally enhances trust and promotes prosocial behavior. The precise neural mechanisms underlying these effects, however, remain unclear. In this study we showed that treating one male macaque monkey with intranasal OT relaxed his social interaction with another male. OT treatment simultaneously suppressed the threatening behavior of dominant males and increased the boldness of submissive males, effectively flattening the pre-existing social hierarchy. Additionally, OT also enhanced the effectiveness of social communication by increasing the behavioral synchrony between the pair. Notably, OT altered the behavior of not only the treated monkey but also his non-treated partner. These effects were largely recapitulated when OT was injected focally into the anterior cingulate gyrus (ACCg), a brain area previously linked to empathy, self-control, and other-regarding behavior. Additionally, the effects of OT were also reproduced, with greater efficacy, via intranasal delivery of AVP in male macaque monkeys. Taken together, these results demonstrated that exogenous OT modulates social behavior partially through non-specific binding with AVP receptors in ACCg. In contrast, OT and AVP intranasal administration in female macaque monkeys resulted in significantly different behavioral patterns. Most notably, both neuropeptides heightened the alertness of females during their interactions with males. Additionally, OT and AVP both significantly reduced the amount of time females chose to spend together in the same home cage, as well as the amount of time they spent grooming each other.

C – 39
EFFECTS OF ACETAMINOPHEN AND IBUPROFEN ON MENTAL ROTATION

Amanda Kaczmarek – University of California, Santa Barbara; Youngki Hong – University of California, Santa Barbara; Alexis Keaveney – The Ohio State University; Baldwin Way – The Ohio State University; Kyle Ratner – University of California, Santa Barbara
These results are part of an ongoing project examining the effects of acetaminophen and ibuprofen on social perception and evaluation (Current n=201, preregistered n=300). Previous research in our lab suggests that acetaminophen blunts evaluative biases in face representations of minimal groups. Since representing faces of group members is influenced by both evaluative and visual sources, the goal of the current work is to examine acetaminophen and ibuprofen effects on a visualizing task that is less influenced by evaluative information. We conducted a double-blind study wherein participants took acetaminophen, ibuprofen, or a placebo and completed a mental rotation task to assess visualization ability. Analyses indicate a significant difference between the acetaminophen and placebo conditions, but no ibuprofen effects. This work suggests that acetaminophen may

influence social perception by disrupting visualization ability.

C – 40

IT'S THE THOUGHT THAT COUNTS: THE NEURAL INTERACTION OF PERSON AND VALENCE IN EVERYDAY SOCIAL AND NON-SOCIAL SCENARIOS THAT ELICIT GRATITUDE OR DISTRESS

Christina M. Karns – University of Oregon

A moral emotion such as gratitude can be understood in the context of the social expectations we have of other people. When we receive an unexpected benefit or harm, the social agency of another person shapes the emotional experience. How do social and value-dependent neural processes support these experiences? FMRI was used to examine this question in a task where 32 female participants read short second-person vignettes about everyday problems, such as parking, deadlines, and obligations, in which the final sentence revealed a positive or negative outcome that was due to another person's intent or not. When a person intended the outcome, regardless of outcome valence, responses were larger throughout the ventral medial prefrontal cortex and posterior parietal cortex, as well as the superior temporal gyrus (STG) ($p < .001$, $k > 20$, FWE $p < .05$) overlapping with regions identified during a separate theory of mind (TOM) localizer task (conjunction $p < .001$, $k > 10$, FWE $< .05$). Importantly, person and valence interacted such that positive person-intended outcomes elicited larger parameter estimates in the most ventral aspect of the medial prefrontal cortex, along with the anterior middle frontal gyrus, posterior parietal cortex and left and right STG ($p < .001$, $k > 20$, FWE $p < .05$) consistent with regions in which we also observed change with gratitude training in a separate altruism task. These results demonstrate that the ventromedial cortex and superior temporal gyrus support gratitude through an interaction between valence and social agency.

C – 41

CONVERGENT VALENCE REPRESENTATIONS ACROSS AUDITORY AND VISUAL MODALITIES FROM FMRI DATA

Jongwan Kim – University of South Carolina; Svetlana Shinkareva – University of South Carolina; Douglas Wedell – University of South Carolina

In an fMRI study participants made responses to either semantic or affective content of short silent videos or music clips on a given trial. Valence was carefully matched across visual and auditory modes and manipulated at three levels: positive, neutral or negative, while controlling for arousal. The aim of the study was to localize brain regions that represent affective valence consistently across visual and auditory modalities, a modality-general representation. Whole brain analyses supported the existence of modality-general representations through cross-modal MVPA classification of valence, and these representations were not dependent on the task. Brain regions reflecting modality-general valence were identified by searchlight analysis by comparing the correlation of voxel responses to the same and different valence conditions across the two modalities. Seven clusters were identified that distinguished signed valence, unsigned valence or both. The identified clusters were validated with crossmodal MVPA and confirmatory MDS. Signed valence was represented in the precuneus, unsigned valence in the bilateral medial prefrontal cortex, superior temporal sulcus (STS)/postcentral, and middle frontal gyrus (MFG) and both types were represented in the STS/MFG and thalamus. These results support the idea that modality-general valence is represented in a network of several locations throughout the brain.

C – 42

THE NEUROBIOLOGY OF EMPATHIC ACCURACY IN ADOLESCENT GIRLS WITH TURNER SYNDROME

Megan Klabunde – Stanford University; Aaron M. Piccirilli – Stanford University; Andrew Gundran – Stanford University; Allan Reiss – Stanford University

Introduction: Turner Syndrome (TS) is a disorder in human females in which part or all of one X chromosome is absent. Despite having normal IQ, girls with TS demonstrate neurocognitive deficits, in particular, visual-spatial and executive function abnormalities. Girls with TS also have well-documented social difficulties, show poor performance on tasks related to social/emotional stimuli, and demonstrate deficits in fearful face recognition and theory of mind tasks. Methods: We are using functional near-infrared spectroscopy to elucidate the neural mechanisms underlying social-emotional problems in TS. A total of 15 girls with TS are being compared to 15 typically developing adolescent girls while they undergo the Empathic Accuracy Task (EAT). A line-tracking task is also utilized to assess and control for visual-spatial and motor abilities. Results: Behavioral findings comparing empathic accuracy between the two groups will be presented as will group-specific patterns of brain activation during the EAT. Key brain regions of interest include the medial prefrontal cortex, and the right parietal and temporal cortices. Conclusions: The results from this study will help identify the role that visual-spatial and theory of mind abnormalities play in social deficits observed in girls with TS. Our results may also provide valuable information about the role of the X-chromosome in empathic processing and potential ways to improve empathic abilities in persons with theory of mind deficits.

C – 43
NEURAL REPRESENTATION OF POPULARITY AND CLOSENESS DIFFERS DEPENDING ON CONTEXT

Monica Kullar – Stanford University; Sylvia A. Morelli – University of Illinois at Chicago; Ryan W. Carlson – Stanford University; Jamil Zaki – Stanford University

Humans naturally monitor others' social status (e.g., popularity), as well as the status of their personal relationship with different individuals (e.g., how close are we?). However, it is unknown whether people (i) automatically track popularity rather than closeness (or vice versa) and (ii) flexibly shift their representations of others depending on the social context. To investigate these questions, we scanned 52 participants as they viewed photos of 30 individuals in their freshman dorm: (i) without instruction or (ii) while explicitly evaluating how close they felt to each individual. When passively-viewing network members, people neurally tracked popularity in regions related to mentalizing and reward. When assessing closeness, brain activity indicated that participants no longer tracked popularity and instead tracked closeness in reward-related regions. These findings suggest that individuals tend to automatically focus on social status, but that they can also flexibly shift how they represent others depending on the context.

C – 44
LOVE FLOWS DOWNSTREAM: A NEURAL PATTERN SIMILARITY APPROACH TO PERCEPTION OF PAIN IN SELF AND FAMILY

Tae-Ho Lee – University of North Carolina at Chapel Hill; Yang Qu – Stanford University; Eva H. Telzer – University of North Carolina at Chapel Hill

Emotional experiences often occur in an interpersonal context. For example, parents may experience more negative feelings when their child is upset. The current study aimed to capture emotion perception in an interpersonal context within parent-child dyadic relationships, using a neural pattern similarity approach. Mother-adolescent dyads (N=22) each completed an emotion perception task during fMRI. During the task, adolescents and their mother each saw negative emotional images and were instructed to either imagine the target person in the scene as themselves or their family member (i.e., child for the mother's scan, mother for the child's scan). Using representational similarity analysis, we compared neural pattern similarity for the self and mother (or child), focusing on the fusiform, a neural region involved in emotion perception. Overall, mothers showed greater neural similarity when perceiving emotion in the self versus child context, whereas children showed less neural pattern similarity and significantly differentiated between self and mother. Interestingly, children's neural pattern similarity was dependent upon parent-child relationship quality, such that they showed greater neural pattern similarity when they reported high relationship quality, whereas parents' neural pattern similarity was high and independent of relationship quality. Taken together, our findings suggest that as children move away from their parents during adolescence, they show more distinct neural patterns in emotion perception involving the self and mother, and such distinction is sensitive to parent-child relationship quality. In contrast, mothers' perception for their child is selfless and unconditional.

C – 45
SOCIAL AND CULTURAL INFLUENCES ON THE NEURAL MECHANISMS OF EMOTION REGULATION

Lynda Lin – University of North Carolina at Chapel Hill; Yang Qu – Stanford University; Eva Telzer – University of North Carolina at Chapel Hill

The experience and regulation of emotions usually occur in a social context, yet the questions of how others influence our emotions and how these influences might impact people of different cultural backgrounds differently, have remained largely unexplored. The goal of this study was to examine the neural mechanisms underlying social influence on emotion regulation among members of two different cultural groups. 22 American and 23 Chinese undergraduate students first came for a behavioral session where they were asked to view and rate how people in different social contexts would feel. About a week later, they completed a task in the fMRI scanner where they saw the same pictures, but were also given information on how other people rated the pictures (influence trials) or were not given any information on how others rated them (no influence trials). After seeing this information, they were asked to rate the pictures once more. We found that both cultural groups engaged neural regions involved in thinking about others (DMPFC, TPJ) when seeing the influence vs no influence feedback, suggesting participants thought about others' opinions when regulating their emotions. In addition, American participants (but not Chinese) recruited neural regions associated with reward (ventral striatum) when they did not see influence from others compared to when they did. These results suggest that American participants might find it rewarding to not be influenced by others, which might be explained by the heightened emphasis on independence in American culture.

C – 46
HOW CREATIVITY IS IMPRINTED ON THE SOCIAL BRAIN DURING SELF AND OTHERS PROCESSING: THE MODERATION ROLE OF SELF-CONSTRUAL

Yi Liu – Shenzhen University; Claudio Petti – University of Salento; Shihui Han – Peking University

Creativity is an adaptive way of thinking and results in novel and useful solutions. Individuals with high and low

creativity showed different features in the brain. Previous research mostly focused on whether creative people showed special brain activity during cognitive tasks. However, whether creative people have some specificity in their social brain during self/other processing is still unknown. There has been behavioral evidence showed self-construal, a concept related to self-other relationship, could influence creative performance. The current work measured participants' trait creativity and self-construal (e.g., interdependence) using questionnaires and integrated functional magnetic resonance imaging (fMRI) and self-reference paradigm to induce self/other-related neural activities to investigate whether trait creativity is associated with self/other-related neural activity and the moderation role of self-construal. Our results showed that trait creativity is characterized by the neural activities in left superior temporal sulcus, right anterior insular, right temporal-parietal junction and right precentral gyrus underlying self-processing and by left superior temporal sulcus and right posterior insular activity underlying friend-processing and the link between creativity and neural activity was moderated by self-construal. Self-construal also modulated the functional connectivity between medial prefrontal cortex (MPFC) and postcentral gyri during friend-processing. Moreover, participants with high and low creativity traits can be dissociated in a three-dimension space defined by interdependence and these brain activities. Our findings provide neural imaging evidence that trait creativity is imprinted on the social brain and the link between creativity and the neural activities underlying the processing of self and others is modulated by self-construal.

C – 47
MEDIA MULTITASKING IS ASSOCIATED WITH REDUCED ACTIVITY IN FRONTOPARIETAL (VERSUS REWARD) SYSTEMS, LOWER TRAIT SELF-CONTROL, AND HIGHER BODY MASS INDEX

Richard B. Lopez – Dartmouth College; Todd F. Heatherton – Dartmouth College

In a recent review of the self-regulation literature, Kelley, Wagner, and Heatherton (2015, Annual Review of Neuroscience) raised the possibility that media multitasking may alter the functioning of brain systems associated with attention and executive control, resulting in possible self-regulatory failure in the eating domain and attendant obesity. To test this hypothesis directly, we ran a large sample (N=146) of college-aged students in a neuroimaging study, in which we assessed both media multitasking (MMT) tendencies and brain responses to appetitive food cues. We computed a brain-based index reflecting the balance of food cue elicited activity in the frontoparietal network—independently defined in resting state functional connectivity studies—relative to activity in regions associated with reward processing (i.e., bilateral ventral striatum and orbitofrontal cortex). Higher balance scores reflected relatively greater recruitment of the frontoparietal network (versus reward regions), whereas lower scores reflected less frontoparietal recruitment and more reward related activity. We found that increased MMT tendencies were associated with lower balance scores, r = -0.309, p < .001. As a key validation step, we tested for other relationships in an independent, held-out sample (N=94). Specifically, MMT was negatively associated with trait self-control, r = -0.463, p < .001, and positively tracked with body mass index, r = 0.283, p = .007. These findings, although preliminary, suggest that media multitasking may characterize individuals who are hyper-responsive to rewarding cues in the environment, which may then lead to patterns of overeating and weight gain.

C – 48
THE NEURAL REPRESENTATION OF COMPETENCE TRAITS: AN FMRI STUDY

Ning Ma – South China Normal University; Simin Wang – South China Normal University; Tingyong Feng – Southwest University; Frank Van Overwalle – Vrije Universiteit Brussel

Previous neuroimaging studies have revealed that a trait code is mainly represented in the ventral medial prefrontal cortex (vmPFC). However, those studies only investigated the neural code of warmth traits. According to the 'Big Two' model of impression formation, competence traits are the other major dimension when we judge others. The current study explored the neural representation of competence traits by using an fMRI repetition suppression paradigm, which is a rapid reduction of neuronal responses upon repeated presentation of the same implied trait. Participants had to infer an agent's trait from brief behavioral descriptions that implied a competence trait. In each trial, the critical target sentence was preceded by a prime sentence that implied the same or opposite competence-related trait, or no trait. The results revealed robust repetition suppression from prime to target in the vmPFC and precuneus during trait conditions. Critically, the suppression effect was much stronger after being primed with a similar and opposite competence trait compared with a trait-irrelevant prime. This suppression pattern was found nowhere else in the brain. Consistent with previous fMRI studies, we suggest that the neural code of competence traits is represented in these two brain areas with different levels of abstraction.

C – 49
TRAIT ANXIETY INFLUENCES HOW INDIVIDUALS EXPRESS SURPRISE

Alison M. Mattek – Dartmouth College; Julia L. Berkowitz – Dartmouth College; Samantha N. Chavez – Dartmouth College; Tracy C. d'Arbeloff – Dartmouth College; Michael D. Mayer – Dartmouth College; Paul J. Whalen – Dartmouth College

Individuals with high trait anxiety experience states of increased vigilance more frequently. Here we examined whether these individuals were more proficient at displaying facial signals that express vigilance. To this end, we (1) measured self-reported anxiety (and other trait measures for specificity) and (2) photographed displays of six basic emotional facial expressions in a group of participants (N=45). The accuracy of each posed facial expression was determined by independent raters who sorted the photos into emotion categories. We selected trait measurements that were predictive of accuracy (of particular emotion expressions) using a training set (n=24), and verified these predictors on a testing set (n=21). Results showed that trait anxiety predicted the accurate portrayal of surprise, such that individuals with low trait anxiety are less likely to pose a surprised facial expression that is accurately categorized by independent raters (predicted accuracy versus actual accuracy of surprised faces in the testing set: $r(19) = 0.477$, $p = 0.029$). Anxiety did not predict rating accuracy of any other facial expression category. Perhaps, high-anxious individuals have more practice widening their eyes (a gesture that facilitates information gathering) and as a result pose surprised facial expressions that others are better able to recognize. More generally, this facial expression stimulus set allows for the study of the trait characteristics of the individuals perceiving an emotional signal as they interact with the individuals sending that signal, whose trait characteristics are known.

C – 50
TRAIT MINDFULNESS IS RELATED TO RETROSPECTIVE BUT NOT CURRENT PAIN

Dominik Mischkowski – National Institutes of Health; Caitlin Stavish – Boston University; Esther Palacios-Barrios – National Institutes of Health; Lauren Banker – National Institutes of Health; Troy C. Dildine – National Institutes of Health & Karolinska Institutet; Lauren Y. Atlas – National Institutes of Health

Trait mindfulness is the disposition to experience enhanced internal and external attentional focus in the present moment. Individuals who report greater dispositional mindfulness also report enhanced coping during acute pain (e.g., Grant & Rainville, 2009). However, it remains unclear whether dispositional mindfulness alleviates the actual pain experience, or alters retrospective ratings of one's experience through cognitive processes such as reappraisal. Seventy-two healthy adult volunteers completed a measure of trait mindfulness, the Mindful Awareness Attention Scale (MAAS; Brown & Ryan, 2003), and rated pain while receiving noxious heat stimulation on the volar forearm in two different tasks that allowed us to calculate participants' pain threshold and tolerance levels. We also assessed the autonomic response to noxious heat by measuring skin conductance responses. Upon completion of the two pain tasks, participants retrospectively rated their overall pain experience during the study on the sensory and affective subscales of the McGill Pain Questionnaire (Melzack, 1983). Individuals who reported higher dispositional mindfulness reported reduced sensory ($r(70)=-.23$, $p=.056$), affective ($r(70)=-.25$, $p=.038$), and combined ($r(70)=-.25$, $p=.034$) retrospective pain ratings. However, analyses of immediate responses to noxious stimulation, including pain threshold, tolerance, trial-by-trial ratings, or autonomic response, revealed no relationship with dispositional mindfulness whatsoever ($ps>.14$). These results indicate that dispositional mindfulness does not change the subjective or autonomic responsiveness to painful stimulation, but alters retrospective assessments of pain. Potential mechanisms that will be investigated in future studies include altered memory, reappraisal, affective shifts, and retrospective report biases.

C – 51
NEURAL IMPLICIT MECHANISMS OF DECEPTION DETECTION

Linda Nguyen – The University of Texas at Dallas; Leanne Young – The University of Texas at Dallas; Jelena Rakic – The University of Texas at Dallas; Daniel Krawczyk – The University of Texas at Dallas

Humans are not very good at detecting deception. Previous research has found that humans were only correct at detecting deception 54% of the time which is only slightly better than chance. Recently, however, there has been some research suggesting that in fact, humans are more accurate than 54% but at an implicit level using the implicit association test. Our study attempts to replicate these findings and tries to take these findings a step further by adding neuroimaging analyses which have not been present in previous studies. In this study, we used a modified implicit association test to see whether or not people were more accurate at detecting deception on an implicit level, and we used another version of the IAT as a measure of cultural bias. We found that whenever a participant saw someone of the same race being honest, they showed higher D scores suggesting that correct differentiation of the liar and truth teller but not when the truth teller was of a different race. One possible interpretation of our behavioral data was that the race effect superseded our truth/lie effect in our IAT. In our GLM analysis of the data from the scanner IAT, we found clear evidence of a race effect and some evidence of deception detection. However, the percent signal change had high variability. This research shows the potential for determining the mechanisms by which we see deception and a glimpse at whether or not race and other environmental factors influence these mechanisms.

C – 52

EFFECTS OF PSYCHOSOCIAL STRESS ON AFFILIATIVE FACIAL MIMICRY

Jonas P. Nitschke – McGill University; Cecile Sunahara – McGill University; Evan W. Carr – Columbia Business School; Piotr Winkielman – University of California, San Diego; Jens C. Pruessner – McGill Centre for Studies in Aging; Jennifer A. Bartz – McGill University

Stress is a fundamental aspect of existence that has profound consequences for individual health and wellbeing. Recently, researchers have become interested in the effects of stress on interpersonal processes and, in particular, empathy and affiliation although, to date, findings have been inconsistent, with work showing both enhancing and detrimental outcomes for affiliation. These inconsistencies may be due to gender/sex difference in the stress response. Extending our prior work showing gender differences in the effects of stress on empathy, here we examined the effects of stress on affiliative facial mimicry (smiling to smiles), a process shown to increase interpersonal rapport, foster empathy, and enhance affiliation. Male (n=20) and female (n=17) participants completed a baseline mimicry task in which they were presented with smiling or frowning faces, while facial electromyography measure changes in the zygomaticus muscle. Three weeks later, they underwent the Trier Social Stress Test, followed by a post-stress facial mimicry task. As predicted, stress differentially impacted men and women, with men showing a more robust cortisol response to the TSST. Regarding affiliative mimicry, consistent with our prior work, we found a significant stress by gender interaction, such that men showed an increase in congruent smiling following the stress task, whereas women showed no change. Of note, women were significantly more likely to show congruent smiling at baseline. These results add to our understanding of the impact of stress and sex/gender differences on affiliative behaviours, particularly on facial mimicry.

C – 53

ENHANCED NEURAL SIMILARITY OF FEAR PERCEPTION AND FEAR EXPERIENCE IN EXTRAORDINARY ALTRUISTS

Katherine O'Connell – Georgetown University; Kristin M. Brethel-Haurwitz – Georgetown University; Elise M. Cardinale – Georgetown University; Kruti M. Vekaria – Georgetown University; Emily Robertson – Georgetown University; Lydia Meena – Georgetown University; John W. VanMeter – Georgetown University; Abigail A. Marsh – Georgetown University

Sensitivity to others' fear is a reliable predictor of altruistic behavior. Non-directed living kidney donors, a rare population of extraordinary real-world altruists, show heightened amygdala activation in response to fearful facial expressions and are relatively better at recognizing these expressions. To test the hypothesis that altruists' neural responses to viewing fearful faces reflects empathic simulation of the expresser's state, we conducted a multivariate pattern analysis of two fMRI paradigms: an emotional face viewing task and an empathic pain anticipation task. After excluding subjects with excessive motion, the final sample consisted of 20 (9m, 11f) altruistic kidney donors and 24 (12m, 12f) matched controls. MVPA investigated brain activity patterns within a bilateral a priori fear network (amygdala, ventromedial prefrontal cortex, anterior cingulate cortex, and hypothalamus) during responses to fearful faces, neutral faces, pain anticipation (self-fear), and anticipation of a study partners' pain (other-fear). Within the fear network, a linear support vector machine using cross validation accurately distinguished brain activity patterns during self-fear and other-fear in both groups (classification accuracy: Controls M=84%, SD=7%; Altruists M=87%, SD=10%; ns). Representational similarity analysis showed that, relative to controls, altruists' neural responses to fearful facial expressions were more similar to their self-fear responses. Observed patterns also correlated with a self-report empathy measure in altruists. This study presents the first evidence that extraordinary altruism may be associated with self-other neural mapping of fear.

C – 54

NEURAL ACTIVITY DURING ANTI-SMOKING MESSAGE EXPOSURE PREDICTS SUBSEQUENT MESSAGE ELABORATION

Rui Pei – University of Pennsylvania; Ralf Schmaelzle – Michigan State University; Elissa Kranzler – University of Pennsylvania; Matt O'Donnell – University of Pennsylvania; Emily B. Falk – University of Pennsylvania

Recent neuroimaging studies have consistently shown that neural activity in the medial prefrontal cortex (mPFC) during heath message exposure can predict behavior change. Although self-relevance and value are functions ascribed to mPFC, the underlying mechanisms linking mPFC activity to persuasion are not yet understood. Here we investigated if mPFC neural activity during message exposure is also associated with subsequent message elaboration and message-related belief change. Forty-three adolescent non-smokers participated in a functional magnetic resonance imaging study, in which they viewed and talked about anti-smoking public service announcements. Levels of elaboration were measured through transcripts of participants' subsequent descriptions of the messages using the LIWC dictionary. Smoking-relevant beliefs were measured through questionnaires before and after the main experiment. We found that neural activity in mPFC during message exposure is associated with subsequent message elaboration as well as changes in beliefs targeting social consequences of smoking.

C – 55

THE TIME COURSE OF IMPLICIT MORAL JUDGMENT IN GOSSIP PROCESSING MODULATED BY DIFFERENT AGENTS

Xiaozhe Peng – Shenzhen University; Can Jiao – Shenzhen University; Chen Qingfei – Shenzhen University; Li Peng – Shenzhen University; Li Hong – Shenzhen University

Previous studies have investigated moral violations with personal or impersonal references (i.e., the protagonists in moral scenarios are the participants themselves or unknown other individuals); however, the roles of various agents in moral judgments have remained unclear. Event-related potentials (ERPs) were used to investigate moral judgments when participants viewed gossip that described (im)moral behaviors committed by different agents (self, friend or celebrity). The results expanded our current understanding of moral judgments in a gossip evaluation task and demonstrated that the automatic processing for moral valence in the early stage was involved as a function of the distinctiveness of the agents. A cognitive control process was subsequently recruited to preserve positive self-views in response to gossip that violated the self-enhancement bias. Specifically, both the early P2 components and the late positive potential (LPC) were larger for immoral than for moral behaviors. More importantly, the P2 amplitude in the celebrity condition was more sensitive to distinguishing immoral behaviors from moral behaviors than that in the other two conditions, whereas the moral valence effect on the LPC was predominately driven by the self-condition. These findings demonstrated that the P2 and LPC may correspond to two successive processes of implicit moral judgment during gossip processing.

C – 56

REGULATING EMOTION THROUGH DISTANCING: A NEUROCOGNITIVE FRAMEWORK AND META-ANALYSIS

John P. Powers – Duke University; Kevin S. LaBar – Duke University

Distancing is a form of reappraisal that uses perspective taking to alter the psychological distance and emotional impact of a stimulus. Although distancing is effective and may have advantages over other forms of reappraisal, previous meta-analyses of functional neuroimaging have only focused on reappraisal more broadly. Here we present a meta-analysis in support of a preliminary neurocognitive model of distancing. We hypothesized that distancing involves generating perspectives of different psychological distances, emotional self-reflection, and cognitive flexibility, and that these processes recruit the temporoparietal junction (TPJ) and greater default mode network as well as dorsolateral prefrontal cortex (DLPFC). We identified appropriate reports by searching the PubMed and PsycINFO databases for "distancing," "reappraisal," or "detachment" in combination with "functional magnetic resonance imaging" or its abbreviated forms; examining reviews and meta-analyses related to reappraisal; and reverse search. Twenty-three reports met inclusion criteria, which included reporting results for a contrast of distancing to downregulate negative emotional responses relative to a natural response condition and reporting whole-brain results from healthy participants. Activation likelihood estimation confirmed the hypothesized involvement of the bilateral TPJ, posterior cingulate cortex, and right DLPFC, and additionally identified the left superior temporal sulcus and supplementary motor area. These results further clarify the neural substrates of distancing and support our preliminary neurocognitive framework. Additionally, they provide a foundation for future translational work to potentially enhance emotion regulation skills through neurostimulation or other brain-targeted techniques.

C – 57

DISCRIMINATING FORMAL REPRESENTATIONS OF RISK IN ANTERIOR CINGULATE CORTEX AND INFERIOR FRONTAL GYRUS

John Purcell – Indiana University, Bloomington; Rena Fukunaga – Indiana University, Bloomington; Joshua W. Brown – Indiana University, Bloomington

Considerable debate persists around the definition of risk and how risk is evaluated across domains (e.g. monetary risk, social risk) to impact decision-making. Depending on the area of study, the concept of risk may be defined as the variance of the possible outcomes, the probability of a loss, or a combination of the loss probability and its maximum possible loss. Mounting evidence suggests the anterior cingulate cortex (ACC), including the surrounding medial prefrontal cortex (mPFC), and the inferior frontal gyrus (IFG) are key neural regions that represent perceived risks associated with decision options. Yet it remains unclear which of these formalisms, if any, best accounts for the pattern of activation in brain regions representing domain-specific risk. To discriminate among the possible definitions, we used fMRI with a novel gambling task that orthogonalized the variance, loss probability, and maximum possible loss among the risky options, while maintaining a constant expected value across all monetary gambles. Here we show that ACC and IFG activation reflect variance, but neither loss probability nor maximum possible loss. Across subjects, variance-related activation within the ACC correlated only indirectly with risk aversion. Specifically, variance activation was negatively correlated with self-report measures of the expected benefits of gambling and investment risk. Our results highlight the variance of the prospective outcomes as a formal

representation of risk that is reflected both in brain activity and behavior, thus suggestive of a stronger link between formal economic theories of financial risk and neural representations of risk impacting decision-making.

C – 58
ROMANTIC TOUCH INDUCES INTERPERSONAL SYNCHRONY AND REDUCES EXPERIENCED PAIN

Marianne Reddan – University of Colorado Boulder; Hannah Young – University of Colorado Boulder; Tor Wager – University of Colorado Boulder

Social support and interpersonal touch profoundly influence physical health, mental well-being, and personal relationships. A gentle caress can strengthen romantic and familial bonds and even reduce surgical recovery time in adults. However, it is unknown if its benefits are primarily driven by biases in self-report or measurable physiological changes. In this experiment we test how three kinds of social support between romantic couples (partner presence, gentle stroking, and handholding) affect experiences of pain, relative to pain experienced alone. We find that touch-based social support leads only female participants to report greater reductions in pain. However, during social support, both female and males demonstrate a reduction in pain-related physiological responses, as indicated by skin conductance responses. This effect is strongest during handholding. Finally, we find that interpersonal synchronicity of physiological signals may provide a mechanistic explanation for the benefits of social support: Increases in interpersonal synchrony during handholding predict reductions in self-reported pain. Overall these results suggest that males and females both benefit from interpersonal touch, despite differences in self-report, and that interpersonal physiological synchrony may drive this effect.

C – 59
INTRINSIC FUNCTIONAL CONNECTIVITY OF THE DEFAULT MODE NETWORK PREDICTS THE PURPOSEFULNESS OF YOUTHS' INTENDED ADULT LIVES

Rodrigo A. Riveros Miranda – University of Southern California; Xiao-Fei Yang – University of Southern California; Rebecca Gotlieb – University of Southern California; Erik Jahner – University of Southern California; Mary H. Immordino-Yang – University of Southern California

Adolescents imagine their future adult life setting goals with varied levels of abstraction: low-level goals pertain to acquiring skills, goods and positions; high-level goals pertain to core values and social responsibilities.
The brain's Default Mode Network (DMN) is involved in projecting the self in time, as well as in reflecting on high-level goals and values. Nevertheless, little is known about how intrinsic functional connectivity of DMN relates to the level of abstraction of future goals in young people. Thirty-five adolescents (21 females, mean age=17.5/SD=0.84) were interviewed about their future goals. Their reported goals were coded for level of abstraction, and highly abstract goals were tallied. Intellectual quotient (IQ) data and 7-minute resting state fMRI scans were also collected. The DMN was identified at the group-level using Independent Component Analysis and back-reconstructed for each participant. Individuals' network maps were entered into a group-level regression analysis with the count of high-level goals as a regressor. Results were examined within the DMN. Adolescents' high-level goals were positively predicted by the functional connectivity of the frontal pole (p=0.001 [correcting for multiple comparisons], cluster size 60 voxels). Results held after controlling for IQ. This study presents preliminary and novel findings on the neural correlates of imagining a meaningful adult life during adolescence. With further research, it also opens the possibility that educators/counselors might be able to support the positive development of purpose, a central driving force for personal growth, moral identity and social participation, by guiding young people in the constructive reflection of adult life.

C – 60
DIFFERENTIAL NEURAL PROCESSING OF PREDATOR AND PREY BEHAVIOR

Michael Rojek-Giffin – Leiden University; H. Steven Scholte – University of Amsterdam; Frans van Winden – University of Amsterdam; K. Richard Ridderinkhof – University of Amsterdam; Carsten K.W. De Dreu – Leiden University

When competing, humans either invest in protecting their resources against greedy others, or to increase their resources at the expense of others. While competitive interactions are well documented at the behavioral level, the neural underpinnings remain elusive. In the current study, we combined fMRI with a novel asymmetrical dyadic game called the predator-prey game (PPG) which models domineering, exploitative behavior in one player (the predator) and subservient, protective behavior in the other player (the prey). We employed both univariate and multivariate analysis techniques in order to elucidate the differential neural events associated with predator and prey decision-making and the processing of decision outcomes. Univariate analyses revealed that during decision-making predator behavior was preferentially reliant on the ventral striatum, a region most commonly associated with reward, while prey behavior was preferentially reliant on the anterior insula, an integrative region associated with the processing of risk and reward. Multivariate searchlight analyses revealed a wide range of brain regions that differed substantially between predator and prey during both decision-making and the processing of decision outcomes. Furthermore, the

degree of this difference in the dorsolateral prefrontal cortex, the angular gyrus, and the supramarginal gyrus exhibited a strong negative relationship to prey competitiveness, and the degree of this difference in the right angular gyrus likewise exhibited a positive relationship to predator competitiveness. These findings suggest that neural processes occurring in a prefrontal-temporo-parietal network are differentially recruited during predator and prey decision-making.

C – 61
RESTING-STATE FUNCTIONAL CONNECTIVITY IN YOUNG INDIVIDUALS WITH MAJOR DEPRESSIVE DISORDER

Ewelina Rzepa – University of Reading; Ciara McCabe – University of Reading
Our previous study showed that individuals at risk for depression by the virtue of increased depression symptomatology presented with decreased resting-state functional connectivity (RSFC) between brain regions involved with the visual, salience, self-referential and cognitive control networks (Rzepa et al., 2016). This study investigated whether similar changes in the RSFC networks would be observed in young individuals with Major Depressive Disorder (MDD). We recruited 27 participants with MDD, and 31 age (16-21) and gender matched healthy controls (HC). We examined seed based RSFC with regions of interest in the amygdala, pregenual anterior cingulate cortex (pgACC), ventral striatum and dorsomedial prefrontal cortex (dmPFC). Compared to HC, the MDD individuals had decreased RSFC between the left amygdala and the left dmPFC and the pregenual cingulate cortex seeds and the lateral occipital cortex, and between the left ventral striatum seed and the posterior cingulate cortex (PCC). Compared to HC, the MDD individuals had increased RSFC between the right dmPFC seed and the PCC/Precuneus. This finding is different from our previous result of decreased RSFC between the right dmPFC seed and the Precuneus in adolescents at increased risk for depression (Rzepa et al., 2016). This study showed that individuals with MDD have abnormalities in the RSFC networks similar to adolescents at increased risk for depression with exception for increased RSFC between the dmPFC seed and the Precuenus. This result is in line with previous RSFC studies in depression and can be suggested as a possible state marker of depression (Sheline et al., 2010).

C – 62
DO MONKEYS KNOW ABOUT OTHERS' PREFERENCES?

KM Sharika – University of Pennsylvania; Michael L. Platt – University of Pennsylvania
Previous studies on prosociality in rhesus macaques have shown that monkeys often choose to make positive decisions for a conspecific at no additional cost to self (Chang et al., 2011, Ballesta et al., 2015). However, how monkeys learn whether a particular outcome is preferable to others or not is not well understood. We examined this by making monkeys perform a 'willingness to pay' task in which they choose between different target options associated with varying magnitudes of sweet or bitter tasting juice to 'self' and 'other' in different trials. We tested whether monkeys were able to make appropriate choices by observing the responses of their conspecifics during the task and if the sensitivity and specificity of choices differed when they were made for self vs. other. Our preliminary results suggest that monkeys can in fact choose for others as they would for themselves suggesting that this paradigm can be suitably used to explore the neural mechanisms of perspective-taking in monkeys.

C – 63
A MODEL FOR INTEGRATING SOCIAL NEUROSCIENCE, MORAL PSYCHOLOGY, AND PHILOSOPHY

Joshua A. Skorburg – University of Oregon; Mark Alfano – Delft University of Technology; Christina Karns – University of Oregon
Much of the neuroscientific research on morality has focused on moral judgments, and more specifically, whether those judgments reflect utilitarian or deontological intuitions. Comparatively little work has addressed the other major school of thought from the history of moral psychology: virtue theory. To address this gap in the literature, the present project brings together an interdisciplinary team from cognitive neuroscience and philosophy to study the embodied and neural bases of the virtue of generosity. We have been developing philosophically informed measures of generosity and are using electrophysiological recordings of cardiovascular (ECG, ICG) and neural (EEG) activity as embodied markers of stress and reward processing in a charitable giving task. The present research demonstrates how theories from moral psychology and philosophy can drive hypothesis construction in social neuroscience. For example, Aristotle thought that the virtuous person behaves fluently and automatically, without having to exercise regulatory control. With respect to the virtue of generosity, this theory would predict that when individuals high in generosity are required to take money from a charity, sympathetic nervous arousal and neural markers of regulatory control (e.g., feedback-related negativity) would be elicited. Similarly, when giving money to charity, high generosity individuals would exhibit neural and autonomic markers consistent with reward processing. Our project thus offers a model for integrating social neuroscience (e.g., research on self-regulation), moral psychology (e.g., research on the development of moral character), and philosophy (e.g., normative virtue ethics).

C – 64

REGULATION OF CRAVING IN ALCOHOL USE DISORDER: AN FMRI STUDY

Shosuke Suzuki – Yale University; Maggie Mae Mell – Yale University; Stephanie O'Malley – Yale University; John Krystal – Yale University; Alan Anticevic – Yale University; Hedy Kober – Yale University

Alcohol use disorder (AUD) is a chronic-relapsing condition, characterized by craving for alcohol and a loss of control over its consumption. Cognitive strategies are known to reduce self-reported craving for drugs (e.g., cigarettes, stimulants) and food. We have previously shown that this reduction in craving depends on activation in cognitive control-related brain regions (e.g., dorsolateral/ventrolateral prefrontal cortex; dlPFC, vlPFC) and relative deactivation in reward-related regions (e.g., ventral striatum). We used functional magnetic resonance imaging to examine behavioral and neural responses associated with alcohol craving and its regulation. Participants with AUD (N=18) were presented with images of alcohol and high-calorie foods previously shown to induce craving. They were instructed to think about each image in one of two ways: (1) Focus on the immediate effects of drinking or eating (e.g., it will feel good; NOW instruction) or (2) Focus on the negative long-term effects of regular consumption (e.g., health problems; LATER instruction). Participants reported significantly lower craving for both alcohol and food when using cognitive strategies (LATER > NOW), and this was accompanied by reduction in ventral-striatal activity. In addition, despite prior reports of diminished PFC function in AUDs, participants recruited dlPFC and vlPFC during regulation of craving for both alcohol and food. Reductions in self-reported alcohol craving correlated with increased vlPFC activation. This suggests that individuals with AUD are capable of using cognitive strategies to reduce alcohol craving via prefrontal mechanisms implicated in cognitive control. These findings have important implications for the treatment of substance use disorders, including AUD.

C – 65

BIPOLAR MOOD TRAITS ARE ASSOCIATED WITH FACILITATED EMOTIONAL LEARNING

Alex R. Terpstra – University of British Columbia; Rebecca M. Todd – University of British Columbia; Sarah R. Moore – University of British Columbia

The rate at which individuals with bipolar traits develop emotional associations may have implications for the onset and progression of bipolar mood changes. Yet few previous studies have examined how bipolar traits relate to patterns of emotional learning. In a healthy undergraduate sample (N=74), we examined the association of bipolar traits with indices of emotional learning derived from three variants of an associative learning task. In each task, participants rated the pleasantness of neutral faces that were paired (CS+) or not paired (CS-) with one of three emotional stimuli: (1) soft touch (social reward), (2) anticipation of reward (incentive reward), and (3) uncertainty of an aversive noise (uncertainty/stress). Bipolar traits were measured using the General Behavior Inventory, a well-validated measure of bipolar mood symptoms. We hypothesized that participants who exceeded cut-off scores for a potential bipolar affective condition on this scale (BD+; n=25) would exhibit significantly increased emotional learning relative to participants who did not exceed cut-off scores (BD-; n=49). We report that BD+ participants demonstrated significantly greater emotional learning responses to incentive reward and uncertainty, such that BD+ participants demonstrated greater divergence between CS+ and CS- ratings across trials relative to BD- participants. There were also marginal associations between BD status and emotional learning responses to social reward. Our results suggest that bipolar traits may facilitate emotional learning, particularly for anticipatory rewarding and uncertain aversive stimuli. Further research is needed to explore how emotional learning may relate to the onset and progression of mood changes in bipolar disorder.

C – 66

BRAIN NETWORKS THAT PROCESS TASK-RELATED STRESS ARE SPATIALLY DISTRIBUTED AND DYNAMICALLY ORGANIZED

Michael J. Tobia – Wake Forest University; Koby Hayashi – Wake Forest University; Grey Ballard – Wake Forest University; Christian E. Waugh – Wake Forest University

The neural processing of stress during task engagement can be difficult to study because it recruits a distributed brain network with unknown temporal dynamics. Dynamic functional connectivity (dFC) analyses may be especially informative because they can reveal the transient formation and dissolution of brain networks. This experiment used fMRI to investigate brain network dynamics for stress processing during a social evaluative stress task (SET). Time-dependent functional coupling matrices were computed for 200 brain regions using the dynamic frequency locking coefficient for 16 healthy adult female participants, and group data were decomposed with the CANDECOMP/PARAFAC model to identify network structure and dynamics. The matrix decomposition revealed several components whose coupling strength varied during the rest and stress epochs. One component identified a bilateral ventral PFC (vPFC) community with a highly connected node in the left subgenual cingulate cortex (MNI [x y z] = [0 20 -8]) that was strongly activated late in the SET and demonstrated brief resurgence during a subsequent recovery epoch. In addition, self-reported anticipatory negative affect was correlated with subject weights on a fronto-parietal-cerebellar network with strong coupling to the right lateral PFC (beta = .038, p = .018). These results suggest that

brain networks for processing task-induced mental stress are not static and that dynamic functional connectivity analyses can identify how various stress-related networks may strengthen and weaken over time.

C – 67
MULTI-SYSTEM APPROACHES: UNDERSTANDING STRESS AND WORKING MEMORY IN CHILDREN

Nancy Tsai – University of California, Irvine; Jodi Quas – University of California, Irvine

Working memory (WM) is a strong predictor of academic outcomes. Individuals differ in their WM abilities, and such variation could be due to conditions that tax the WM system, such as arousal. Research examining the influence of arousal, typically as indexed via stress-sensitive physiological markers (e.g., cortisol), has yielded conflicting results. In adults, negative associations between arousal and WM have emerged. What remains unclear, however, concerns how arousal affects WM in children, a noteworthy omission given that WM exerts a profound influence on learning outcomes in childhood. Quesada et al. (2012) failed to uncover significant associations between cortisol responses to a laboratory task and WM in 8-10 year olds. It is unclear whether arousal indexed via multiple stress response systems (e.g. the hypothalamic pituitary adrenal gland [HPA] axis and sympathetic nervous system [SNS]) would reveal interaction effects and whether these effects would vary across a wider age range. We exposed 101 8-14 year olds to the Trier Social Stress Test-Modified (TSST-M; Yim et al., 2010) and indexed arousal via multiple stress response systems with repeated saliva samples collected for cortisol and alpha amalyse (sAA) to index HPA and SNS activity. Approximately 20 minutes after the TSST-M ended, children completed an n-back task (Jaeggi et al., 2010), a well-established measure of WM. Our findings reveal age-dependent differences for WM performance: as age increases, high SAA, regardless of cortisol level, is associated with improved WM performance. Subsequent analyses will examine other variables such as gender and puberty for potential moderating effects.

C – 68
MULTIVARIATE ANALYSIS OF ALTRUISM AND SELFISHNESS IN SOCIAL DECISION-MAKING

Lukas J. Volz – University of California, Santa Barbara; Locke Welborn – University of California, Santa Barbara; Matthias S. Gobel – University of California, Santa Barbara; Scott T. Grafton – University of California, Santa Barbara; Michael S. Gazzaniga – University of California, Santa Barbara

Social decision-making involves frequent, unavoidable trade-offs between benefits and costs for self and others. The ability to make such interpersonal decisions is essential for successfully navigating the social landscapes of daily life. Recent studies suggest hyper-altruistic tendencies to constrain such decisions whereas implications for real-life scenarios remain controversial. In the present study, we assessed dynamic sensitivity to rewards and costs in interpersonal contexts, adapting a decision-making paradigm used both in human and animal populations. In two intrapersonal decision conditions, participants chose to accept or reject trade-offs that allocate monetary reward and electric shocks either exclusively to themselves or exclusively to another person. In two interpersonal decision conditions, participants chose to accept or reject trade-offs in which rewards and costs are asymmetric (rewards to self – shocks to other; shocks to self – reward to other). Using computational modeling and representational similarity analysis (RSA), we quantified decision profiles across these conditions. RSA revealed differential patterns of reward-cost trade-offs for oneself versus another person when assessing both decisions and associated response times. Relative to intrapersonal trade-offs, participants were more hesitant both to impose costs for their own benefit and to suffer costs on another's behalf. These findings were corroborated by computational models highlighting differences in the sensitivity to reward and costs across experimental conditions, extending previous findings. In summary, we present evidence of both selfish and altruistic tendencies in social decision-making. We will discuss the critical importance of interpersonal contexts for shaping the psychological and neural mechanisms underlying such decisions.

C – 69
REPRESENTATIONAL SIMILARITY ANALYSES REVEAL STABLE MENTAL STATE CONCEPTS FOR SELF AND OTHERS

Miriam E. Weaverdyck – Princeton University; Mark A. Thornton – Harvard University; Diana I. Tamir – Princeton University

How do we understand others' invisible mental states – their happiness, nostalgia, or decision-making? One possibility is that we use the same mental state representations to conceptualize others' experiences as we use to represent our own experiences. Here, we test this possibility using fMRI and multivoxel pattern analysis. Participants in the imaging experiment imagined three target people at differing psychological distances from the self – the self, a close similar other, and a dissimilar stranger – experiencing 25 mental states. On each trial, participants indicated which of two scenarios would be more likely to elicit a particular mental state in one of the targets. We found that each target elicited different levels of univariate activity and unique target-specific multivoxel patterns within the social brain network. However, individual mental states were represented with highly consistent patterns of neural activity across the three targets. That is, people thought about each mental state in a similar way, regardless of who

experienced it. Using representational similarity analysis to map the conceptual space of mental states, we found robust stability across targets with no significant changes in the "shape" of the representational space. The same set of dimensions, with the same weights on each, could describe the state-specific activity patterns within each target. Together, these results suggest that mentalizing relies on the independent contributions of thinking about a mental state and thinking about a specific person.

C – 70
EMBODIED SIMULATION IN FALSE BELIEF UNDERSTANDING REFLECTED IN THE ROTATION RELATED NEGATIVITY

Jiushu Xie – South China Normal University; Him Cheung – The Chinese University of Hong Kong; Yanli Huang – The University of Hong Kong; Lei Mo – South China Normal University

This study examines the spontaneous use of embodied egocentric transformation (EET) in understanding false beliefs in the minds of others. EET involves the participants mentally transforming themselves into the orientation of an agent when trying to adopt his or her visuospatial perspective. Since false belief is propositional and not apparently linked to face orientation and point of view, we do not know if it also involves EET as visuospatial perspective does. In this experiment, an agent placed a ball into one of two boxes and left. The ball then rolled out and moved either into the other box (new box) or back into the original one (old box). The participants were to decide if the agent would try to recover the ball in one specific box while the event-related potential (ERP) technique was used to measure their brain responses. We manipulated the angle between agent and participants when the participants completed the false belief task. Results showed a rotation-related negativity (RRN) at the parietal electrode sites between 300 and 700 ms. The potential's mean amplitude was a function of the rotation angle: the potential became more negative while the angle between agent and participants increased (i.e., more mental rotation had to be executed). The results support that people might mentally transform themselves to the others' positions to understand what others think. The current study suggests that higher socio-cognitive processes that are propositional in nature (e.g., false belief reasoning), are also embodied, as stipulated by the embodied simulation theory.

C – 71
CHANGE-POINT ANALYSES OF POSITIVE EMOTIONS SUPPORTING STRESS RECOVERY

Xi Yang – Wake Forest University; Katelyn Garcia – Wake Forest University; Kateri McRae – University of Denver; Christian Waugh – Wake Forest University

Despite the accruing evidence showing that positive emotions facilitate stress recovery, the neural basis for this effect remains unclear. To test the potential mechanism that positive emotions decrease negative emotions via an adaptive change in stress-related ruminations, we compared stress recovery for people reflecting on the stressor while in a positive emotional context with that for people in a neutral context. In the MRI scanner, healthy community participants (n = 50) completed a stressful anagram task followed with a recovery period when they reflected on the task failure while watching a positive or neutral emotion inducing video. Throughout the tasks, participants also reported their pleasant and unpleasant mood ratings. Thought content and personality data were collected at the end. Because the experiment manipulation on mood during the recovery period was not consistently successful, we examined how changes in positive mood might correlate with neural activation changes to the stressor. We are using change-point analyses to estimate for how long stress-related regions (amygdala and dMPFC) remained active (or remained less active) from the end of the stress period into the recovery period as well as the relationship between these regions and the positive emotion related regions such as the vMPFC and NaC. Mood ratings and personality will be used as covariates to explain individual differences in stress recovery. This study will show that positive emotions support stress recovery via beneficial information input to influence the appraisal system and that this is supported by changes in connectivity between the dMPFC and vMPFC/NaC.

C – 72
TREATMENT FOR SOCIAL ANXIETY DISORDER ALTERS FUNCTIONAL CONNECTIVITY IN EMOTION REGULATION NEURAL CIRCUITRY

Katherine S. Young – University of California, Los Angeles; Lisa J. Burklund – University of California, Los Angeles; Jared Torre – University of California, Los Angeles; Darby Saxbe – University of Southern California; Matthew D. Lieberman – University of California, Los Angeles; Michelle G. Craske – University of California, Los Angeles

Social anxiety disorder (SAD) is characterized at a neurobiological level by disrupted activity in emotion regulation neural circuitry. Previous work has demonstrated amygdala hyperreactivity and disrupted prefrontal responses to social cues in individuals with SAD (Kim et al., 2011). While exposure-based psychological treatments effectively reduce SAD symptoms, not all individuals respond to treatment. Better understanding of the neural mechanisms involved offers the potential to improve treatment efficacy. In this study, we investigated functional connectivity in emotion regulation neural circuitry in a randomized controlled treatment trial for SAD. Participants with SAD underwent fMRI scanning while performing an implicit emotion regulation task prior to treatment (n=62). Following

12 weeks of cognitive behavioral therapy, acceptance and commitment therapy, or wait-list, participants completed a second scan (n=42). Psychophysiological interaction analyses using amygdala seed regions demonstrated differences between SAD and healthy control participants (HC; n=16) in right amygdala-vmPFC connectivity. SAD participants demonstrated more negative amygdala-to-vmPFC connectivity, compared to HC participants, an effect that was correlated with SAD symptom severity. Post-treatment symptom reduction was correlated with altered amygdala-to-vm/vlPFC connectivity, independent of treatment type. Greater symptom reduction was associated with more negative amygdala-to-vm/vlPFC connectivity. These findings suggest that effective psychological treatment for SAD enhances amygdala-prefrontal functional connectivity.

C – 73
BIOLOGICAL AND COGNITIVE UNDERPINNINGS OF RELIGIOUS FUNDAMENTALISM

Wanting Zhong – Rehabilitation Institute of Chicago & Northwestern University; Irene Cristofori – Rehabilitation Institute of Chicago & Northwestern University; Joseph Bulbulia – Victoria University of New Zealand; Frank Krueger – George Mason University; Jordan Grafman – Rehabilitation Institute of Chicago & Northwestern University

Religious beliefs profoundly affect people's lives, but their cognitive and neural pathways are poorly understood. Although previous research has identified the ventromedial prefrontal cortex (vmPFC) as critical to representing religious beliefs, the means by which vmPFC enables religious belief is uncertain. We hypothesized that the vmPFC represents diverse religious beliefs and that a vmPFC lesion would be associated with religious fundamentalism, or the narrowing of religious beliefs. To test this prediction, we assessed religious adherence with a widely-used religious fundamentalism scale in a large sample of 119 patients with penetrating traumatic brain injury (pTBI). If the vmPFC is crucial to modulating diverse personal religious experiences, we predicted that pTBI patients with lesions to the vmPFC would exhibit greater fundamentalism, and that this would be modulated by cognitive flexibility and trait openness. Instead, we found that participants with dorsolateral prefrontal cortex (dlPFC) lesions have fundamentalist beliefs similar to patients with vmPFC lesions and that the effect of a dlPFC lesion on fundamentalism was significantly mediated by decreased cognitive flexibility and openness. These findings indicate that cognitive flexibility and openness are necessary for flexible and adaptive religious commitment, and that such diversity of religious thought is dependent on dlPFC functionality.

nature
human behaviour

NOW LIVE

nature
human behaviour
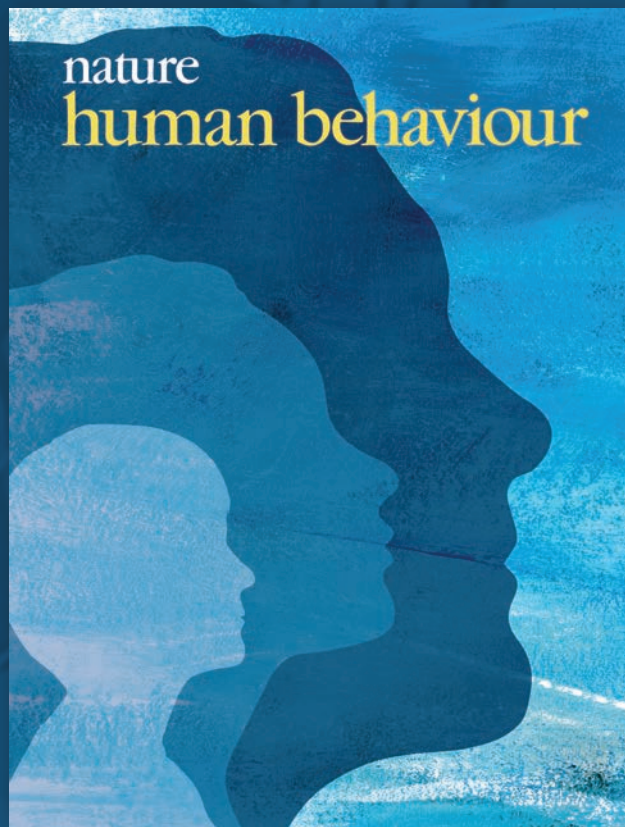
First issue now published
and available free online for a year

nature.com/nathumbehav

@NatureHumBehav