Social & Affective Neuroscience Society Annual Meeting 2008

June 6-8, Westin Copley Place
Boston, MA

Organizing Committee

Jason Mitchell, Harvard University

David Amodio, New York University

Jennifer Beer, University of Texas, Austin

Wil Cunningham, The Ohio State University

Matthew Lieberman, University of California, Los Angeles

Kevin Ochsner, Columbia University

Schedule-at-a-glance

Friday, June 6

3:00 PM	Registration opens
5:00-6:30 PM	Session A (Keynote address)
6:30-8:00 PM	Reception

Saturday, June 7

8:00 – 9:00 AM	Continental breakfast
9:00 – 10:40 AM	Session B
10:40 – 11:10 AM	Coffee break
11:10 – 12:30 PM	Session C
12:30 – 2:30 PM	Break
2:30 – 4:10 PM	Session D
4:10 – 5:30 PM	Session E (Posters)
5:30 – 6:30 PM	Session F (Keynote address)

Sunday, June 8

8:00 – 9:00 AM	Continental breakfast
9:00 – 10:40 AM	Session G
10:40 – 12:00 PM	Session H (Posters)
12:00 – 1:30 PM	Break
1:30 – 3:15 PM	Session I

Presentations

session A Keynote Address

Friday, June 6, 2008
5:30 PM – 6:30 PM

Chris Frith, *University College London*

"Social cognition: The group versus the individual"

session B Person Perception

Saturday, June 7, 2008
9:00 - 10:40 AM

Frank Van Overwalle, *Vrije Universiteit Brussel*

Jeff Cooper, *Stanford University*

Ulrike Rimmele, *New York University; University of Zürich*

Alex Todorov, *Princeton University*

A B S T R A C T S

ELECTROPHYSIOLOGICAL TIME COURSE AND BRAIN AREAS OF SPONTANEOUS AND INTENTIONAL TRAIT AND GOAL INFERENCES *Frank Van Overwalle, Marijke Van Duynslaeger and Laurens Van der Cruyssen; Vrije Universiteit Brussel* – Two studies measured event-related potentials during spontaneous and intentional trait and goal inferences. Participants read sentences describing the behavior of a target person from which a strong trait or goal could be inferred. The last word of a sentence determined the consistency with the inference (trait or goal) implied in the preceding sentences. In comparison with behaviors that were consistent with the implied inference, a positive waveform was obtained when the behaviors were inconsistent with the inference, starting at 200 ms for goals (P200) and 600 ms for traits (P300). This indicates that goals were inferred rapidly and automatically while reading the behaviors, while traits were inferred more slowly and deliberately, although irrespective of the participants' spontaneous or intentional instructions. In contrast, source localization (LORETA) of the event-related potentials suggests that spontaneous inferences show greater activation in the right temporo-parietal junction (rTPJ), whereas intentional inferences recruit the medial prefrontal cortex (mPFC) more. Interestingly, during automatic goal identification (~225 ms), the rTPJ dominated brain activation, whereas this was not the case for trait inferences (~600 ms). Memory measures taken after the presentation of the stimulus material involved sentence completion and trait-cued recall, and supported the occurrence of trait and goal inferences. They also showed significant correlations with the neural components (i.e., P200, P300 and the LORETA activation in the rTPJ and mPFC), indicating that these components are valid neural indices of spontaneous inferences.

LEARNING TO LIKE: SOCIAL OBSERVATION INFLUENCES PREFRONTAL ACTIVATION FOR VIEWING OTHERS *Jeffrey C. Cooper, Tamar Kreps, Brian Knutson (all Department of Psychology, Stanford University* – How do people learn who to like? Behavioral observation provides one important source of information. Often, people make enduring positive and negative judgments of others based on limited observation. Little is known, though, about how the brain builds positive or negative social impressions on the basis of observation. We scanned participants with event-related FMRI in a novel social prediction task in which participants observed the outcomes of an earlier six-person repeated public goods game and made predictions about how much was donated on each round. Participants

were not told in advance that the donation profiles of each player in the game were designed to be more or less altruistic. Participants were accurate at estimating each player's average donation, and formed strong impressions of each player. After observation, altruistic players were judged to be more likeable and trustworthy, while selfish players were judged to be less likeable and trustworthy. Preliminary analysis indicated that viewing the faces of altruistic players (vs. selfish players) activated medial orbitofrontal cortex and anterior medial prefrontal cortex. Feedback for predictions about altruistic players (vs. selfish players) also elicited differential activation of ventral medial prefrontal cortex. This study is among the first to examine how observation changes both emotional impressions of others and neural responses to them. These results are consistent with recent research indicating that positive social outcomes may be processed in the brain like other types of rewards -- simply viewing others we like may constitute a positive outcome.

OXYTOCIN DECREASES RATINGS OF TRUSTWORTHINESS FOR HIGHLY TRUSTWORTHY FACES *Ulrike Rimmele, Department of Psychology, New York University and Department of Psychology, University of Zürich, Switzerland; Peter Klaver, MR Center, University Children's Hospital Zürich and Department of Psychology, University of Zürich; Michael Kosfeld, Institute for Empirical Research in Economics, University of Zürich; Kai Lutz, Department of Psychology, University of Zürich; Markus Heinrichs, Department of Psychology, University of Zürich* – Successful social interaction depends on accurate social judgment. The neuropeptide oxytocin that plays a central role in social approach behaviour in non-human mammals, improves mind-reading and increases trust in humans. In a double-blind, placebo-controlled between-subjects design (N=32 healthy males), we investigated whether intranasally administered oxytocin influences judgments of trustworthiness for male faces. Compared to placebo, oxytocin-treated subjects, unexpectedly, showed a significant decrease in trustworthiness ratings for faces that according to a pilot study expressed high trustworthiness. In contrast, ratings for faces expressing low trustworthiness were comparable between oxytocin and placebo conditions. In a follow-up study (N=30 healthy males), we could show that the decrease in trustworthiness ratings of oxytocin subjects was related to specific facial features. Our finding suggests that the decrease in trustworthiness ratings is a consequence of oxytocin-induced increased sensitivity to facial expression.

THE NEURAL BASIS OF FACE EVALUATION *Alexander Todorov, Nikolaas Oosterhof, Andrew Engell, Chris Said, Center for the Study of Brain, Mind and Behavior, Princeton University* – People automatically evaluate faces on multiple trait dimensions and these evaluations predict important social outcomes ranging from electoral success to sentencing decisions. Based on behavioral studies and computer modeling, we identify two orthogonal dimensions - valence and dominance - that underlie evaluation of emotionally neutral faces and show that a) these dimensions can be approximated by judgments of trustworthiness and dominance; b) whereas the valence dimension is sensitive to features resembling expressions signaling approach/ avoidance behavior, the dominance dimension is sensitive to features signaling physical strength/ weakness; and c) judgments such as threat can be reproduced as a function of these two dimensions. The findings suggest that face evaluation is an overgeneralization of adaptive mechanisms for inferring harmful intentions and the ability to cause harm. In a series of functional neuroimaging studies, we investigate the neural basis of face evaluation. We find that valence evaluation of faces involves the amygdala and inferotemporal cortex. We are currently investigating the neural basis of dominance evaluation.

session C Stereotyping and prejudce

Saturday, June 7, 2008
11:10 AM - 12:30 PM

Cheryl Dickter, *Union College*

Jay Van Bavel, *The Ohio State University*

David Amodio, *New York University*

Naomi Eisenberger, *University of California, Los Angeles*

ABSTRACTS

ATTENTION TO RACE AND GENDER IN SOCIAL CATEGORIZATION *Cheryl Dickter, Union College; Bruce Bartholow, University of Missouri-Columbia* – Recent electrophysiological research indicates that perceivers differentiate individuals along social dimensions quickly, often within a few hundred milliseconds. However, most categorization studies have been limited to White participants, neglecting potential differences in processing between racial groups. Moreover, few studies have examined the extent to which race interferes with categorization along other dimensions when race is made irrelevant to a perceiver's task. A modified flanker task was used to test the extent to which race information would implicitly interfere with explicit gender categorization. Participants identified the gender of target faces, which were embedded among flanker faces presented simultaneously around the target face. The flanker faces varied in compatibility with the target face on race and gender. Event-related potentials (ERPs) were measured in order to examine early attention to race and gender information. As predicted, behavioral and electrocortical data indicated that participants attended to both the task-relevant gender dimension and the task-irrelevant race dimension, even when attending to race was detrimental to their performance. Additionally, processing of target race differed between Black and White participants as seen in the early attentional components of the ERP (i.e., N100, P200, N200). In conclusion, this study indicated that perceivers are clearly aware of the multiple dimensions on which targets can be categorized, and are influenced by the context in which categorization takes place. Furthermore, this research suggests that the race of the perceiver may be more important than the race of the target in the social categorization process.

THE NEURAL SUBSTRATES OF INGROUP BIAS: AN FMRI INVESTIGATION *Jay J. Van Bavel, The Ohio State University & University of Toronto; Dominic J. Packer, The Ohio State University; & William A. Cunningham, The Ohio State University* – Social psychological theory suggests that ingroup bias is functional and motivates much of human social cognition. Indeed, a series of classic minimal group studies have shown that mere categorization with a novel group is sufficient to evoke a range of perceptual, affective, and behavioral ingroup biases. We randomly assigned participants to a mixed-race team and used fMRI to identify brain regions involved in processing novel ingroup and outgroup members independent of pre-existing attitudes, stereotypes, or familiarity. Whereas previous research on intergroup perception found amygdala activity to stigmatized social groups - typically interpreted as negativity - we found greater amygdala, fusiform, orbitofrontal cortex, and dorsal striatum activity when participants viewed novel ingroup relative to outgroup faces. Moreover, ingroup bias in orbitofrontal cortex activity was correlated with self-reported preference for ingroup over outgroup members. These ingroup biases in neural activity were not moderated by race or explicit attention to team membership vs. race, suggesting that they occur relatively automatically. This study helps clarify the role of neural substrates involved in perceptual and affective ingroup biases.

ROLE OF THE MEDIAL PREFRONTAL CORTEX IN THE REGULATION OF SOCIAL RESPONSES *David M. Amodio, New York University; Polina Potanina, New York University* – Activity in the medial prefrontal cortex (mPFC) has been associated with aspects of social cognition on a variety of tasks. To date, interpretations of these activations have focused on processes of person perception and impression formation, with less emphasis on links to social behavior. We proposed that the mPFC plays an important role in self-regulation by integrating personal goals with perceived goals of others. We tested this hypothesis in an fMRI study in which White American subjects made either interpersonal or non-interpersonal judgments of people in conditions that did or did not require self-regulation. Subjects viewed pairs of White and/or Black faces and judged which of the pair was more likely to be their friend (an interpersonal judgment) or was more likely to be athletic (a stereotype-relevant impersonal judgment). During mixed-race trials, there was potential for showing racial bias, and thus regulatory concerns were present. When judging between same-race faces, these regulatory concerns were absent. We found that regions of PFC and anterior cingulate were more highly activated for mixed-race vs. same-race trials, consistent with the notion that thee trials elicits greater regulatory processing. Importantly, within the mixed-race condition, mPFC activity was significantly stronger for interpersonal (friendship) judgments than impersonal (trait) judgments. By contrast, impersonal (vs. interpersonal) judgments were associated with activation in the right lateral PFC, a region often implicated in inhibitory processes. Together, these findings suggest that the mPFC is involved in the broader process of self-regulation, beyond researchers' extant focus on its role in person perception.

EXPERIENCING RACIAL DISCRIMINATION: AN FMRI INVESTIGATION *Naomi I. Eisenberger, Carrie Masten, Eva Telzer, University of California, Los Angeles* – Although previous research has examined the neural correlates of racial bias, these investigations have focused exclusively on White's perceptions of Black targets. To date, no work has examined the neural underpinnings of the experience of racial discrimination, or being a target of racial bias. Experiencing racial discrimination is thought to be "painful" and is hypothesized to contribute to the higher incidence of physical health problems among African American individuals. Building on previous work showing that social exclusion activates some of the same neural regions involved in the distressing experience of physical pain, we examined whether experiencing racial discrimination is similarly painful, utilizing this underlying neural circuitry as well. Both Black (n = 12) and White (n = 13) participants were scanned while being excluded from a virtual ball-tossing game by two supposed White participants. Thus, Black and White participants were always excluded by White individuals. Self-reports of social distress, attributions for the rejection episode (e.g. "Were you rejected because of your race?"), and ratings of rejection sensitivity and race-related rejection sensitivity were collected following scanning. Results revealed some similarities with previous studies of social exclusion, as well as differences specific to experiences of perceived racial discrimination. Implications for understanding the detrimental effects of discrimination as well as the computational components of rejection experience will be discussed.

session D Morality, deception, and trust

Saturday, June 7, 2008
2:30 PM – 4:10 PM

Kamila Sip, ***Aarhus University***

Guiseppe di Pellegrino, ***University of Bologna***

Andrea Glenn, ***University of Pennsylvania***

Joshua Greene, ***Harvard University***

A B S T R A C T S

I THINK YOU ARE LYING TO ME NOW... DECEPTION AS CONTEXTUAL DECISION MAKING *Kamila E. Sip, Centre for Functionally Integrative Neuroscience (CFIN), Aarhus University Hospital, 8000 Aarhus, Denmark, Institute of Anthropology, Archaeology and Linguistics, University of Aarhus, Denmark; Morten Lynge, Department of Computer Science, Aarhus University; William McGregor, Institute of Anthropology, Archaeology and Linguistics, University of Aarhus, Denmar; Chris Frith, Wellcome Trust Center for Neuroimaging, Functional Imaging Laboratory, University College London Andreas Roepstorff, Centre for Functionally Integrative Neuroscience (CFIN), Aarhus University Hospital, 8000 Aarhus, Denmark, Institute of Anthropology, Archaeology and Linguistics, University of Aarhus, Denmark* – To investigate real-life deceptive behavior, we need to be aware that deception draws on a number of cognitive processes that are not by themselves deceptive. Also, in real-life deception, a lie is not simply the opposite of truth because truth can be equally deceptive. To examine realistic deceptive interactions, we conducted an fMRI study of a competitive, deceptive game. The subjects decided whether to lie or tell the truth based on their own judgment and the state of the game. The game alternated between two aspects: (1) being deceptive and (2) detect deception. 18 subjects underwent fMRI scanning in a Siemens Trio 3T MR. TR=3sec, 35slices, whole-brain coverage, 5 x 5min sessions, 100volumes/session. Data analyzed with SPM5. Deciding to tell the truth or a lie in a context of the potential to lie is processed differently from deciding to tell the truth when there is no other option. In risky context, we found activation in BA 8 ($p<0.05$ corrected) implicated in management of uncertainty in decision-making. Yet, comparing a lie and a truth respectively versus a no-risky truth suggests that lying is more cognitively demanding in any context. When subjects decide to disbelieve their opponent, we found activity in dopaminergic and insular structures including nucleus accumbens that have previously been implicated in processing reward during trust and reciprocity games ($p < 0.001$ uncorrected). Our results demonstrate that

processings deception is highly context dependent and interrelate truth and lie in the contexts of trust, mistrust, and risk taking.

INVESTMENT AND REPAYMENT IN A TRUST GAME AFTER VENTROMEDIAL PREFRONTAL DAMAGE *Giovanna Moretto, Department of Psychology, University of Bologna, Italy; Giuseppe di Pellegrino, Department of Psychology, University of Bologna, Italy* – Although trust and reciprocity are ubiquitous in social exchange, their neurobiological substrate remains largely unknown. Here, we investigated the effect of damage to the ventromedial prefrontal cortex (vmPFC) - a brain region critical for adaptive social emotions - on individuals' decisions in a single-round trust game. In this game, one player, the Investor, is endowed with a sum of money which she can keep or invest. The amount she decides to invest is tripled and sent to the other player, the Trustee, who then decides what fraction to return to the Investor. In separate games, six patients with focal bilateral damage to the vmPFC and control participants made 12 decision while playing in the role of either Investor or Trustee with 12 different anonymous counterparts in each game. A lottery game was also included in which the Investor faced exactly the same decisions as in the Trust game, but a random device (e.g., a computer), not another player, determined the final payoffs. Results showed that vmPFC patients invested significantly more than control subjects in the trust game, whilst no difference was observed in the lottery game. Furthermore, when acted as Trustee, vmPFC patients made lower back transfers toward Investors, thereby showing less reciprocity behaviour. Taken together, these results indicate that social valuation and emotion subserved by vmPFC have a critical role in trusting and reciprocity decisions. The findings support the hypothesis that vmPFC damage may impair affective systems specifically designed for mediating social transaction with other individuals.

THE NEURAL CORRELATES OF MORAL JUDGMENT IN PSYCHOPATHY *Andrea L. Glenn, University of Pennsylvania; Adrian Raine, University of Pennsylvania; Robert Schug, University of Southern California* – Recent brain imaging studies have begun to explore the neural correlates of moral judgment, revealing that emotion-related brain regions are highly involved. However, psychopaths are a unique subset of individuals characterized by immoral behavior and emotion-related deficits. A recent review of brain imaging studies in psychopaths highlighted the point that psychopaths exhibit deficits in many of the same brain regions that have been implicated in moral judgment (Raine & Yang, 2006). Using fMRI, this study examined brain functioning of psychopaths during moral decision-making by implementing a task involving moral dilemmas (e.g., the trolley problem) that has been used in previous fMRI studies of moral judgment (Greene et al., 2001, 2004). While in the scanner, subjects were presented with moral dilemmas, some of which are "personal" and more emotion-provoking, and others which are "impersonal" and have been shown to involve more cognitive processing. Analyses revealed that individuals who were more psychopathic exhibited less activation in emotion-related brain regions that have previously been implicated in moral judgment during personal versus impersonal moral dilemmas. These results suggest that the emotional component of moral decision-making may be less salient in psychopaths, which may lead to the immoral behavior observed in psychopathy.

THE SECRET JOKE OF KANT'S SOUL *Joshua D. Greene, Harvard University* – According to utilitarian philosophers like John Stuart Mill, morality is ultimately about promoting the "greater good." According to deontological philosophers like Immanuel Kant, right and wrong is ultimately a matter of respecting rights and fulfilling duties that may trump the greater good. Drawing on a range of studies, both neuroscientific and behavioral, I will argue that the longstanding tension between utilitarian and deontological philosophy ultimately reflects a more fundamental tension between separate, and in some cases competing, systems in the brain. More specifically, I will argue that characteristically deontological judgments are driven by intuitive emotional responses (based in the medial prefrontal cortex, etc.) while characteristically consequentialist judgments are driven by more controlled cognitive processes (based in the dorsolateral prefrontal cortex, etc.).

session F Keynote Address

Saturday, June 7, 2008
5:30 PM – 6:30 PM

Tom Insel, *National Institute of Mental Health*

session G The self in social cognition

Sunday, June 8, 2008
9:00 AM – 10:40 AM

Michael Lombardo, *University of Cambridge*

Stephanie Preston, *University of Michigan*

Joan Chiao, *Northwestern University*

Matthew Lieberman, *University of California, Los Angeles*

A B S T R A C T S

THE INTERPLAY BETWEEN THE MENTALIZING AND MIRROR NEURON SYSTEMS IN REFLECTIVE REPRESENTATIONS ABOUT THE SELF AND OTHER *Lombardo MV, Department of Psychiatry, Autism Research Centre, University of Cambridge, Cambridge, United Kingdom; Chakrabarti B, Department of Psychiatry, Autism Research Centre, University of Cambridge; Sadek SA, Department of Psychiatry, Autism Research Centre, University of Cambridge; Pasco G, Department of Psychiatry, Autism Research Centre, University of Cambridge,; Wheelwright SJ, Department of Psychiatry, Autism Research Centre, University of Cambridge,; Suckling JS, Department of Psychiatry, Brain Mapping Unit, University of Cambridge; Bullmore ET, Department of Psychiatry, Brain Mapping Unit, University of Cambridge; & Baron-Cohen S, Department of Psychiatry, Autism Research Centre, University of Cambridge* – Various types of pre-reflective representations of the self and others (e.g., touch, pain, disgust, perception-action) overlap within the brain. It is unclear however, whether the neural systems involved in reflective representations about the self and others also overlap. We tested 23 healthy male volunteers in a 2x2 factorially-designed 3T fMRI experiment in order to test whether reflective mentalizing or physical judgments about the self or a familiar non-close other would recruit shared or distinct neural systems. Parametric group level conjunction analyses showed that when asked to mentalize, there was self-other overlap in the ventromedial prefrontal cortex (VMPFC), posterior cingulate cortex/precuneus (PCC), and bilateral temporo-parietal junction (TPJ). Reflective physical representations about the self or other recruited overlapping regions within the dorsomedial prefrontal cortex (DMPFC), bilateral inferior frontal gyrus/ventral premotor cortex (IFG/VPMC), and inferior parietal lobule (IPL). Our results clearly show that the neural systems for reflective representations of the self and other are largely overlapping. We discuss our results in relation to simulation theory and the possible integration of the reflective mentalizing and mirror systems in simulating other's minds. In addition, we discuss how understanding the overlapping neural systems for reflective self and other judgments is important in understanding atypical populations where self- and other-referential cognition is impaired, such as autism.

"I TOTALLY KNOW HOW YOU FEEL:" SIMILAR PAST EXPERIENCE MEDIATES THE BEHAVIORAL, PSYCHOPHYSIOLOGICAL AND NEURAL PROCESSES OF EMPATHY AND HELPING *Stephanie D. Preston, Department of Psychology, University of Michigan* – Brain-imaging studies consistently find overlapping activation for experiencing and observing emotional states. However, these studies typically utilize commonly-experienced states like pain, which inadvertently discount a defining feature of empathy - that many difficult problems are not shared by others and cannot engender empathy (e.g. specific health conditions or interpersonal dynamics). We investigated the

correlates of empathy using real-life emotional experiences. Study 1 used [15O]H2O PET brain imaging and found identical patterns of neural and autonomic activation when subjects relived a past experience or imagined another's relatable experience. When subjects could not relate, autonomic arousal decreased and the ventral temporal cortex was recruited. In study 2, we scanned participants using 3T fMRI while they watched videos of patients discussing illness. High need in the patients did not produce higher offers of help, but rather personal distress and negative emotion, associated with anterior and medial emotion-processing regions (e.g. OFC, ACC, anterior insula, and hypothalamus). Offers of help increased with levels of attention, emotion, empathy, and sympathy, which were associated with more posterior and ventral regions (e.g. ITC, parahippocampal gyrus, and TPJ). In study 3, the same paradigm was used to compare women with and without depression. Supporting the need for common past experience, women with depression felt less negative emotion and more empathy when the patient had high need, even when this led to personal distress. Future research needs to focus on how neural representations for past experience are stored and retrieved to facilitate empathy, paying particular attention to ventral temporal regions.

NEURAL BASIS OF INDIVIDUALISTIC AND COLLECTIVISTIC VIEWS OF SELF *Joan Y. Chiao, Department of Psychology, Northwestern University; Tokiko Harada, Department of Psychology, Northwestern University; Hidetsugu Komeda, National Institute for Physiological Sciences, Okazaki, Japan; Zhang Li, Department of Psychology, Northwestern University; Yoko Mano, National Institute for Physiological Sciences, Okazaki, Japan; Daisuke N. Saito, National Institute for Physiological Sciences, Okazaki, Japan; Todd B. Parrish, Department of Radiology, Northwestern University; Norihiro Sadato, National Institute for Physiological Sciences, Okazaki, Japan;, Tetsuya Iidaka, Department of Psychiatry, Nagoya University, Nagoya, Japan* – Individualism and collectivism refer to a fundamental psychological dimension, called "self-construal style", often used to explain differences in how individuals from Western and Eastern cultures construe themselves and their relation to the world. Individualists perceive themselves as stable entities, autonomous from other people and their environment, while collectivists view themselves as dynamic entities, continually defined by their social context and relationships. Here we used functional magnetic resonance imaging (fMRI) at 3T in two experiments examining the neural bases of individualism and collectivism. In Experiment 1, we used cross-cultural neuroimaging to show that neural activity within the anterior rostral portion of medial prefrontal cortex during general versus contextual self judgments positively predicts how individualistic or collectivistic a person is across cultures. In Experiment 2, bicultural individuals primed with either an individualistic or collectivistic orientation showed greater activation within the anterior rostral portion of medial prefrontal cortex during general relative to contextual self judgments, respectively. Our findings reveal two kinds of neural representations of the self that vary as a function of self-construal style, and highlight the importance of culture in shaping neurobiological mechanisms underlying self-relevant social cognition.

NEURAL BASES OF PERSUASION AND DISSONANCE-RELATED ATTITUDE CHANGE *Matthew Lieberman, Emily Falk, Johanna Jarcho, & Elliot Berkman, University of California, Los Angeles* – Attitude change and persuasion are fundamental topics within social psychology and yet the neurocognitive mechanisms involved in these phenomena have gone largely unexplored. We will present four social neuroscience studies that begin to elucidate these mechanisms. The first two studies examine the neural bases of cognitive dissonance-induced attitude change using both neuropsychological (study 1) and neuroimaging (study 2) methodologies. These studies indicate that contrary to existing theories, dissonance-induced attitude change occurs in parallel with the dissonance-inducing decision, rather than a significant time later, and that such attitude change does not always depend on reflective/deliberative processing. The second set of studies examine the neural bases of persuasion in which Americans (study 3) or Koreans (study 4) read persuasive arguments and subsequently rated the persuasiveness of each argument. In both samples, persuasiveness was positively associated with activity in theory of mind and memory encoding networks. Additionally, in these studies and in the fMRI study of cognitive dissonance, activity in bilateral anterior insula was negatively associated with the magnitude of attitude change.

session I

Self-regulation

Sunday, June 8, 2008
1:30 PM – 3:15 PM

Kateri McRae, *Stanford University*

Heather Urry, *Tufts University*

Christine Hooker, *Harvard University*

Marcia Johnson, *Yale University*

A B S T R A C T S

NEURAL CORRELATES OF THE COGNITIVE CONTROL OF EMOTION: COMPARING COGNITIVE REAPPRAISAL AND DISTRACTION *Kateri McRae, Department of Psychology, Stanford University; Brent Hughes, Department of Psychology, University of Texas at Austin; Sita Chopra, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology; John D.E. Gabrieli, Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology, James J. Gross, Department of Psychology, Stanford University; and Kevin N. Ochsner, Department of Psychology, Columbia University* – Distraction and reappraisal are two forms of cognitive emotion regulation with proven experimental and clinical efficacy. Recent imaging work has suggested that each strategy depends upon interactions between affective appraisal and prefrontal control systems. Because no studies have directly compared them, however, its remains unclear whether they have draw on different regulatory mechanisms that have different emotional consequences. The present study provides the first direct comparison of the behavioral and neural consequences of both strategies to down-regulate negative emotion. Whole-brain BOLD signal was obtained from 17 women while alternating between cognitive reappraisal, distraction and unregulated responding while viewing negative picture stimuli. Three key findings were obtained. First, both strategies resulted in significant drops in self-reported negative affect and amygdala activity and showed common recruitment of prefrontal and cingulate regions associated with cognitive control. Second, effects on the two indices of emotional responding were not equivalent. Whereas reappraisal resulted in greater down-regulation of self-reported negative emotion, distraction resulted in greater down-regulation of amygdala activity. Third, greater activity during reappraisal was also observed in a network of regions associated with meaning-based processing of emotional stimuli (medial prefrontal and anterior temporal cortices). Greater activity during distraction was observed in a few regions (prefrontal and parietal cortices) that are often implicated in the effortful direction of attention. Taken together, these data support the view that reappraisal and distraction differentially depend upon systems involved in cognitive reframing and attentional deployment. This conclusion has implications for the appropriate context-dependent use of reappraisal and distraction.

THE NEURAL CORRELATES OF EMOTION REGULATION: IMPLICATIONS FOR WELL-BEING *Heather L. Urry, Tufts University; Carien M. van Reekum, University of Reading; Tom Johnstone, University of Reading; Ned H. Kalin, University of Wisconsin-Madison; Richard J. Davidson, University of Wisconsin-Madison* – Much recent attention has been paid to pinpointing the neural and physiological correlates of deliberate emotion regulation. While it is clear that people can voluntarily change how they feel, at least to some extent, one question that must be raised is whether being able to purposefully modify affective responses has predictive validity outside the laboratory. This talk will argue that it does, focusing on the extent to which brain responses as participants deliberately decrease negative affect in response to unpleasant pictures are associated with regulation of the hypothalamic-pituitary-adrenal (HPA) axis, a system that mobilizes energy in stressful situations. Specifically, participants displaying higher signal in ventromedial prefrontal cortex and lower signal in the amygdala when decreasing compared to simply attending to negative emotion exhibit a more normative decline in cortisol over the course of the day. This talk will also present findings indicating that brain function during volitional emotion regulation is associated with normal variation in depressive symptoms, and that depressed individuals exhibit different patterns of activation compared to healthy controls.

VENTROLATERAL PREFRONTAL CORTEX ACTIVITY TO EMOTIONAL CUES FROM PARTNER PREDICTS ABILITY TO REGULATE MOOD AFTER AN INTERPERSONAL CONFLICT *Christine Hooker, Harvard University; Anett Gyurak, University of California at Berkeley; Sara Verosky, Princeton University; Asako Miyakawa, University of California at Berkeley; Özlem Ayduk, University of California at Berkeley* – Failure to regulate emotional response after an interpersonal conflict can precipitate depressed mood. Research has shown that the ventrolateral prefrontal cortex (VLPFC) facilitates emotion regulation by controlling the intensity of emotional experience. Here we used fMRI and daily-diary methods to investigate whether VLPFC activity to negative facial expressions from a dating partner predicts the ability to regulate mood after an interpersonal conflict. Participants viewed pictures of positive, negative, and neutral facial expressions of their dating partner and an opposite sex stranger while undergoing an fMRI scan. In addition, participants completed a 21 day diary in which they rated their mood and identified whether they had a conflict with their partner. We found that level of VLPFC activity in response to negative emotional expressions of a dating partner was a significant predictor of whether an interpersonal conflict resulted in a change in mood the next day. Specifically, participants with low VLPFC activity in response to negative facial expressions of their dating partner had an increase in negative mood following a conflict. We found the same pattern for VLPFC response to positive facial expressions from the partner; those with low VLPFC activity reported more negative mood after an interpersonal conflict. VLPFC activity in response to emotional expressions of the stranger was not a significant predictor of change in mood after a conflict. The results suggest that VLPFC activity to interpersonally relevant emotional stimuli reflects cognitive control capacity which then predicts the ability to regulate mood after an interpersonal stressor.

Poster Session E

E1

EXCEPTIONAL FACE RECOGNITION ABILITY *Richard Russell, Harvard University; Garga Chatterjee, Harvard University; Brad Duchaine, University College London; Ken Nakayama, Harvard University* – The ability to recognize other people is fundamental to social cognition. Faces provide a wealth of social information, and are the primary means by which people are recognized. Recent work has discovered that approximately 2% of the general population has extreme difficulty recognizing faces, even those of their closest family members. Following recent media coverage of these 'developmental prosopagnosics', several individuals contacted us to self-identify as being the opposite of prosopagnosic-having significantly better than ordinary face recognition ability. They describe their face recognition abilities in strong terms, such as "...if I've seen your face before I will be able to recall it. It happens only with faces." We have tested four of these individuals. On two tests of face recognition, they each received higher scores than any other subject, collectively performing three standard deviations above the mean. From these results, we conclude that these individuals are indeed much better than normal at recognizing faces. These results also indicate that the range of individual variation in the ability to recognize faces is much greater than previously realized. This large range of ability allows us to use individual differences methods to determine what abilities and neural properties are associated or dissociated with face recognition ability. To date, we have found associations between face recognition ability and general visual memory, as well as the ability perceive differences between faces. Future work will investigate possible associations between face recognition and other cognitive, social, and affective abilities.

E2

A NEURONAL INVESTIGATION OF THE RELATIONSHIP BETWEEN STEREOTYPE THREAT, SELF-DOUBT AND THE DISRUPTION OF ATTENTION AND MEMORY ENCODING PROCESSES *Chad E. Forbes, University of Arizona; Toni Schmader, University of Arizona; John J.B. Allen, University of Arizona* – Stereotype threat is thought to engender a barrage of negative cognitions and emotions that may interfere with one's ability to remain focused during a performance situation. Little is known however about how these processes may interfere with attention and memory encoding processes during the performance itself. The present study measured White and minority students' EEG activity while receiving error induced feedback on a response-conflict task described as either a perceptual task or an intelligence task. Theta power was isolated via wavelet analyses to provide an on-line neuronal index of attention and encoding of error feedback on the task. The relationship between theta and self-reported error estimates, discounting, and self-doubt was then examined. Results revealed that minorities under stereotype threat demonstrated a significant decrease in theta activity in response to errors compared to Whites in both conditions and compared to minorities in the control condition. This decrease in theta activity was significantly correlated with an overestimation of errors made on the supposed intelligence test. This relationship was not present among Whites or minorities in the control condition. In addition, error overestimations were also associated with increased feelings of self-doubt among minorities under threat and increased levels of discounting among their White counterparts. These results suggest that stereotype threat may interfere with one's ability to efficaciously attend to and encode feedback that would be important for success. As a result, perceptions of underperformance may lead stigmatized minorities to make negative internal attributions as opposed to Whites who tend to make external attributions.

E3

SEROTONIN AND IMPULSIVE DECISION-MAKING: CONTRASTING EFFECTS OF TRYPTOPHAN DEPLETION ON VARIETIES OF IMPULSIVITY *Molly Crockett, University of Cambridge; Luke Clark, University of Cambridge; Golnaz Tabibnia, UCLA; Matthew Lieberman, UCLA; Trevor Robbins, University of Cambridge* – Serotonin (5-HT) has long been implicated in a range of emotional and behavioural control processes, and previous influential theories have associated impaired or decreased 5-HT function with impulsivity. However, recent findings suggest this model to be overly simplistic. This may result from the likelihood that there are multiple varieties of impulsivity, each with a unique neural substrate. We temporarily lowered 5-HT levels in healthy volunteers using an acute tryptophan depletion (ATD) procedure in order to investigate the relationship between 5-HT function and three varieties of impulsivity: motor impulsivity, measured by commission errors on a Go/No-go task; reflection impulsivity, or the failure to gather sufficient information before making a decision; and social impulsivity, indexed by the tendency to reject unfair offers in an Ultimatum Game. When interpreted in terms of impulsivity, the different tasks revealed dramatically contrasting effects of ATD, ranging from impairment to improvement. When framed in terms of emotion regulation, however, the tasks showed consistent effects of ATD. Taken together, these results suggest that 5-HT modulates the impact of emotion on decision-making, and highlight the importance of distinguishing varieties of impulsivity when considering their neural substrates.

E4

IS OUR SELF BASED ON REWARD? SELF-RELATEDNESS RECRUITS NEURAL ACTIVITY IN THE REWARD SYSTEM *G. Northoff; M. Rotte; R. Paus; D. Moritz; R. Thiemann; U. Proesch; U. Bruer; S. Moerth; C.*

Tempelmann; B. Bogerts; M. De Greck, Otto-von-Guericke University of Magdeburg – Every organism has to evaluate incoming stimuli according to their current and future significance. The immediate value of every stimulus is coded by the reward system, but the processing of their long-term relevance implements a valuation system that implicates self-relatedness. This suggests that regional activity during self-relatedness builds upon the reward system. Using event-related functional MRI, we investigated whether self-relatedness can be differentiated from the reward system by the temporal pattern in neural activity. Self-relatedness induced signal changes in the bilateral Nucleus accumbens (NACC), ventral tegmental area (VTA) and ventromedial prefrontal cortex (VMPFC). The same regions were recruited during reward. The BOLD time course revealed no difference between conditions in the first xxx seconds of the BOLD signal, whereas subsequently self-relatedness showed a higher late signal change than reward. In sum, our findings indicate sustained recruitment of the reward system during self-relatedness. These findings may contribute to a better understanding the reward-based nature of our self. In a second step, data from patients with alcoholism will be demonstrated that show neural dissociation between reward and self-relatedness in reward circuitry. This lends further support to the close relationship and distinction between self and reward. Finally, methodological issues of how to investigate self-relatedness and its distinct psychological components will be discussed.

E5

SUBLIMINAL FACIAL EXPRESSIONS INFLUENCE CONSUMPTION BY MODULATING UNCONSCIOUS AFFECT: EVIDENCE FROM EMG AND APPETITIVE REFLEX-MODULATION *M.J. Starr, UCSD; J. Lin, UCSD; P. Winkielman, UCSD* – Subliminal facial expressions can influence appetitive behavior, such as consumption of a novel drink. However, is this effect accompanied by a genuine change in an affective state? In the current study, we tested the engagement of appetitive and defensive systems by measuring the influence of masked subliminal happy and angry faces on physiology, beverage consumption, and mood ratings. We found a significant valence effect on an appetitive reflex (the post-auricular muscle response) and zygomaticus activity, with responses greater after happy than angry faces. Behaviorally, happy faces increased consumption compared to angry, though this effect was limited in time. The effects on the measures of the defensive system (startle blink and corrugator activity) were non-significant. Despite significant changes in physiological and behavioral measures of appetitive response, mood ratings (PANAS) revealed no significant changes in conscious feelings. These results suggest that unconscious affective stimuli can influence consumption behavior by inducing a genuine, if unfelt, change in positive affect.

E6

DOES EMOTION ALWAYS "BOUND" RATIONALITY? *Pranjal H. Mehta, The University of Texas at Austin; Jennifer S. Beer, The University of Texas at Austin* – Economic models of decision-making begin with the assumption of rational decision-making based on cognitive factors. Humans are considered to make decisions based on "bounded" rationality because under certain circumstances, people predictably make less than rational decisions. For example, people may have negative perceptions of unequal offers or gambles that are framed as losses. The negative perceptions are theorized to engage an "emotional" system which has more impact on decisions than the 'rational' cognitive metric of monetary gain. Brain imaging studies suggest that regions that encode valence and arousal such as the insula and amygdala drive bounded rationality whereas rationality is supported by regions associated with control such as the frontal cortex. In a series of studies, we identify individual differences that reliably predict rationality and bounded rationality in the Ultimatum Game and investigate the relative involvement of regions involved in valence and control. Study 1 found that people high in Agreeableness and high in Openness were more like to accept unfair offers. Study 2 replicated these behavioral effects and identified the neural systems that mediate rational and irrational decision-making. Irrational decision-making results were consistent with previous studies (Sanfey et al. 2003). Rational decision-making involved regions associated with valence and cognitive control. For instance, higher Openness predicted greater activity in the left caudate and left orbitofrontal cortex in response to unfair offers. Greater activity in these regions also predicted rational decision-making. Together these studies suggest that both rationality and bounded rationality are associated with interactions between emotion and cognition.

E7

FAIRNESS REDEFINED: AN INVESTIGATION OF THE FIXED OPPONENT VERSION OF THE ULTIMATUM GAME *J. Beadle, University of Iowa; C. Kovach, University of Iowa; S. Paradiso, University of Iowa; D. Tranel, University of Iowa* – Human behavior on the Ultimatum Game (UG), a widely used economic game, demonstrates that fairness is valued when individuals make decisions in a social context. In the UG, one player (the Proposer) is given a sum of money to split with another player (the Responder). If the Responder accepts the offer, both players receive the proposed division, whereas if the Responder rejects the offer, both players get nothing. The current study investigated how a modified version of the UG, the Fixed Opponent Game, compared to the standard 1- Shot Game. In the Fixed Opponent version, the same two players remain paired across all 20 rounds of the UG, rather than playing a new partner on each round as in the 1-Shot version. We studied 28 pairs of normal adults (25-81 years) who played the Fixed Opponent Game. Results were compared to findings from

two studies (Koenigs & Tranel, 2007; Sanfey et. al, 2003) that are representative of the standard 1-Shot version. Interesting differences emerged for the "unfair" offers-offers where the Proposer keeps more money than s/he gives. Specifically, while clearly unfair offers ($1 and $2) were rejected more than 50% of the time in the Fixed Opponent game (similar to 1-Shot games), "ambiguously" unfair offers of $3 and $4 were rejected at a much higher rate in the Fixed Opponent version (61%, versus 10% in the 1-Shot version). These findings suggest that repeated interactions with another individual may enhance competition and set a higher bar for perceived "fairness."

E8

BRAIN MORPHOLOGY FOLLOWING BILATERAL AMYGDALA LESIONS *Aaron D. Boes*, University of Iowa; Sonya Mehta*, University of Iowa; David Rudrauf, University of Iowa; Ralph Adolphs, University of Iowa, California Institute of Technology; Peg Nopoulos, University of Iowa; Douglas Langbehn, University of Iowa; Thomas Grabowski, University of Iowa * Indicates both authors contributed equally* – Emotional and social cognition relies on interactions between the amygdala and multiple cortical and subcortical brain systems. We hypothesized that the structural integrity of those connected brain systems would partially depend on the presence of a functional amygdala. Specifically, we hypothesized that bilateral amygdala lesions would result in gray matter morphometric abnormalities due to disconnection in 1) the ventromedial prefrontal cortex (vmPFC) and connected subcortical structures (the striatum and mediodorsal thalamus) and in 2) the ventral visual stream. We also hypothesized that brain regions with sparse amygdala connections would not show such abnormalities (including the dorsolateral prefrontal cortex (DL PFC) and the dorsal visual stream). We measured brain morphometry in two women (S.M and A.P) with rare restricted bilateral amygdala lesions (respectively 100% and 50% damaged) and in groups of gender- and age-matched comparison subjects, using multiple neuroimaging analysis techniques. S.M. showed increased cortical thickness in the vmPFC and a relative increase in the volume of the vmPFC and caudate. Cortical regions along the ventral visual stream showed decreased thickness and a relative decrease in volume. A.P. also demonstrated a similar trend of increased thickness in the vmPFC. In both subjects, the DL PFC and dorsal visual stream presented a normal morphometric profile. These findings support the hypothesis that the integrity of the vmPFC and of regions related to the ventral visual stream depends on the integrity of the amygdala. This is the first evidence in humans of the remote alteration of brain morphology in association with amygdala lesions.

E9

ERPS RECORDED FROM SUBDURAL ELECTRODES IN HUMAN OCCIPITOTEMPORAL CORTEX IN RESPONSE TO FACE AND BODY STIMULI *James P. Morris, Yale University; Kenneth Vives, Yale University; Gregory McCarthy, Yale University* – Functional magnetic resonance imaging (fMRI) has revealed similar patterns of activation in the fusiform gyrus (FG) in response to faces and bodies without faces. These findings have generated competing hypotheses regarding the role of the occipitotemporal cortex during social perception. For example, Cox and colleagues have suggested that FG activation may be modulated by context (Science, 2004), while alternative explanations suggest that separable category-specific responses for faces and bodies exist in closely adjacent cortical patches. Here we recorded from subdural electrodes in four consecutive human patients undergoing epilepsy monitoring. A screening task consisting of pictures of faces, tools, fruits, animals, and letterstrings was first used first identify face-specific sites. A face-specific site was one in which faces evoked a large potential at ~200 ms (N200) that was at least twice as large in amplitude as that evoked by any other stimulus category. In the primary task, subjects viewed faces, flowers, and bodies without faces. At face-specific sites, bodies and flowers evoked equivalent N200s that were much smaller than face N200s. No other electrode site in ventral occipitotemporal cortex showed evidence for a body-specific N200. However, in one patient, an equivalent N200 ERP to faces and bodies was obtained at a face-specific site in lateral occipitotemporal surface near the middle occipital gyrus. We consider how these findings relate to the current literature of face and body processing, and to recent reports of body-specific ERPs recorded from lateral temporal scalp electrodes.

E10

FLEXIBILITY IN AUTOMATIC INTERGROUP CATEGORIZATION *Nathan L. Arbuckle, The Ohio State University; Jay J. Van Bavel, The Ohio State University; Dominic J. Packer, The Ohio State University; Ashley Waggoner, University of Indiana; William A. Cunningham, The Ohio State University* – Research on person categorization suggests that people tend to automatically categorize others according to group memberships (e.g. Brewer, 1988; Fiske & Neuberg, 1990). One such group membership that has been extensively studied is race. Other research using electroencephalography (EEG) examining the timecourse of intergroup categorization has found that White participants tend to show an early difference in processing Black faces as opposed to White faces (Ito, Thompson, & Cacioppo, 2004). In the present study, we wanted to examine the role of induced motivational shifts in producing changes in early racial processing. Specifically, we wanted to see if inducing an approach motivational state would lead to differences in processing when viewing members of a racial outgroup. To examine this, we manipulated approach and avoidance motivational states by having participants push or pull a joystick while seeing White or Black faces; participants performed this task while being measured with EEG. As expected, results showed a replication of previous findings when participants were in an avoidant motivational state, such that they showed smaller P100

(and larger N170) waveform to Black than to White faces. Additionally, source localization indicates that these differences occur in the fusiform gyrus. Critically, when participants were in an approach motivational state, there were no differences in their reactions to White and Black faces, confirming our hypothesis. These data demonstrate that automatic person categorization is a flexible process that can be affected by motivational states.

E11

NEURAL RESPONSE TO RECEIPT OF PEER FEEDBACK IN ADOLESCENCE *Eric E. Nelson, NIMH; Amanda E. Guyer, NIMH; Erin B. McClure-Tone, Georgia State University; Daniel S. Pine, NIMH* – The emotional importance of peer interactions in adolescence has been relatively well-characterized using observational and self-report techniques, but few laboratory-based experiments have been used to assess this phenomenon. We present results of a new functional magnetic resonance imaging (fMRI) paradigm designed to elicit neural response to socially-evaluative feedback from peers. The "Chatroom Task," had two phases. In phase one, subjects were told they were participating in a study of internet-based interaction among teenagers and would have a brief chat session with a peer. Subjects then viewed photographs of other adolescents and rated their interest in interacting with them (stimulus desirability). Subjects were themselves photographed and told the other participants would also rate their photograph. In phase two, subjects underwent neuroimaging while they were shown feedback (accept or reject) from the peers the subjects had previously rated. Subjects' desirability ratings were used in two contrasts: acceptance vs. rejection from high-interest peers and from low-interest peers. Acceptance relative to rejection from both high and low desirable peers engaged medial prefrontal cortex. However, acceptance only engaged reward regions (striatum) when it came from high desirable peers while acceptance from low desirable peers engaged orbitofrontal cortex, possibly indicating response flexibility activation. Subjects' self-reports indicated more positive emotions to acceptance than rejection from high-desirable peers but not from low-desirable peers. Combining neuroimaging methods with traditional behavioral assessments may help elucidate how biological and sociocultural factors affect cognition, emotion, and behavior in adolescence.

E12

EARLY DIFFERENTIATION OF RESPONSES TO EMOTIONAL FACE REPETITION *Elise Christopher, Yale University; Harlan Fichtenholtz, Yale University; Steven Lao, Yale University; Marcia Johnson, Yale University; Gregory McCarthy, Yale University* – This study examined the electrophysiological correlates of emotional face repetition. Eighteen participants viewed angry, fearful, happy and neutral faces, with each expression portrayed by the same 40 actors. Subjects performed a gender discrimination cover task. Fearful expressions evoked an enhanced response that peaked at 108ms post-stimulus at frontal electrode sites (FPz, Fz, F3) and was significantly attenuated by repetition. A later positive ERP evoked by fearful expressions peaked at approximately 400ms post-stimulus over central-posterior scalp (Cz, CPz, Pz) and was also attenuated by repetition. These enhanced ERPs were not evoked by the other facial expressions, suggesting that the neural response to fear is different from that evoked by other facial expressions. It is notable that the early response to fearful face expressions occurs earlier in latency that either the subdurally-recorded face-specific N200 from the fusiform gyrus, and the scalp-recorded N170 ERP recorded from lateral posterior scalp electrodes. Although face identity was not our focus, we found that identity repetitions produced progressive signal attenuation between 220-350 ms despite differences in expression. This signal recovered at the beginning of the second block, but then rapidly attenuated.the next presentation. This result suggests long-term savings following repetition of specific identity.

E13

TO SLOW DOWN OR NOT TO SLOW DOWN: NEURAL PROCESSES DURING RISK TAKING IN A STOP SIGNAL TASK *Chiang-shan Ray Li, Yale University; Peisi Yan, Yale University; Tien-Wen Lee, Yale University* – Background Cognitive control allows behavioral flexibility. Impairment in cognitive control has been implicated in a number of psychiatric conditions, including OCD, ADHD, and impulse control and substance use disorders. In previous studies we combined fMRI and a stop signal task (SST) to dissect the component processes of cognitive control - response inhibition, error detection and post-error behavioral adjustment. Here we report a novel finding related to risk-taking in the SST. Methods In a SST, that tracked participants' performance so errors are elicited approximately half of the time, participants displayed great variability in go trial reaction time (RT, n=40). Brain imaging data collected with this rapid event-related design was modeled with events of interest, including post-go go trials with RT increase (pGGi, risk-aversive decision) and those with RT decrease (pGGd, risk-taking decision). Results We observed greater activation in bilateral visual cortices, left amygdala, precuneus/posterior cingulate cortex, and middle frontal gyrus during risk-taking, as compared to risk-aversive decisions ($p<0.05$, FWE corrected). Conversely, no brain regions showed greater activation during risk-aversive compared to risk-taking decisions ($p<0.01$, uncorrected) Conclusions These results delineate the neural circuitry specifically involved in behaviors that mimic risk-related decisions during the SST. The results have broadened the utility of the SST in the investigation of the neural processes underlying many clinical conditions, in which deficits in cognitive control are implicated.

E14

NEUROPSYCHOLOGICAL CORRELATES OF EXECUTIVE DYSFUNCTION IN ALEXITHYMIA *Whitney L. Thomas, Bates College; Nancy S. Koven, Bates*

College – The construct of alexithymia is defined by difficulty attending to and distinguishing among emotions, as well as an externally-oriented thinking style. While not a unique clinical syndrome per se, alexithymia has been implicated in numerous medical and psychiatric conditions. Etiological theories of alexithymia include frontal lobe impairment, which would suggest corresponding weaknesses in executive functioning. Although some studies have identified isolated cognitive deficits in alexithymics, no study to date has systematically investigated executive functioning in this population while simultaneously deconstructing the alexithymia construct into empirically-derived dimensions. In this study, 104 unselected participants completed self-report surveys of alexithymia (Toronto Alexithymia Scale, Trait Meta Mood Scale, Mood Awareness Scale), as well as a neuropsychological measure of executive functioning (BRIEF-A). Principal components analysis revealed two alexithymia-related factors: Emotional Clarity (EC; 42% of the total variance) and Emotional Monitoring (EM; 26% of the total variance). Subsequent analyses revealed that low-EC participants (N = 15) performed worse than high-EC participants (N = 15), $F(9,20) = 4.0$, $p = .005$, across multiple executive function domains, including behavioral initiation and inhibition, set-shifting, self-monitoring, working memory, error recognition, and ability to plan and organize. No relationship was found between EM and patterns of cognitive performance. These data further suggest frontal lobe abnormality in alexithymia when specifically considering the EC aspect of the construct.

E15

THE EFFECTS OF NEGATIVE EMOTIONAL DISTRACTERS ON BOLD RESPONSES ASSOCIATED WITH GOAL-DIRECTED PROCESSING AND EMOTION REGULATION *Ilana T. Naftalin, NIMH; Samantha L. Crowe, NIMH; and R. James R. Blair, NIMH* – Previously, we examined modulation of emotional responding by attentional control and the modulation of attentional control by emotion (Blair et al., 2007). Emotional distracters did not significantly disrupt regions of dorsal anterior cingulate and lateral prefrontal cortex implicated in attentional control. However, in recent work with PTSD patients, emotional distracters significantly disrupted these regions. This might reflect putative frontal pathology in PTSD or the greater impact of emotional distracters in PTSD patients. We tested this latter hypothesis in the current study by having three levels of distracter (neutral, moderately negative, highly negative) to determine if increased emotional intensity of distracters disrupts frontal systems involved in attentional control. Healthy volunteers (N=18) were scanned using event-related fMRI on an affective Stroop task. In this task, two numerical displays are bracketed by emotional distracters. The displays are either congruent (two 2s vs. three 3s) or incongruent (two 3s vs. three 2s). For view-only trials, only the emotional distracter is displayed. Neutral and low negative distracters were associated with significantly greater recruitment of dorsal cingulate and lateral frontal cortices to congruent and incongruent trials relative to view trials; this was not seen for highly negative distracters. These results have two main implications: First, sufficiently intense emotional distracters can disrupt the recruitment of regions of frontal cortex implicated in attentional control. Second, assumptions of frontal pathology in PTSD based on responding to emotional stimuli may be unwarranted; instead, the reduced frontal activity may reflect an appropriate response to the pathological intensity of the emotional stimulus.

E16

THE NEURAL UNDERPINNING OF THEORY OF MIND: EVIDENCE FROM FMRI ADAPTATION *J.R. Andrews-Hanna, Harvard University, Massachusetts General Hospital; R. Saxe, Massachusetts Institute of Technology; R. Poulin, Harvard University, Massachusetts General Hospital; R. Buckner, Harvard University, Massachusetts General Hospital, Howard Hughes Medical Institute* – A growing body of literature highlights a set of brain regions involved in attributing mental beliefs to others. This critical social skill, referred to as "theory of mind," is consistently linked to temporoparietal junction (TPJ) prominently in the right hemisphere (e.g. Saxe & Kanwisher, NI, 2003; Saxe & Powell, Psychol. Sci, 2006). Additional regions including dorsal medial prefrontal cortex (dMPFC), posterior cingulate, and superior temporal sulcus (STS) are also recruited during theory of mind tasks (Frith & Frith, Curr. Biol, 2007). In order to further investigate the neural underpinnings of processes linked to solving these tasks, the present study used fMRI adaption - the reduction in fMRI hemodynamic response when a specific process is facilitated through repetition (reviewed in Henson, Prog. Neurobiol., 2003). Pertinent to understanding theory of mind, repetition effects in rTPJ would enable dissociation of task effects from non-task effects. 51 participants (21.8 years; 31 female) underwent fMRI scanning (3T, 12 channel). Across four functional runs, participants read a series of false belief and false photo stories, half shown earlier (repeated) and half novel. Results revealed robust repetition-related reductions for repeated stories in right and left TPJ, STS, and dMPFC. Interestingly, repetition effects were also present in many of the regions for false photo stories, although to a significantly greater extent for false belief stories. In conjunction with additional observations, these results highlight fMRI adaptation as an important approach for studying social cognition.

E17

E-MODEL OF EMOTION REGULATION: A PDP APPROACH *C. Gatti, Stanford University; J. McClelland, Stanford University; N. Giuliani, Stanford University; J.J. Gross, Stanford University* – The present study aim is to simulate J. Gross' Emotion Regulation Paradigm by creating an experimental environment with a Parallel Distributed Processing (PDP) approach. Early models of emotion regulation focus on appraisal theories, non-

linearity and neural network modeling (Barrett et al, 2007). However, no studies to date have used the Interactive Activation and Competition (IAC) architecture to recreate a coherent covariation among experiential, behavioral and peripheral physiology of emotion regulation. The present IAC model is partially constrained upon experimental data about cognitive reappraisal of amusement (Giuliani et al, in press) and by J. Gross' theoretical approach to emotion regulation (Gross, 2001). PDPTool is the neural network simulator used to develop the present IAC model, created and tested by McClelland on Microsoft Window XP and Matlab version 7.2 R2006a. Model units are interconnected by bi-directional links with weight fixed either +1 or -1, and units' activation changes over time in accord with the model-learning algorithm. Subjects' responses simulation has been tested running cycles after imposing cognitive reappraisal to the amusement activation state. Results indicate that the present IAC model is unstable if emotion elicitation activation units have a weight above +0.4. However, below +0.4, the model can significantly distinguish between up- and down-regulation of amusement in all created domains. Thus, results indicate the necessity to expand the architecture sensitivity and stability by constraint satisfaction; so, additional experiments about cognitive reappraisal (e.g. disgust) are required. Overall, the present PDP model suggests the IAC suitability to simulate J. Gross' Emotion Regulation Paradigm.

E18

AMYGDALA RESPONSE TO EMOTIONAL FACE WITH DIFFERENT DESIGN METHODS *Xiaoyun Liang, Brandeis University; Leslie Zebrowitz, Brandeis University; Itzhak Aharon, Massachusetts General Hospital, Harvard University* – Goals: Our aim was to investigate the contribution of methodological variations to activation of the amygdala while viewing disgusted, angry, happy, fearful, and neutral faces. To this end, we compared responses to emotion faces presented in a block design (BL) with responses in an event-related design (ER). Methods: Participants (17 for BL and 16 for ER design) passively viewed disgusted, angry, happy, fearful, and neutral faces in a 3T scanner (TR=2000ms; TE=30ms; FOV=40_20 cm; functional image resolution=3.1 _ 3.1_4.8 mm; 30 slices covering whole brain). Results: Differences among emotion faces in percent signal changes (PSC) differed between BL and ER. In BL, PSC for fear and neutral faces were lower than for disgust, anger, and happy. In ER, however, PSC for fear and neutral faces was comparable to the other emotions. Habituation of PSC in BL was analyzed using ANOVA. There was significant habituation for both fearful and neutral faces in bilateral amygdala (for fear, left, p=0.000, right, p=0.004; for neutral, left, p=0.025, right, p=0.000). There also was significant sensitization for angry faces in right amygdala (p=0.046). We assumed that there was no habituation or sensitization for our ER data, since ER is more resistant to such effects. Conclusion: Relatively lower PSC to fear and neutral faces in a BL than ER design may result from habituation to these faces and sensitization to anger faces in BL. These effects derive from feedback from higher brain regions when stimuli are repeatedly presented in the BL design.

E19

ADAPTING HUMAN FEAR CONDITIONING TO A FULLY-IMMERSIVE 3-DIMENSIONAL VIRTUAL REALITY ENVIRONMENT *Nicole C. Huff, Duke University; David Zeilinski, Duke University; Holton S. Thompson Duke University; Jose Alba Hernandez, Duke University; Rachael Brady, Duke University; Kevin S. LaBar, Duke University* – Pavlovian fear conditioning is a widely used paradigm in non-human animal research to investigate the neural mechanisms underlying fear and anxiety. A major challenge in conducting conditioning studies in humans is the ability to strongly manipulate or simulate the environmental contexts that are associated with conditioned emotional behaviors. In this regard, virtual reality (VR) technology is a promising tool .Yet, adapting this technology to meet experimental constraints requires special accommodations. Here we address the methodological issues involved when conducting fear conditioning in a fully immersive, 6-sided VR environment. To study the influence of context on fear-related processes, VR scripts were created using Virtools software for three distinct environments: home interior, neighborhood, and forest. Maya computer graphics were used to design dynamic conditioned stimuli (CSs - snakes and spiders), then imported into Virtools. Some of the constraints made on VR technology are as follows. To control the duration and viewing angle of each context, the participant was taken on a guided path through the context at a seated at eye level. This feature also minimized proprioceptive dissonance for the participant and reduced movement artifacts in skin conductance response (SCR) recordings. Path shape, length, and context complexity were matched across environments. To time-lock fear responses to stimulus type and context configuration, the location and duration of CS presentation and wrist shock (US) onset was specified along the navigational path. Preliminary data will be presented to illustrate how addressing these methodological issues permitted investigation of contextual influences on fear relapse with virtual reality technology.

E20

RECOGNITION OF A THREATENING SITUATION IN DYNAMIC BODY EXPRESSIONS WITH AND WITHOUT ATTENTION *C.B.A. Sinke, University of Tilburg, University of Maastricht; B. Sorger, University of Maastricht; R. Goebel, University of Maastricht; B. de Gelder, University of Tilburg, Massachusetts General Hospital* – Being able to recognize and react to a threatening situation has considerable adaptive value and requires rapid appraisal of the situation even if one's attention is occupied otherwise. The neurobiological basis of perceiving bodily signals of threat is thus far still poorly understood. Using

functional magnetic resonance imaging (fMRI), this study tried to investigate the neuronal structures involved in perceiving threat signals derived from dynamic whole bodies. Furthermore, this study also explored the role of attention in the perception of body expressions of threat. Twelve subjects were being scanned while they were shown 3s movies (192 trials and 96 scrambles) of either a threatening or a teasing situation. In one condition they paid attention to the emotion and decided whether the situation was threatening, while in the other case they focused on three randomly appearing dots and decided whether they were of the same color or not. We show that the major body sensitive visual areas are modulated by emotion with increased activation for threat videos. Activation of the fusiform gyrus by the bodies is strongly affected by attentional modulation. The right middle temporal/middle occipital gyrus shows an interaction effect between emotion and attention. Right superior temporal sulcus (STS) shows a main effect for emotion and attention and also an interaction effect. Consistent with earlier findings, left amygdala (AMG) is more activated when attention is on the bodies than on the dots, irrespective of emotion. These results show how attention modulates the neural correlates of threat perception in dynamic bodies.

E21

CORTICAL STRUCTURES IN CHILDREN WITH CONDUCT PROBLEMS AND CALLOUS-UNEMOTIONAL TRAITS: A VOXEL-BASED MORPHOMETRY STUDY *StÇphane De Brito, King's College; Andrea Mechelli, King's College; Alice Jones, King's College, University College; Marko Wilke, 3University of TÅbingen; Kristin Laurens1, Gareth Barker, King's College; Sheilagh Hodgins, King's College; Essi Viding, King's College, University College* – Background: Brain imaging studies in adults with psychopathy and children with conduct problems only (CP) point to abnormalities in limbic and prefrontal regions involved in emotion recognition, emotion regulation, decision-making, and empathy. Children with conduct problems (CP) and callous-unemotional traits (CP/CU+) are thought to be at risk of developing psychopathy. However, to date, no brain imaging study has examined this subgroup of children with CP. Goals of the study: We set out to investigate whether, compared with typically developing boys, boys with elevated levels of CP/CU+ traits would have structural differences in brain regions previously identified in studies of adults with psychopathy and children with CP. Methods: Our sample consisted of community based boys aged 10-13 years with CP/CU+ traits in the top 10% (n=23) and typically developing controls (n=25). We conducted voxel-based morphometry analyses. Specifically, we created study-specific probability maps and identified four regions of interest (Orbitofrontal (OFC), anterior cingulate (ACC), and insular cortices, and amygdala) for our analyses. Results: Group comparisons indicated that compared with control boys children with CP/CU+ traits had increased grey matter volume in the right OFC and the right ventral ACC. CU traits correlated positively with the volume of grey matter in these areas. Conclusions: Our results replicate and extend findings of prior studies in adults with psychopathy and children with CP. Subgroup of children with CP/CU+ traits had structural differences in two brain areas involved in decision-making and emotion regulation (OFC and ACC).

E22

SOCIAL ATTRIBUTION TO 'TRIANGLES PLAYING TRICKS' IS DIMINISHED AND DOES NOT IMPROVE WITH AGE AMONG CHILDREN WITH HIGH FUNCTIONING AUTISM SPECTRUM DISORDERS *Gregory L. Wallace, NIMH; Benjamin E. Yerys, Children's National Medical Center; Mark J. Celano, NIMH; Joette D. James, Children's National Medical Center; Jennifer Sokoloff, Children's National Medical Center; Lauren E. Kenworthy, Children's National Medical Center; Jay N. Giedd, NIMH* – We sought to examine uncued social attribution to interacting geometric shapes in children with high functioning autism spectrum disorders (ASDs) versus typically developing (TD) children and to investigate age-related changes in social attribution performance for each of the groups. 44 children with a high functioning ASD and 44 TD children matched group-wise on age (7-16 years), IQ (80+), and sex ratio (80% male) were shown the 'Triangles Playing Tricks' task and asked to provide verbal descriptions of the animations. Responses to goal-directed and 'theory of mind' animations were rated for appropriateness and 'intentionality.' A significant main effect of group but no significant group by condition interaction was found for intentionality ratings, indicating that children with ASDs were less likely to ascribe intentionality to characters in both types of animations. This could not be explained by discrepant verbal output since no group difference in length of verbal descriptions was noted. Age was positively associated with both indices of performance on the theory of mind animations for TD, but not ASD children. Moreover, regression analyses indicated that not only age but also an age x group interaction term significantly predicted both indices of performance on the theory of mind animations. High functioning children with ASDs demonstrated a diminished likelihood of assigning intentionality to uncued, impoverished animations of interacting geometric shapes. In contrast to the pattern observed among TD children, theory of mind performance did not improve with age among high functioning children with ASDs.

E23

MEMORY PROCESSING ASSOCIATED WITH OUTGROUP FACES PRESENTED IN A NEGATIVE STEREOTYPIC CONTEXT IS MODERATED BY MOTIVATION TO NOT BE PREJUDICED: FMRI AND BEHAVIORAL EVIDENCE *Christine Cox, University of Arizona; Chad Forbes, University of Arizona; Lee Ryan, University of Arizona* – An fMRI study assessed neural correlates of contextual modulation of negative implicit

attitudes toward outgroup members; participants heard various types of music (violent, misogynistic rap [VMR], nonviolent rap, death metal) during presentation of fast (30ms) and slow (525ms) Black and White faces. A surprising result was observed in the hippocampus, a structure critical for memory: bilateral activity unique to fast Black faces in the VMR condition. Two hypotheses could explain this activation: 1) outgroup faces presented in negative, stereotypic contexts are interpreted as salient and potentially threatening and engage memory encoding processes, potentially predicted based on emotional memory literature (encoding hypothesis); or 2) following outgroup homogeneity effects, these faces are processed generically, as opposed to individualistically, leading to increased semantic memory processing (homogeneity hypothesis). No memory measures were collected in the imaging study, so a behavioral study was carried out using the same general paradigm, but including a surprise recognition test. Results indicated poor memory in all conditions, but recognition of Black faces in VMR was moderated by one's motivation to not be prejudiced. Better recognition was associated with more motivation, poorer recognition with less motivation. This provides preliminary support for the encoding hypothesis since all participants in the fMRI study reported high motivation to not be prejudiced. It is possible that when primed with negative stereotypes, people low in motivation to not be prejudiced may be more likely to stereotype, possibly via a lack of effort or inability to encode individual faces that belong to the negatively stereotyped outgroup.

E24

SEPARABLE (AND RACE-SELECTIVE) NEURAL MECHANISMS FOR JUDGING INDIVIDUATED AND NON-INDIVIDUATED OTHERS *Jonathan B. Freeman, Tufts University; Daniela Schiller, New York University; Nicholas O. Rule; Tufts University; Elizabeth A. Phelps, New York University; Nalini Ambady, Tufts University* – From the quickest glimpse of someone, 'snap' judgments are readily made using superficial information; these are often stereotypic, and other times, surprisingly accurate. The neural basis of these is unclear. We used fMRI with a factorial design to examine whether dissociable neural systems underlie non-individuated judgments (i.e., made at zero-acquaintance given only superficial information) and individuated judgments (i.e., made when given additional idiosyncratic information), and if these systems are sensitive to a target's race. White and Black targets were either 'introduced' through a gradual presentation of idiosyncratic person-descriptive information (individuated), or they remained superficial, continuously accompanied by bogus non-descriptive information (non-individuated). Between information segments, participants repeatedly made dispositional judgments about targets. These judgments never explicitly corresponded with any person-descriptive information participants may have received. Whole-brain analyses revealed that the amygdala showed selective responses to judgments of non-individuated others. In contrast, individuated judgments engaged a network associated with Theory of Mind (ToM), including left temporoparietal junction, superior temporal sulcus, and middle frontal gyrus. Critically, activity in a localized region of paracingulate cortex (PCC), important for reasoning/representing another's mind, showed a robust interaction: while the PCC elicited greater activity when judging individuated relative to non-individuated Whites, it was not 'online' when judging Blacks. The findings point to distinct neural circuitry involved in judging individuated versus non-individuated others. We speculate that the amygdala may facilitate snap social judgments. The PCC is distinguished from other regions involved in ToM by its selectivity to ingroup (White) members, possibly providing a neural correlate of outgroup dehumanization.

E25

TO BRAKE OR ACCELERATE WHEN THE LIGHT TURNS YELLOW? AGE DIFFERENCES IN HOW STRESS AFFECTS RISK TAKING IN A DRIVING GAME *Mara Mather, University of Southern California; Marissa Gorlick, University of Southern California; Nichole Kryla-Lighthall, University of Southern California* – Stress affects brain systems involved in risk and reward processing. Yet, despite the fact that important decisions and stress often go hand in hand, little is known about the influence of stress on decision processes. In our study, we compared younger and older participants' risk-taking in a driving game (N = 92). Before starting the game, half of the participants in each age group submerged their left hand in ice water for three minutes, a stress induction that raises cortisol levels. (In the control group, participants submerged their hand in warm water.) We measured both cortisol and salivary alpha amylase responses to the stress manipulation. In the driving game, participants earned points while driving a car but not while it was stopped. During each trial, a green traffic light turned yellow and then, at a random interval, turned red. If the car was stopped when the light turned red, participants were awarded the points they had earned on that trial. Otherwise, they lost the points. Thus, driving the car while the light was yellow was risky. Overall, when compared with the control condition, stress significantly reduced older adults' total points (by nearly half of the total), because older adults spent much less time driving during yellow lights in the stress condition than in the control condition. In contrast, stress slightly increased younger adults' risk taking in the task. These results indicate that stress can have a quite different impact on the risk-taking tendencies of younger and older adults.

E26

SOCIAL ATTENTION IN YOUNG CHILDREN WITH NEURODEVELOPMENTAL DISORDERS: EVIDENCE FROM EYE-TRACKING Meaghan A. Kennedy, Boston University; Daniela Plesa-Skwerer, Boston University; Mary A.E. Lindeke, Boston University; Alex B. Fine, Boston University; and Helen Tager-Flusberg, Boston

University – Neurodevelopmental disorders are often characterized by distinct social phenotypes, and the neural mechanisms underlying this variability are not well understood. Children with autism spectrum disorders (ASD) have impaired social reciprocity, whereas sociability is characteristic of Down Syndrome (DS). We aimed to investigate attentional processes underlying variability in social phenotype by recording visual scanpaths in a preferential looking paradigm. We examined visual preferences in 2 to 6-year-old typically-developing (TD) children and children with DS and ASD using a TOBII-1750 eye-tracker. Fifty image pairs of people with animals, flowers, butterflies, landscapes, or abstract designs were displayed for 6 seconds, separated by 1-second central fixation stimuli. To account for baseline attentional differences, fixation counts per image were divided by total fixations per trial. Fixations were counted when point-of-regard remained within 30 pixels for 100 ms. ANOVA comparing groups on fixations to social and nonsocial stimuli (excluding animals) yielded a significant group-by-category interaction ($F(2,32)=7.81, p<.01$). Children with DS fixated more on people and less on nonsocial images than the TD and ASD groups ($p<.05$). The TD and DS groups preferred people to nonsocial images ($p<.01$). Comparing people, abstract, and animal images yielded another group-by-category interaction ($F(4,62)=2.51, p<.05$). TD children preferred people to abstract images, while the DS group preferred people to both animals and abstracts ($p<.05$). Children with ASD showed no categorical preferences. These findings suggest that visual preferences reflect the social phenotypes characteristic of ASD and DS. Eye-tracking can enhance our understanding of social attentional processes in children with neurodevelopmental disorders.

E27

EARLY AND LATE DISPLAYS SHOW DIFFERENTIAL ATTUNEMENTS TO CLEAR AND AMBIGUOUS THREAT: AN FMRI INVESTIGATION *Robert G. Franklin, Jr., Pennsylvania State University; Reginald B. Adams, Jr., Pennsylvania State University, Michael T. Stevenson, Pennsylvania State University* – Responses to threatening stimuli include both early and late processing streams, with the early processing stream representing low-level unconscious processing of threat and the late processing stream representing high-level conscious processing of threatening stimuli. In this paradigm, we tested the idea that early and late processing streams of threat are differentially tuned to visual representations of threat. Specifically, early streams, which are visually cruder, are tuned to clearer threatening displays while late streams are tuned to more ambiguous displays of threat. To test this, we used anger and fear faces to represent threat. Threatening faces can represent either clear threat when eye gaze is congruent to the approach-avoidance motivation of the emotion (i.e. direct gaze anger and averted gaze fear), or ambiguous threat, when the eye gaze is incongruous to the emotion motivation. We conducted two fMRI studies, the first using masked subliminally presented blocked (33 ms) emotional faces to study early unconscious processing streams while the second used consciously presented (2000 ms) emotional faces in an event-related design to study late conscious processing. Clear minus ambiguous threat showed substantially more activation than the reverse contrast and we found predicted activation in the bilateral amygdala in an a priori ROI analysis ($p < .05$) In the consciously presented stimuli, the ambiguous minus clear contrast showed substantially more activation than the reverse contrast, with significant regions (at $p<.001$) in the left amygdala, suggesting that ambiguous threat more activates the amygdala than clear threat in conscious processing.

E28

DYNAMIC CONNECTIVITY OF MEDIAL CORTICAL REGIONS DURING SOCIAL JUDGMENT *A.C. Chen, University of Michigan; R.C. Welsh, University of Michigan; I. Liberzon, University of Michigan; S.F. Taylor, University of Michigan* – Introduction: Medial cortical structures, including the anterior medial frontal cortex (aMFC), ventral medial prefrontal cortex (vmPFC) and posterior cingulate cortex (PCC), exhibit high resting metabolism and constitute part of an hypothesized 'default network'. Cognitive tasks typically decrease activity in this network, while tasks with self-referential, social or emotional components increase activity. Furthermore, the network exhibits spontaneous low-frequency correlations. While some findings suggest that network correlations are invariant across tasks, we set out to identify network dynamics interacting with a task that engages midline activity. Method: Twenty-one healthy subjects were instructed to make either preference judgments (like/dislike) or identify the gender of emotionally salient faces (Happy, Neutral, Fearful), in pseudorandomized blocks, separated by baseline/rest blocks. fMRI scans were obtained using a reverse spiral sequence. Realigned and normalized images were analyzed in a standard, random effects model. A psycho-physiological interaction analysis (PPI) was performed on midline regions of interest identified from the random effects model. Results: Preference, relative to gender, recruited more aMFC, vmPFC and PCC. All three medial cortical regions displayed task-dependent changes in connectivity, only in the context of preference. In addition, during the preference task, both aMFC and PCC showed significant positive coupling with bilateral frontal cortices, and dACC/pre-SMA. Discussion: The results support the theory that medial cortical components of the default network represent a dynamic functional network that also interacts with areas engaged by cognitive control. A disturbance of network homeostasis may be an underlying mechanism for disorders characterized by abnormal socio-emotional functioning, such as schizophrenia and autism.

E29

EXPECTING TO LIFT A BOX TOGETHER MAKES THE LOAD LOOK LIGHTER *Adam Doerrfeld, Rutgers,*

The State University of New Jersey; Natalie Sebanz, University of Birmingham; Maggie Shiffrar, Rutgers, The State University of New Jersey– In two experiments, we examined how the social context of a situation may influence object perception. We investigated whether participants would judge the weight of a box differently depending on whether they are expecting to lift it either alone or with another person. In Experiment 1, participants judged the weight of a transparent box filled with different amounts of potatoes (between 1-20 pounds) before lifting it alone or with another participant. Participants gave written estimates before and after lifting the box. Results show that participants expecting to lift boxes with a partner judged them as lighter than participants expecting to lift the same boxes alone. In Experiment 2, we investigated whether the observed effect would hold for action observation. Participants viewed static images of either one person lifting a wire basket of different amounts of potatoes (between 1-20 pounds), or of two people lifting the same weights together. Participants indicated on a continuous scale how much they thought the basket weighed. Results show that when observing pictures of two people lifting, participants judged the weight to be lighter than when they saw one person lifting, consistent with the results of Experiment 1. This suggests that observers simulated being in the actors' position while making judgments. Our findings suggest that one's perception of objects is shaped by one's own action capabilities in combination with those of others. Furthermore, this relationship holds during observation of static pictures. Though we used strictly behavioral measures, the potential for neuroimaging methods is there.

E30

REINFORCEMENT LEARNING DEFICITS ASSOCIATED WITH VAL/VAL HOMOZYGOSITY IN THE COMT VAL158MET POLYMORPHISM *N.G. Hollon, NIMH; J. Devido, NIMH; C.C. Wu, NIMH; E. Gorodetsky NIMH; R.J.R. Blair, NIMH; K.S. Blair, NIMH* – Catechol-O-methyl transferase (COMT) is an enzyme involved in the breakdown of catecholamine neurotransmitters such as dopamine, particularly in prefrontal cortex. The common Val158Met single nucleotide polymorphism occurs in the COMT gene such that methionine (met) substitutions of valine (val) alleles lead to the production of COMT with reduced enzymatic activity. This results in greater available prefrontal dopamine in individuals carrying met alleles than in val/val homozygotes. In this study, 55 healthy adult participants provided DNA samples for genotyping and performed the differential reward and punishment learning task. This task involves sequential choices between pairs of stimuli associated with different magnitudes of reward or punishment. Participants learn to choose the stimulus that will result in the greater gain or lesser loss. Trials differ according to decision type (between objects associated with different reward levels or different punishment levels) and reinforcement distance (the magnitude of the reinforcement difference between the objects). A prior fMRI study with this task implicates ventromedial prefrontal cortex (vmPFC) in decision type (representing reinforcer outcome value; Blair et al., 2006) and anterior cingulate in resolving response conflict relating to reduced reinforcement distance. Val/val homozygotes made significantly more errors than met carriers on this task. This related to differences in sensitivity to reinforcement distance. Whereas met carriers made fewer errors when stimulus options had a greater difference in associated values, val/val homozygotes had similarly high error rates across all reinforcement distances. These data suggest that frontal dopaminergic projections are critical for successful stimulus-reinforcer based decision making.

E31

EMOTIONAL MODULATION OF MEMORY: THE ROLE OF THE LIMBIC SYSTEM AND GENETICS *Kathryn Handwerger, Tufts University; Lisa M. Shin, Tufts University, Massachusetts General Hospital, Harvard Medical School* – Background: Previous research has demonstrated that arousing emotional stimuli are remembered better than neutral stimuli, and that this effect is likely driven by the amygdala and hippocampus. However, whether the emotional modulation of memory is affected by specific genes previously identified as affecting limbic function (e.g., polymorphisms of the serotonin transporter and BDNF genes) is unknown. Methods: We used fMRI in healthy individuals (n=9; 5 male) to assess BOLD signal while they viewed positive, negative, and neutral pictures from the International Affective Picture System. A surprise memory test was administered offline one week later. fMRI data were analyzed using SPM2. Contrasts compared BOLD signal in response to the specific emotional relative to neutral pictures that were subsequently remembered. Results: A preliminary repeated-measures ANOVA revealed a significant effect of picture type ($p<.01$) indicating better memory for emotional (positive and negative) than neutral pictures, even when controlling for false alarm rates (d'). Furthermore, subjects remembered significantly more negative than positive pictures. fMRI analyses revealed significantly greater activation in bilateral amygdala, right hippocampus, and dorsal anterior cingulate cortex (all $ps<.001$) during the viewing of subsequently remembered emotional versus neutral pictures. Genetic data are currently being analyzed and will be presented (along with a larger N). Conclusions: These preliminary results support the idea that emotional information is better remembered than neutral information, and that activation of limbic regions during encoding helps to account for this difference. Additional analyses are expected to illuminate the role of genetics in the modulation of emotional memory.

E32

RECOVERING LOSSES AND LOSING RECENT GAINS: NEURAL EFFECTS OF PRIOR OUTCOMES

ON CURRENT OUTCOME PROCESSING *Daniel Campbell-Meiklejohn Department of Experimental Psychology, University of Oxford, CFIN, Aarhus University; Dick Passingham, University of Oxford; Robert Rogers, University of Oxford*– Many studies on reward processing show that same reward or loss can evoke different emotions, promote different choice behavior and evoke unique neural activity depending on the context in which they are experienced. Context can be provided by earlier outcomes. A relieving reward is not the same experience as a win that does not recover and a loss may be less aversive if it can be offset by a prior win. New to the literature, this study shows how a just a single outcome can affect the underlying neural process of subsequent outcomes, even when magnitude (immediate or cumulative) and probability of the reward is unchanged. In this study, we used event-related fMRI to compare neural responses of rewards and losses that follow different prior outcomes (a prior win or prior loss). Rewards that follow losses evoke a strong bilateral ventral putamen and inferior frontal junction response relative to a win of equal magnitude with no prior outcome. Losses in the context of recent wins evoke greater ventromedial prefrontal cortex and hippocampus activity relative to losses of equal magnitude with no such context. Finally, winning twice in a row evokes greater right anterior insula activity relative to a win of equal magnitude (cumulative or immediate) on its own. These findings show that a single prior outcome can change the neural processing of current outcomes and may lead to new studies for characterization of emotions and cognitions of relief, offsetting of aversive experiences with prior rewards, and being on a roll.

E33

NEURAL CORRELATES OF *PERSUASION* *Emily Falk, UCLA; Lian Rameson, UCLA; Yoona Kang, Yale University; Matthew Lieberman, UCLA* – Persuasion is at the root of countless social exchanges in which one person or group is motivated to have another person or group share its beliefs, desires, or behavioral intentions. Here, we report two functional magnetic resonance imaging (fMRI) studies that begin to elucidate the neurocognitive networks associated with feeling persuaded by an argument made by another individual. Based on previous persuasion research, candidate neurocognitive networks that might contribute to persuasion processes were identified, including regions that support deliberative reasoning, emotional processing, social cognition, self-referential processes and memory encoding. Methods: In a first study, American participants were presented with arguments relating to a number of different objects and activities during an fMRI scanning session. Participants rated the persuasiveness of each overall argument shortly after exiting the scanner. Results: There was clear evidence that persuasiveness was associated with increased activity in networks previously associated with social cognition (dorsomedial prefrontal cortex, posterior superior temporal sulcus, temporal poles) and memory encoding (bilateral hippocampus and left inferior prefrontal cortex). Apart from additional activations in left lateral prefrontal cortex and visual cortex, these networks were the only brain regions where activity was greater during persuasive than unpersuasive passages. In a second study using similar methods in a native Korean sample, we found results that were remarkably consistent with study one. Conclusions: The current results indicate that the experience of persuasion may be supported by neural machinery that overlaps with mentalizing and memory encoding processes. Future directions and implications will be discussed.

E34

STAYING COOL WHEN THINGS GET HOT: FMRI COMPARISON OF TWO REGULATION *STRATEGIES* *J.P Hayes, Durham VA Medical Center, Duke University Medical Center; R.A. Morey, Durham VA Medical Center, Duke University Medical Center; C.M. Petty, Durham VA Medical Center; S. Seth, Durham VA Medical Center; M. Smoski, Duke University Medical Center; G. McCarthy, Yale University; K.S. LaBar, Duke University Medical Center* – Emotion regulation refers to the modulation of the behavioral, experiential, and physiological aspects of emotion. Various regulation strategies may have different effects on emotional experience. In reappraisal the individual cognitively changes the meaning of the stimulus which is often superior to expressive suppression in reducing the impact of negative affect for emotional stimuli. Although there is an emerging literature on the neural correlates of strategy use in comparison to non-regulation, or "attend only" conditions, few imaging studies have directly compared the brain activity patterns associated with more than one strategy during voluntary regulation of negative affect. In the present study, healthy young adults were instructed to reappraise, suppress, or attend to negative emotional pictures while undergoing event-related fMRI. Behavioral results revealed that negative experience was reduced during the emotion regulation conditions. Imaging results revealed that in comparison to the attend condition, both reappraisal and suppression activated lateral and medial prefrontal cortex regions often associated with cognitive control processing. When directly compared, reappraisal elicited greater activity in medial prefrontal cortex, posterior cingulate, and midbrain, whereas suppression elicited greater activity in the inferior prefrontal and parietal cortices. In addition, there was a greater reduction in amygdala activation during reappraisal than during suppression. These results provide evidence for partially unique neural signatures for different regulatory strategies that may reflect the recruitment of different component processes during attempts to reduce negative affect.

E35

HOW STEREOTYPE THREAT INFLUENCES THE ABILITY TO LEARN: AN ERP STUDY OF ANTICIPATORY ATTENTION AND ERROR *CORRECTION* *Jennifer A. Mangels, Baruch College, CUNY; Ronald Whiteman, City College of New York, CUNY; Ted*

Altschuler, City College of New York, CUNY; Brian Maniscalco, Columbia University; Carol Dweck, Stanford University; Catherine Good, Baruch College, CUNY – Under stereotype threat (ST), worry is hypothesized to occupy working memory resources, ultimately interfering with performance on resource demanding tasks. Less is known about the effects of ST on the equally attention demanding process of explicit learning. In the present study, we examined the effects of ST on the moment after females received error feedback on a math task, and right before they had the opportunity to learn the correct answer and engage with an interactive math tutor that provided concrete strategies for remediating their error. Error remediation was evaluated at a surprise retest given 48-hours later. To probe mindset during this intervening period, we focused on the stimulus preceding negativity (SPN), a slow cortical potential associated with anticipation of motivationally-relevant stimuli. To relate this activity to the learning success, females within threat and non-threat conditions were each divided into better and poorer learners based on a median split of the percentage of errors subsequently corrected. Under non-threat only, a widespread parieto-occipital SPN, thought to index anticipation of visual stimuli, was enhanced for better learners compared to poorer learners. In contrast, under threat only, an anterior SPN associated with a more affective aspect of anticipatory attention emerged for poorer learners compared to better learners, perhaps reflecting continued rumination on the negative outcome. These findings suggest that ST can negatively impact female math students' ability to correct errors by predisposing them to fixate on negative appraisal of the error, rather than directing their attention externally toward information that could facilitate learning.

E36

MOTIVATIONAL CONTEXT AND INDIVIDUAL DIFFERENCES MODULATE THE NEURAL UNDERPINNINGS OF RISK *Hani D. Freeman, University of Texas at Austin; Jennifer S. Beer, University of Texas at Austin* – Not all risk is created equal. Some risks provide the potential for some benefit whereas others are purely for thrills. Extant neural research has identified a neural system that supports risk by focusing on gambling tasks where risk has some potential for benefit (e.g., monetary gain). Is this system also activated when risk is taken in a context with no benefit except thrills? We conducted an fMRI study to assess differences in adaptive (e.g., potential for benefit) and maladaptive risk-taking behavior. Participants were presented with scenarios that were equally risky but had the potential for adaptive benefits (e.g., taking an experimental drug that might kill you or save your life) or potential for thrills (e.g., taking a recreational drug that might kill you or give you a pleasurable experience). Consistent with previous neural research on risk, the study found that adaptive risks were associated with significant activation in caudate, insula, and middle temporal gyrus. However, risks that were taken purely for thrills engaged different neural systems depending on the individual's level of thrill seeking. Individuals high in sensation seeking significantly activated putamen and insula whereas individuals low in sensation seeking significantly activated anterior cingulate gyrus and prefrontal cortex. These findings suggest that our understanding of the neural mediation of risk must take into account the motivation context of risk and individual interest in thrill seeking.

E37

DECLARATIVE MEMORY IS CRITICAL FOR SUSTAINED ADVANTAGEOUS COMPLEX DECISION-MAKING BEHAVIOR *Rupa Gupta, University of Iowa; Melissa C. Duff, University of Iowa; Natalie L. Denburg, University of Iowa; Neal J. Cohen, University of Illinois at Urbana-Champaign; Antoine Bechara, University of Southern California; Daniel Tranel, University of Iowa* – Previous studies have reported conflicting evidence concerning the contribution of declarative memory to advantageous decision-making on the Iowa Gambling Task (IGT). A group study, in which the measurement of psychophysiology during the task necessitated a 10-sec delay between card selections, found that amnesic participants (n=6) failed to develop a preference for advantageous decks over disadvantageous decks (Gutbrod et al., 2006), whereas a case study (where psychophysiology was not measured and no delay between card selections occurred) showed that the amnesic patient developed the normal preference for advantageous decks (Turnbull & Evans, 2006). We sought to resolve these discrepant findings by examining IGT performances in five patients (1 woman) with profound amnesia (WMS-III General Memory Index M = 64) and bilateral hippocampal damage caused by anoxia/HSE. In one administration of the IGT, psychophysiology measurements interposed a 6-sec delay between card selections. In a second administration 1 to 7 years later (M = 4 years), no delay between card selections was interposed. While age-, sex- and education-matched healthy comparison participants showed significant learning with a gradual preference for advantageous decks, amnesic patients, irrespective of IGT administration condition and of etiology of amnesia, failed to develop this preference. These findings strongly discount the possibility that the delay between card selections explains why amnesic participants fail to learn in the IGT, and suggest a significant role for medial temporal lobe declarative memory systems in the type of complex decision-making tapped by the IGT. Grant support from DT: NIDA R01 DA022549 and NINDS P01 NS19632

E38

THE INFLUENCE OF PRIOR RECORD ON MORAL JUDGMENT *Dorit Kliemann, University of Bremen, Massachusetts Institute of Technology; Liane Young, Massachusetts Institute of Technology; Jonathan Scholz, Massachusetts Institute of Technology; Rebecca Saxe, Massachusetts Institute of Technology* – Repeat offenders are commonly given more severe sentences than first-time

offenders for the same violations. Though this practice makes intuitive sense, the theory behind escalating penalties is disputed in both legal and economic theories. Here we investigate folk intuitions concerning the moral and intentional status of actions performed by people with positive versus negative prior records, using behavioural and neuroimaging methods (functional magnetic resonance imaging). We hypothesized that prior record would modulate both moral judgment and mental state reasoning. Subjects first engaged in an economic game with fair (positive prior record) and unfair (negative prior record) competitors and then read descriptions of their competitors' actions that resulted in either positive or negative outcomes. The descriptions left the competitors' mental states unstated. We found that subjects judged actions producing negative outcomes as more "intentional" and more "blameworthy" when performed by unfair competitors. Although explicit mental state evaluation was not required, moral judgments in this case were accompanied by increased activation in brain regions associated with mental state reasoning, including predominantly the right temporo-parietal junction (RTPJ). The magnitude of RTPJ activation was correlated with individual subjects' behavioural responses to unfair play in the game. These results thus provide insight for both legal theory and moral psychology.

E39

ORIENTING OF ATTENTION TO GAZE AND ARROW CUES IN WILLIAMS SYNDROME *Alex Fine, Boston University School of Medicine; Daniela Plesa-Skwerer, Boston University School of Medicine; Robert Joseph, Boston University School of Medicine; Lucia Ciciolla, Boston University School of Medicine; Helen Tager-Flusberg, Boston University School of Medicine* – Previous studies show reflexive attentional orienting to gaze in typically developing individuals. Orienting of attention has not been systematically examined in Williams syndrome (WS), a neurodevelopmental disorder characterized by mild mental retardation, impairments in spatial ability, and heightened social interest. Measuring attentional processes engaged in orienting tasks may elucidate low-level processing of social information in this population. We administered a standard cueing paradigm with non-predictive, centrally-presented schematic faces and arrows at two stimulus onset asynchronies (200, 600 SOA) to individuals with WS and to mentally age-matched normal controls (NC). Manual response time to target location on correct trials was measured to assess effects of cue-direction on attention deployment. An ANOVA with cue-type and SOA as within-subjects variables yielded significant group by cue-type and group by SOA interactions. In the arrow condition, WS showed a validity effect at both SOAs; NCs showed the effect only at the shorter SOA. The validity effect for arrows was of a greater magnitude for WS individuals overall than for controls. These results suggest that WS may have more difficulty using top-down attention control mechanisms to disengage from the "rule-like" directional quality of the arrows. For the schematic faces the NC group showed a validity effect at 200ms but not at 600ms. The opposite was true in the WS group, which showed a validity effect at the longer SOA. Our findings suggest that orienting to gaze is preserved in individuals with WS, although proceeds on a different time-course which may be constrained by domain-general processing efficiency.

E40

OXYTOCIN ENHANCES POSITIVE VERSUS NEGATIVE EMOTIONAL INFORMATION PROCESSING IN HEALTHY MALE VOLUNTEERS *Martina Di Simplicio, University of Siena; Rachel Massey-Chase, Warneford Hospital; Philip J. Cowen, Warneford Hospital; Catherine J. Harmer, Warneford Hospital* – Rationale: Animal studies have shown the role of oxytocin in affiliation and attachment and recent evidence suggests that oxytocin is also involved in human models of approach behaviour, possibly by modulating the processing of emotionally valenced stimuli. Although oxytocin administration has been reported to decrease neural responses to facial emotional information, the effects on a range of behavioral measures of emotional processing are still discussed. Objective: The aim of this study was to investigate whether intranasally administered oxytocin affects the processing of positive and negative affective information in healthy male volunteers across tasks measuring attention, perception and memory. Methods: Twenty-nine male healthy volunteers were randomly allocated to receive a single dose of oxytocin nasal spray (24 UI) or placebo. Fifty minutes later, participants completed a battery of psychological tests measuring emotional processing (facial expression recognition, emotional memory, attentional dot probe). Mood and subjective experience were also assessed. Results: A single-dose of intranasally administered oxytocin slowed reaction time to correctly identify fearful facial expressions and reduced the misclassification of positive emotions as negative ones. Volunteers receiving oxytocin were also more likely to recall words describing positive characteristics. These effects occurred in the absence of significant differences in subjective ratings of mood and anxiety. Conclusions: Oxytocin modulates emotion processing in healthy male volunteers. This action may contribute to the emerging role of the neuropeptide in promoting affiliative and approach behaviour, by reducing the salience of potentially ambiguous and threatening social stimuli and promoting a processing bias towards positive stimuli.

E41

SENSITIVITY TO FAIRNESS AND INTENTIONS OF OTHERS IN THE ULTIMATUM GAME AMONG PATIENTS WITH VENTROMEDIAL PREFRONTAL LESIONS *S.G. Shamay-Tsoory, University of Haifa; R. Suleiman, University of Haifa; R. Gohary, University of Haifa;, G. Hirshberger, University of Haifa; J. Aharon-Peretz, University of Haifa* – In the Ultimatum Game (UG) two players split a sum of money. The proposer decides about

the division of the money while the responder can accept or reject this offer. It has been shown that identical offers in an UG trigger vastly different rejection rates depending on the other offers available to the proposer. Thus, healthy responders tend to reject a given offer with an unequal distribution of material payoffs if the proposer could have proposed a more equitable offer. This suggests that healthy responders take into account the intentions and perspective of the proposer and not only the distributive consequences. Here, we investigate whether perspective taking defects following localized ventromedial prefrontal (VM) lesions are associated with a different decision making. To examine this hypothesis 8 patients with VM damage and 18 healthy controls (HC) participated as responders in the UG with twelve fake proposers. Participants had to either accept or reject offers of 2/8 NIS (2 for them and 8 for the proposer), which was paired with one of four different offers (5/5, 4/6, 2/8, 8/2). Whereas HC rejected the offered 2/8 when it was paired with 4/6 than 5/5, patients showed the opposite pattern of preferences. Furthermore, in the VM group, ratings in a perspective taking scale correlated with rejection rates, such that poorer perspective taking was associated with higher rejection rate and lower total monetary gains. This suggests that impaired perspective taking may account for these patients' aberrant economic conduct.

E42

ROLE OF PREFRONTAL CORTEX AND STRIATUM IN INTER-TEMPORAL CHOICE *Xinying Cai,Yale University School of Medicine; Soyoun Kim, Yale University School of Medicine; Daeyeol Lee, Yale University School of Medicine* – Humans and animals sometimes forsake a large delayed reward and settle for a smaller but more immediate reward, suggesting that the subjective value of reward diminishes according to its delay. Neuroimaging studies have identified a network of cortical and subcortical areas involved in this so-called inter-temporal choice. In addition, single-neuron recording studies have shown that the individual neurons in the dorsolateral prefrontal cortex of rhesus monkeys often combine information about the magnitude and immediacy of reward and encode temporally discounted value of the reward expected from a particular choice. To better understand the role of the cortico-basal-ganglia loop in inter-temporal choice, we recorded the activity of neurons in the caudate nucleus of a rhesus monkey while it performed an oculomotor inter-temporal choice task. The reward magnitude and delay for each target were manipulated randomly across different trials and signaled symbolically using visual cues. Using a regression analysis, we found that approximately 40% of the caudate neurons significantly modulated their activity according to the temporally discounted value of a given target. In addition, many neurons changed their activity similarly in response to an increase in reward magnitude and a decrease in reward delay for the same target. Signals related to the temporally discounted values were attenuated during a control task, in which reward magnitude and delay were fixed and the animal was required to choose the target shown in the same color as the fixation target. This suggests that prefrontal cortex and caudate nucleus play similar roles during inter-temporal choice.

E43

TEMPORAL CHARACTERISTICS OF AFFECT IN THE YOUNG AND AGING HUMAN BRAIN *Alyson M. Negreira, Massachusetts General Hospital; Stephanie M. Carpenter, Massachusetts General Hospital; Mariann R. Weierich, Massachusetts General Hospital; Christopher Sege, Boston College; Elizabeth A. Kensinger, Boston College; Christopher I. Wright, Massachusetts General Hospital; Lisa F. Barrett, Massachusetts General Hospital, Boston College* – Affect, the neurophysiologic barometer of an individual's relationship to the environment, depends on three crucial properties: hedonic valence, arousal, and novelty. Previous neuroimaging experiments typically studied one or two properties of affect and disregarded the temporal characteristics of each property. The current study sought to simultaneously assess the effects of valence, arousal and novelty during affective processing and to investigate the temporal characteristics of these affective properties using functional magnetic resonance imaging (fMRI). Five young and ten healthy elderly participants viewed International Affective Picture System (IAPS) pictures within an event-related fMRI design. Twelve distinct groups of IAPS pictures were created based on the dimensions of hedonic valence, arousal, and novelty (e.g.. a Familiar/High Arousal/Negative group, etc). An individual participant anatomic region of interest (ROI) approach identified voxels active to the task and percent signal change measures were extracted from these voxels. We have observed that the amygdala is differentially responsive to valence, arousal, and novelty across the time course of the hemodynamic response. Peak amygdala responses to novelty, valence and arousal occurred 6 to 8 seconds after stimulus onset. As predicted, the arousal and novelty responses were similar for both age groups. A positivity effect was not observed in elderly vs young amygdala responses, although elderly participants were significantly less responsive to negative compared to positive pictures 12 to 14 seconds in the hemodynamic response, whereas no difference was observed for young participants at that point in the time course.

E44

EFFECTIVE CONNECTIVITY OF AUTOBIOGRAPHICAL MEMORY NETWORK VARIES BY PERSONAL INVOLVEMENT *Keely A. Muscatell, Boston College, MGH/MIT/HMS Anithoula A. Martinos Center for Biomedical Imaging; Donna Rose Addis, Harvard University, MGH/MIT/HMS Anithoula A. Martinos Center for Biomedical Imaging; Elizabeth A. Kensinger, Dept. of Psychology, Boston College, MGH/MIT/HMS Anithoula A. Martinos Center for Biomedical Imaging* – Autobiographical memory (AM) is an important part of everyday life, and neuroimaging technology has enabled researchers to characterize the

neural network underlying AM retrieval. In the present study, we examined how one characteristic of AM, personal involvement, modulated the effective connectivity of the AM-retrieval network. Thirteen members of the Boston College Women's Ice Hockey team underwent a functional neuroimaging scan while they recalled game details from the 2006-2007 hockey season. Following the scan, participants rated their memories on a number of dimensions, including their personal involvement with each of the game events recalled. Memories were divided into "high involvement" (e.g., recalling when you scored a goal) and "low involvement" memories (e.g., recalling watching from the bench as your teammate scored a goal). Using structural equation modeling, we examined how the effective connectivity among regions of the AM network differed based on personal involvement. Results indicated that, during retrieval of high involvement events, there was a strong, positive connection between the right amygdaloid-hippocampal region and medial prefrontal cortex (mPFC), and also between the left hippocampus and mPFC. During retrieval of low involvement events, there was an even stronger positive connection between the left hippocampus and mPFC but also a negative connection between the right amygdaloid-hippocampal region and mPFC. Thus, though there appears to be a similar amount of overall connectivity between medial-temporal lobe structures and mPFC regardless of personal involvement, the influence of the right amygdaloid-hippocampal region on other regions differs based upon the personal involvement of a retrieved memory.

E45

AN FMRI STUDY OF DIFFERENT LEVELS OF CONSTRUAL IN ACTION IDENTIFICATION *Robert P. Spunt, UCLA; Matthew D. Lieberman, UCLA; Ajay B. Satpute, UCLA* – Action Identification Theory (AIT; Vallacher & Wegner, 1986) posits that the same action (e.g., "brushing teeth") can be accurately described on different levels of construal, with low-levels focusing on how the action is performed (e.g., "gripping the toothbrush") and high-levels focusing on "why" the action is performed (e.g., "maintaining dental hygiene"). Moreover, AIT posits that individuals tend to prefer high-level identifications of actions. The current study sought to explore the neural correlates of different levels of construal in action identification. 18 subjects (9 male, 9 female) underwent fMRI while providing descriptions of 5-second video clips of a male actor performing various everyday actions. Subjects passively watched each clip and then described them on three levels of construal: Low-level (How is he doing it?), Basic-level (What is he doing?), and High-level (Why is he doing it?). Preliminary analyses suggest that, as level of construal decreases from high to low, activity in neural regions associated with mentalizing and motivation, including the dorsomedial prefrontal cortex, precuneus, insula, and ventral striatum, decrease as well. The data suggest that low-level action identification requires the suppression of processes that automatically make sense of action in terms of goal-driven mental states. This proposition is consistent with central findings of AIT that individuals prefer high-levels of action identification. Moreover, the data suggests that self-regulation-which requires low-level action identification-may require the suppression of the natural tendency to construe actions on high-levels of identification.

E46

EFFECTS OF AGE ON DETECTION OF EMOTIONAL INFORMATION: EVIDENCE FROM BEHAVIORAL, EYE-GAZE, AND NEURAL EXPERIMENTS *Christina M. Leclerc, Boston College; Elizabeth A. Kensinger, Boston College* – Emotion has been found to play a large role in the prioritization of attention to information in our environments. Although young and older adults prioritize processing of emotional information, there often is an age-related valence reversal in the processing of emotional stimuli. Previous research indicates that older adults remember more positive compared to negative information (Carstensen & Mikels, 2005), and neurobiological evidence (Leclerc & Kensinger, in press) indicates an age-related reversal in the valence of information eliciting activity within the medial prefrontal cortex (MPFC). The current research examined age differences in affective processing using a visual search task paradigm with behavioral, eye-tracking, and neuroimaging methodologies. Behavioral and eye-tracking results indicate that, compared with neutral images, both age groups were faster to detect, and looked longer at, high arousal emotional images. Despite this general similarity in task performance, neuroimaging results indicate an age-related reversal in MPFC activation, with detection of negative compared to positive targets activating the MPFC more for young adults, and detection of positive compared to negative images activating the MPFC more for older adults. Together these results provide evidence not only that the detection benefit for emotional material is preserved across the lifespan, but also that the previously observed age-related reversal in neural activation can exist even on tasks that require only relatively automatic processing of emotional information.

E47

UNFORGETTABLY UNFAIR: AN FMRI INVESTIGATION OF MEMORY FOLLOWING SOCIAL ECONOMIC EXCHANGE *Luke Chang, University of Arizona; Mascha Van't Wout; University of Arizona; Katia Harle, University of Arizona; Alan Sanfey, University of Arizona* – Previous research in the domain of social cognitive neuroscience has demonstrated that people are extremely sensitive to social norms of fairness and cooperation norms, and indeed often experience a negative emotional reaction when these social preferences are violated by another intentional human agent. However, less is currently known about how these norm violations affect subsequent social perception and decisions. To investigate the nature of the neural response

to the detection of cheaters, we conducted an experiment in which participants played a single-shot Ultimatum Game with many partners while undergoing functional magnetic resonance imaging. In this game participants were presented with proposals ranging from $1 to $5, all divisions of a $10 pot. In addition to the Ultimatum Game, participants also completed a recognition memory task in the scanner, in which they were presented with a series of faces and asked to rate their confidence that they had played the Ultimatum Game with this partner. In actuality, half of the faces had been previously encountered, while half were novel distracter faces. Behaviorally, participants were more accurate in discriminating between faces that had previously made unfair offers ($1-2) compared to those that had made fair offers ($5). The imaging results indicate that a network that has previously received attention for its association with social processing and as a default-mode network may underlie this phenomenon. This suggests that the ability to discriminate cheaters appears to recruit regions that are important in inferring negative intentions.

E48

GOALS IN ACTION: NEURAL CORRELATES OF THE BEHAVIORAL INHIBITION AND ACTIVATION SYSTEMS DURING GOAL *PURSUIT* *Elliot T. Berkman, UCLA Matthew D. Lieberman, UCLA* – How do we overcome the temptations that arise in the course of goal pursuit, and what are the neural systems underlying this process? The present line of research examines the role of the behavioral activation and inhibition systems (BAS and BIS, respectively) in goal pursuit in general and inhibition of temptations in particular. Our model proposes that BAS facilitates goal pursuit broadly, whereas the BIS relates to inhibition of goal-irrelevant temptations or impulses. On a neural level, trait BAS is hypothesized to relate to regions associated with action planning and motivation during goal pursuit, reward regions following goal attainment, and be left-lateralized; and trait BIS is expected to relate to activation in regions involved in conflict detection and inhibition, and be right-lateralized. Importantly, neural activity in these regions during goal pursuit is expected to mediate behavioral outcomes. Brain activity was measured using functional magnetic resonance imaging (fMRI) while participants completed a motivational reverse-contingency task that required regulation of goal-irrelevant prepotent responses on some trials. In support of the hypotheses, regions associated with action planning (dorsolateral PFC) and reward (ventral striatum) were associated with success across all participants, particularly for those higher in trait BAS. Likewise, regions associated with conflict detection and regulation (cingulate cortex, ventrolateral PFC) were selectively activated on trials when regulation was necessary, and particularly for participants higher in trait BIS. These results support a dynamic model of goal pursuit that involves interacting motivational and cognitive processes that are modulated by individual differences in BIS and BAS.

E49

ENCODING OF GAINS AND LOSSES IN PRIMATE FRONTAL CORTEX AND *STRIATUM* *Hyojung Seo, Yale University School of Medicine; Xinying Cai, Yale University School of Medicine; Daeyeol Lee, Yale University School of Medicine* – Decision making in humans is frequently based on the evaluation of symbolic events, such as monetary gains and losses. Previous neuroimaging studies have shown that a broad cortical and subcortical network is involved in the anticipation and evaluation of gains and losses. However, little is known about the neuronal and circuit mechanisms for processing information about abstract gains and losses. We developed a novel decision-making task for rhesus monkeys in which visual tokens are used as conditioned reinforcement. A variable number of tokens in the form of red disks presented at the center of the computer screen served as conditioned reinforcement. Upon the extinction of a central fixation target, the animal freely chose between two peripheral stimuli by making a saccade. A token was stochastically added or removed according to the payoff matrix of a biased matching pennies game. Juice reward was delivered automatically when 6 tokens were cumulated. We recorded single-neuron activity from the dorsomedial frontal cortex, dorsolateral prefrontal cortex and dorsal anterior cingulate cortex as well as the caudate nucleus. Neural activity in all of these areas was modulated by gains and losses not only in the current trial but also in the previous trials. These signals were represented most strongly in the medial cortical areas. Furthermore, signals related to gains and losses were independently encoded across population in each brain area. These results suggest that the process of updating the animal's behavioral strategies according to conditioned reinforcement is mediated by the frontal cortex-basal-ganglia network.

E50

IDENTIFICATION OF THE AREAS OF THE PAIN-PROCESSING NETWORK CORRELATED WITH INDUCED NEGATIVE MOOD: AN FMRI STUDY *Chantal Berna, University of Oxford; Siri Leknes, University of Oxford; Emily Holmes, University of Oxford; Guy Goodwin, University of Oxford; Irene Tracey, University of Oxford* – Goals of the study While there is an increasing understanding of the central pathways of pain perception, their modulation by cognitive and emotional processes is still under investigation. Our study aims to identify the neural correlates of negative mood during an experimental pain procedure. Methods In the functional Magnetic Resonance scanner (fMRI), subjects were exposed to 21 second heat pain bursts on a patch of skin pre-treated with capsaicin (0.075%), following a negative and a neutral mood induction using Velten-type statements and music (pseudorandomised order). Each stimulus was preceded by a mood booster, in order to keep the mood state steady. After the stimulus, subjects rated the unpleasantness of the stimulus on a Visual Analogue Scale, as well as the prevalence of catastrophizing. Results In a preliminary group of n= 12,

the contrast <mood booster negative-neutral> confirms a negative mood induction with a unique activation in the subgenual anterior cingular cortex (sACC). A functional connectivity analysis between subjects' activity in the sACC and activity during pain processing revealed correlations with the controlateral posterior insula, the periacqueductal gray, and bilaterally the anterior insula, amygdala, hippocampus, ACC, and precuneus. Conclusion These preliminary results highlight areas involved in central pain processing which are affected by mood. These areas, known to be important in emotional processing, could be responsible for altered pain perception during negative mood. Further analysis on a larger sample should lead to a better understanding of the role of these neuronal circuits, and their involvement in mood and pain.

E51

ANTERIOR CINGULATE CORTEX ACTIVATION PREDICTS DEGREE OF SAME-RACE BIAS IN EMPATHIC RESPONSE TO PERCEIVED PAIN *Vani A. Mathur, Northwestern University; Tokiko Harada, Northwestern University; Trixie Lipke, Northwestern University; Joan Y. Chiao, Northwestern University* – Group selection observed in altruistic behavior suggests that people are more likely to respond to distress signals, such as pain or fear, when expressed by people from their own social group. Prior neuroimaging studies have shown that the anterior cingulate cortex (ACC) and bilateral anterior insula (AI) are involved in pain processing and empathic response. However, whether social group membership, such as race, affects neural responses related to pain perception and empathy remains unknown. Here we used functional magnetic resonance imaging at 3T to examine the neural bases of a same-race bias in empathy to perceived pain. During scanning, eleven African-American participants viewed complex visual scenes of African-American or Caucasian-American targets in either painful or neutral situations and indicated how much empathy they had for the target (i.e., how badly they felt) using a four-point Likert scale. Participants' behavioral ratings indicated significantly greater empathy for same-race relative to other-race targets in pain. Greater activation in ACC and left AI was found in response to same-race pain targets relative to other-race pain targets. Furthermore, degree of activation in ACC was positively and significantly correlated with degree of same-race bias in self-reported empathy. These findings demonstrate that race affects degree of empathic response to perceived pain and activity within ACC predicts the extent to which a person feels greater empathy for a same- or other-race target in pain.

E52

NEURAL CORRELATES OF PERCEIVING DYNAMIC SIGNALS OF THREAT IN BODILY EXPRESSIONS OF ANGER AND *FEAR* *S. Pichon, Laboratoire de Neurosciences Cognitives, INSERM U742, DÇpartement d'Etudes Cognitives, Ecole Normale SupÇrieure, Paris; B. de Gelder, ., Tilburg University, Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School; J. Grãzes, Laboratoire de Neurosciences Cognitives, INSERM U742, DÇpartement d'Etudes Cognitives, Ecole Normale SupÇrieure, Paris* – Recently, it has been suggested that the ability to understand others' emotional behaviour may be sustained by automatic simulation of actions observed. Simulation of actions with the goal of representing the action may be all that is needed to understand the type of action but when the action is performed with a clear emotional overtone other neural substrates may matter. Typically, perception of other's threat may recruit defence mechanisms such as involved in the experience of fear or anger. Using event related fMRI we identified threat specific activity associated with the observation of videos of actors performing fear or anger expressions as opposed to neutral ones. 16 healthy right-handed volunteers participated to the study and were instructed to categorize the expressions. Images were acquired on a 3T magnet and a RFX analysis was implemented at the group level using SPM2. As predicted, expressions of threat compared to neutral videos triggered enhanced activity in the temporal cortex (MTV5, fusiform, STS and Amygdala) as well as in the prefrontal cortex (orbitofrontal cortex, Broca's area and medial superior frontal gyrus). Furthermore, recognition performance for fear expressions but not anger ones correlated with activity in bilateral amygdala while anger expressions elicited broader activations than fear ones in the left amygdala, the ventromedial prefrontal cortex, the orbitofrontal cortex (BA47) and temporal cortices. These results suggest that in a dynamic visual context, direct threat signals from angry body expressions are more prone to elicit emotional responses in the amygdala and the orbitofrontal cortex than fear ones.

E53

MENTALIZING UNDER UNCERTAINTY: GREATER MEDIAL PREFRONTAL INVOLVEMENT IN UNCONSTRAINED MENTAL INFERENCE *Adrianna C. Jenkins, Harvard University; Jason P. Mitchell, Harvard University* – Research on the neural basis of social cognition has generated contradictory empirical findings with respect to the role of the medial prefrontal cortex (MPFC) in mentalizing (i.e., the ability to infer the mental states and personality traits of others). Whereas some lines of research have identified MPFC as the locus of mentalizing activity, other lines of research have concluded that MPFC is not necessary, or is less important than other regions, for inferring the contents of other minds. Critically, research along these different lines has operationalized mentalizing in different ways, opening the possibility that such inconsistencies have arisen because different tasks have tapped into different subcomponent processes of mentalizing. Such tasks have differed along two potentially-important, but so far confounded, dimensions: their 1) content (typically, belief versus preference), and 2) degree of constraint, i.e., the degree to which perceivers' inferences are logically

dictated by the information provided. The current study manipulated both dimensions systematically in a single set of participants in order to establish the effects of content and constraint on MPFC recruitment during mentalizing. Participants were scanned using FMRI while making constrained and unconstrained inferences about the beliefs and preferences of protagonists in short vignettes. Activity in MPFC was moderated by the degree of constraint on perceivers' inferences. Specifically, MPFC responded more during unconstrained inferences of both types of content, suggesting MPFC-based processes are engaged more during mental inferences that require the construction of novel predictions from minimal information than during logical reasoning from established premises.

E54

DISTINCT NEURAL NETWORKS SUPPORT AUTOBIOGRAPHICAL MEMORY AND THEORY OF *MIND* *Jennifer Rabin, York University; Donald T. Stuss, Rotman Research Institute, University of Toronto; Asaf Gilboa, University of Haifa; R. Shayna Rosenbaum, York University, Rotman Research Institute* – Neuroimaging studies suggest that self-referential processing during autobiographical memory (AM) and theory of mind (ToM) for inferring other people's mental states activate the same core network of brain regions, but recent lesion data suggest that the abilities are dissociable. We examined the functional distinction between ToM and AM using a real-world 'family photos' test of mental state attribution, in which AM and ToM conditions were closely matched with respect to event content and vividness. Participants were scanned with fMRI as they recollected their own mental states while viewing past personal photos (AM condition), and as they inferred others' mental states while viewing strangers' photos (ToM condition). Analyses revealed a common network of regions, including the left frontal pole/paracingulate cortex, bilateral anterior and posterior cingulate/retrosplenial cortex, bilateral precuneus, right temporal pole, bilateral parahippocampal cortex, and left angular gyrus. However, the conditions differed in terms of strength and location of activations. Specifically, activity within the entire network was greater during AM, except for the left angular gyrus, which was greater during ToM. Superior medial prefrontal cortex was recruited in both conditions, but on the left during AM and right during ToM. Moreover, right hippocampal activation was unique to AM, whereas left superior temporal gyrus activation was unique to ToM. The results suggest that AM and ToM draw on overlapping, but not identical, brain regions and processes, which may reflect the difference between re-experiencing details of personal episodes and recombining or generating novel details of events experienced by others.

Poster Session H

H1

AUTOMATIC OR ATTENTIONAL CONTROL? NEURAL RESPONSE TO EMOTIONAL EXPRESSIONS *Charlene C. Wu, NIMH; Samantha L. Crowe, NIMH; Derek G.V. Mitchell, NIMH, University of Western Ontario; R. James R. Blair, NIMH* – The extent to which activation of the amygdala to emotional expressions occurs independent of the availability of attentional resources (i.e., the degree to which this activation is "automatic") remains debated. This event-related fMRI study investigated the impact of attentional load on the BOLD response to emotional expressions. Participants were presented with composite stimuli consisting of semi-transparent words superimposed on neutral, fearful, and disgusted faces. This manipulation held stimulus-driven features constant across multiple levels of attentional load. Participants made either (1) gender discriminations based on the face; (2) case judgments based on the words; or (3) syllable number judgments based on the words. A significant main effect for processing load was found in prefrontal cortex, parietal cortex, visual processing areas, amygdala, and insula. Results indicate activation in attention-related regions, such as dorsolateral prefrontal cortex and parietal cortex, increased with greater attentional load. Critically, enhanced activity in the amygdala and insula to emotional expressions during low attentional load (gender discriminations) was significantly reduced during higher levels of attentional load (linguistic discriminations). Collectively, these data support the view that processing task-irrelevant fear- or disgust-based emotional information is, like neutral information, subject to the effects of attentional load and top-down control.

H2

ON THE WRONG SIDE OF THE TROLLEY TRACK: ARE SOME LIVES VALUED MORE HIGHLY THAN OTHERS? *Mina Cikara, Princeton University; Rachel A. Farnsworth, Princeton University; Lasana T. Harris, New York University; Susan T. Fiske, Princeton University* – Do people value the lives of certain people more than others? Group stereotypes can be organized into four clusters along the dimensions warmth and competence (Fiske et al., 2002). These dimensions create a high/low warmth X high/low competence space that describes four broad and culturally universal stereotype categories and the emotional prejudices those categories elicit. Targets high on both warmth and competence (e.g., students) elicit emotions such as pride, whereas targets low on both (e.g., drug addicts) elicit emotions such as disgust. Targets in the mixed quadrants elicit ambivalent emotions; envy is reserved for targets perceived as high in competence but low in warmth (e.g., business professionals) and pity is elicited by targets perceived as low in competence and high in warmth (e.g., elderly). Participants' resolutions of moral dilemmas in the fMRI scanner revealed that stereotypes motivate people to value the lives of people belonging to certain social categories more highly than others. Warmth of the sacrificed target predicted activation in a network previously associated with processing personal moral dilemmas (Greene et al., 2001), including the amygdala, posterior cingulate, precuneus, STS, and mPFC, whereas perceived competence did not. Simple contrasts revealed pride targets were driving the main effect of warmth. Competence interacted with warmth: Envied targets were associated with deactivation of dACC, suggesting participants were least conflicted about sacrificing them relative to the other 3 groups. Finally, sacrificing disgust targets activated anterior vmPFC, which has been associated with reward, specifically reward from a social source.

H3

WHEN PAIN IS AVOIDED: MORE POSITIVE AFFECT IN PESSIMISTS THAN IN OPTIMISTS *Siri Leknes, University of Oxford; Chantal Berna, University of Oxford; Irene Tracey, University of Oxford* – This study investigated the effects of individual differences in dispositional optimism/pessimism on the experience of relief following threat of pain. The level of surprise at a rewarding (or aversive) counterfactual outcome is thought to increase its pleasantness (or unpleasantness). While optimism is associated with increased well-being and life expectancy, the pessimist's negative expectations may lead to increased rewarding relief when these expectations are violated. To test this hypothesis, 18 healthy volunteers participated in a functional magnetic resonance imaging (fMRI) study where a visual cue predicted intensely painful thermal stimulation with 50% probability. A safety cue signalled the relief condition where no heat was applied. During the scan, subjects were also asked to imagine rewarding or neutral scenarios (e.g. your favourite meal or an airplane meal). Both the safety cue and the pleasant scenarios were rated as highly pleasant. Subjects also reported feeling dread during anticipation of pain/relief. As predicted, pessimism correlated positively with both dread and relief. This pattern was confirmed by the fMRI data, which showed that relief-related activation in the ventral striatum correlated with pessimism. Supporting the link between pleasant relief and other types of reward, we identified overlap between relief and reward processing in the ventromedial prefrontal and rostral anterior cingulate cortices. Furthermore, positive correlations between with pleasantness ratings and activation in ventral striatum were found for both the relief and the reward processing contrasts. Overall, our findings support a link between pessimism and pleasant relief, suggesting that optimism is not the only route to positive affect.

H4

TALKING TO GOD - PERSONAL PRAYER ACTIVATES AREAS OF SOCIAL COGNITION *Uffe Schj_dt, University of Aarhus; Armin W. Geertz, University of*

Aarhus; Hans St_dkilde-J_rgensen, Aarhus University Hospital; Andreas Roepstorff, Aarhus University Hospital – Religious experience has widely been considered a uniform category in the experimental neuroscience literature. In my paper I argue that religious practices like secular practices are concrete actions that differ widely in both cognitive content and corresponding neural correlates. We do hypothesize that belief in supernatural beings separates religious practice from secular equivalents in the social cognitive domain, because religious subjects consider gods to be real and capable of reciprocating personal requests. We employed a two-by-two design using fMRI to test our hypotheses on twenty young Christian Protestants by measuring the BOLD response during different types of prayer. Unlike recitation of a formalized prayer, performing a personal prayer activated a strong response in the temporopolar region, the medial prefrontal cortex and the temporoparietal junction. This result supports our hypothesis that religious prayers are diverse cognitive phenomena and that praying subjects activates the neural substrates of social cognition, when engaging in a personal prayer. In a main-effect analysis we also found a highly significant regional increase of the BOLD response in the caudate nucleus. This supports another hypothesis that religious prayer as a form of frequently recurring behaviour is capable of stimulating the dopaminergic reward system in practicing individuals. It extends recent research, which demonstrates a relation between interpersonal trust and activation in the dopaminergic system, to encompass also relations to abstract entities.

H5

A ROLE FOR THEORY OF MIND IN JUDGING HELPFUL VERSUS HARMFUL ACTIONS: AN FMRI *INVESTIGATION* *Liane Young, Harvard University; Rebecca Saxe, Massachusetts Institute of Technology* – When evaluating the moral status of an action, we often consider both the action's outcome as well as the agent's mental state at the time of action. Previous studies of moral judgment have focused on harmful actions, revealing a critical role for brain regions that support "theory of mind" (ToM), the capacity to represent the mental states (e.g., beliefs) of others. The current study systematically investigates the role of ToM in judgments of both harmful and helpful actions. Participants read vignettes concerning harm and help in a 2x2 design: protagonists produced a valenced outcome (harmful or helpful) or neutral outcome, based on the belief that they would produce the valenced or neutral outcome. Participants judged the amount of blame and praise deserved by the protagonist in the harm and help vignettes, respectively. The results indicate a robust and selective role for the right temporo-parietal junction (right TPJ), and to a lesser extent, left TPJ, precuneus, and medial prefrontal cortex, in judgments of both harm and help: for harm, discrimination on the basis of belief was observed for neutral outcomes only; for help, discrimination on the basis of belief was observed for positive outcomes only. Furthermore, the percent signal change (PSC) in the right TPJ was negatively correlated with blame for accidental harm; higher PSC indicated less blame assigned to those who harmed without believing they would. The current study provides neural evidence for ToM in judgments of both harm and help and reveals differences in how ToM is specifically engaged.

H6

TO BET OR NOT TO BET? THE NE/ERN ASSOCIATED WITH RISK TAKING CHOICES *Rongjun Yu, Peking University; Xiaolin Zhou, Peking University, State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University, Capital Normal University* – The functional significance of error-related negativity (Ne/ERN), which occurs at approximately the same time as erroneous responses, has been investigated extensively using reaction time (RT) tasks. The error detection theory assumes that the Ne/ERN reflects the mismatch detected by comparing representations of the intended and the actually performed actions. The conflict monitoring theory asserts that the Ne/ERN reflects the detection of response conflict between intended and actually performed actions during response selection. In this study, we employed a gambling task in which participants were required to choose whether they would take part in betting in each trial and they were presented with gain or loss feedback in both the "to bet" and the "not to bet" trials. The response-locked ERP magnitudes were more negative for "to bet" than for "not to bet" choices for both large and small stakes and were more negative for choices involving large rather than small stakes. Dipole source analysis localized the ERP responses to the anterior cingulate cortex (ACC). These findings suggest that ACC may function as an early warning system that signals the need for higher order cognitive control and alerts the brain to prepare for the potential negative consequence associated with the risky action.

H7

NEURAL ACTIVATIONS FOR SELECTIVE MEMORY WITHIN EMOTIONAL SCENES *Jill D. Waring, Boston College; Elizabeth A. Kensinger, Boston College, Athinoula A. Martinos Center for Biomedical Imaging* – Emotionally arousing visual scenes are remembered better than neutral scenes, but not all portions of emotional scenes are remembered with the same accuracy. Although memory for emotionally arousing items is enhanced relative to neutral items within scenes, memory is often impaired for peripheral background information contained within emotional scenes. Numerous behavioral studies have indicated that this trade-off effect is robustly present in young adults. In this study, we investigated how the neural processes engaged during encoding may explain this trade-off effect. In an event-related fMRI study, we showed young adults scenes containing positive, negative, and neutral items placed upon neutral backgrounds. Later, outside the scanner, participants completed a surprise recognition memory test, with the items and backgrounds from the scenes presented independently. A

subsequent memory design allowed us to measure the neural response related to the trade-off, identifying the neural activity that predicted both enhanced memory for highly arousing items compared to neutral ones, and also impairment in memory for their backgrounds relative to neutral scenes. Conjunction analyses revealed activation in the amygdala, medial prefrontal cortex, and orbitofrontal cortex regions showed this pattern, likely reflecting emotion-mediated allocation of attention. There were also several areas activated within the fusiform that showed this type of response, likely reflecting heightened attention for the emotional elements within the scenes. These results indicate that strong activation in emotion and visual processing regions for highly emotionally arousing scenes leads to good memory for emotionally arousing scene items, yet to poor memory for their background contexts.

H8

PREFERENCE OVER REWARD SEQUENCES AND VIOLATION OF INDEPENDENCE ASSUMPTION IN RHESUS *MONKEYS* *Soyoun Kim, Yale University School of Medicine; Daeyeol Lee, Yale University School of Medicine* – Commonly observed preference for immediate reward is frequently accounted for by various models of temporal discounting in which the subjective value or utility of delayed reward is given by a decreasing function of reward delay. In real life, however, choices are often made among different temporal sequences of rewards and penalties. Whereas models of temporal discounting assume that the contribution of a particular outcome to the preference of the entire outcome sequence is independent of the outcomes available in other time steps, it has been demonstrated that for people this independence assumption is often violated. To investigate whether and how this independence assumption is violated in other primates, we trained two rhesus monkeys in a novel reward sequence choice task, in which the animals chose between two reward sequences each providing a discrete stream of rewards delivered in a series of five 2-s intervals. The choice behavior of both animals was better fit by a hyperbolic, rather than exponential, discount function. Moreover, when a particular pattern of reward was added to a pair of reward sequences, the animal's preference was systematically altered, indicating that the assumption of consumption independence is violated. In particular, a relatively large reward added to a particular time step increased the weights given to the rewards in nearby time steps. These results suggest that monkeys evaluate the value of reward in a context-dependent manner according to the temporal pattern of the overall reward sequence.

H9

EMOTIONAL MODULATION OF DECISION MAKING IN OBSESSIVE-COMPULSIVE BEHAVIOUR *Cavedini Paolo, San Raffaele Scientific Institute, SRT Hospital; Zorzi Claudia, Vita-Salute San Raffaele University; Bellodi Laura, San Raffaele Scientific Institute, SRT Hospital, Vita-Salute San Raffaele University* – Literature suggests that not only cognitive aspects but also "somatic" or emotional signals play a role in decision-making (DM) processes. Particularly, the somatic marker (SM) hypothesis (Damasio, 1994) states that the reactivation of a somatic state, allows to curtail the decision-making process which would otherwise depend on a demanding cost-benefit analysis of the various possible choices that could override the processing skills and prevent a quick and appropriate on-line decision. Clinical models of impaired decisional processing can be useful to get a better insight in DM itself along with allowing a better comprehension of physiopathological mechanisms of emotional-behavioural disorders. Obsessive-Compulsive Disorder (OCD) could represent a relevant clinical model for DM studies for its emotional-behavioural and neurofunctional features. Moreover neuropsychological studies highlighted impairment in DM tasks in OCD: patients were guided by short time rewards in spite of long-term negative consequences (Cavedini, 2002; Cavedini, 2006). We investigated the presence of a connection between DM performances and choice-related psychophysiological responses, in order to identify a possible SM impairment and its involvement in poor decisional abilities. We analyzed skin conductance responses (SCRs) during the Iowa Gambling Task (IGT) in an adult OCD group and a healthy control group, measuring anticipatory and posticipatory psychophysiological reactions to reward and/or punishment cues. Preliminary results suggest that OCD patients performed worse than normal controls and all of them exhibited weaker SCRs responses when pondering choices and after wins and losses. These results support the role of an impaired emotional modulation in OCD patients' DM.

H10

THE NEGATIVITY BIAS IN ECONOMIC DECISION-MAKING: THE ROLE OF THE VENTROMEDIAL PREFRONTAL CORTEX *Samantha M. Mowrer, The Ohio State University; Amanda Kesek, University of Minnesota Institute of Child Development; William A. Cunningham, The Ohio State University* – According to Prospect Theory (Kahneman & Tversky, 1979) and the Evaluative Space Model (Cacioppo & Berntson, 1994), negative information is weighted heavily in decisions and evaluations, a phenomenon known as the negativity bias (Ito et al., 1998). The current study examined this bias in the activity of regions previously implicated in decisional processes, namely areas of the ventromedial prefrontal cortex thought to provide computations of expected value. Using fMRI, participants completed a task during which they chose to accept or reject gambles that simultaneously varied in the probability and magnitude of both gains and losses. Trials consisted of two phases. During the decision/anticipation phase, participants saw the stimuli and made a response, while during the outcome phase participants received feedback regarding the outcome of the trial. Results showed that an area of the ventromedial prefrontal cortex (VMPFC) responded in a manner consistent with the negativity bias, exhibiting greater

activity related to context-dependent negativity. Specifically, during the outcome phase, greater VMPFC activity was associated with negative aspects of the stimulus when participants accepted the gamble, but positive aspects of the stimulus when participants rejected the gamble. Given the context, accepting a loss and rejecting a gain are both negative experiences. The results of this study suggest that the VMPFC may represent an affective valuation function involved in the computation of subjective expected utility rather than expected value, as this area was implicated in the negativity bias. However, negativity is situationally determined.

H11

PROSODY INFLUENCES THE LISTENER'S ONLINE REPRESENTATION OF THE SPEAKER'S THOUGHTS *Evelina Fedorenko, MIT; Lillia Cherkasskiy, Stanford University; Steven Piantadosi, MIT; Rebecca Saxe, MIT* – A critical question in social cognition concerns whether people represent others' utterances as simply their meanings or as the others' beliefs about their meanings. Whereas representing utterances as others' beliefs may be socially-relevant, it is also computationally intensive. We hypothesized that the probability of representing the speaker's utterances as beliefs depends on how salient the speaker is in the listener's mind. We manipulated the speaker's saliency by comparing two prosodic contour of the phrase "I think" which preceded the speaker's utterances in naturalistic dialogs: the version where both words were unstressed and the version where "I" was stressed. Speakers use the latter prosodic contour to draw attention to their own opinion, in contrast to the opinions of others. We therefore reasoned that this prosodic contour should increase the speaker's saliency. In the behavioral study, we found that people infer greater confidence of the speaker (but do not themselves form more confident opinions) when "I" is stressed. In the fMRI study we first identified brain regions that have been implicated in forming a representation of another's thoughts. We then compared the activation in these regions to "I think" sentences with different prosodic contours. Consistent with our hypothesis, these regions show a higher response to the condition where "I" is stressed than to exactly the same sentence if both words are unstressed. This is the first demonstration of the regions that have been implicated in representing others' thoughts interpreting utterances as others' beliefs in naturalistic dialogs.

H12

DIFFERENTIAL EFFECTS OF PERSONALITY TRAIT ON FACIAL EXPRESSION RECOGNITION. AN RTMS *INVESTIGATION* *Martina Di Simplicio, University of Siena; Vincenzo Falzarano, University of Siena; Alberto De Capua, University of Siena; Simone Rossi, University of Siena;* – Rationale: It has been suggested that avoidance-related emotions are preferentially controlled by the right prefrontal cortex (PFC), whereas approach-related emotions by the left PFC. Previous studies have shown that rTMS over the dorsolateral PFC can modulate attention to emotional stimuli. Moreover, personality traits might be relevant in disclosing an anterior asymmetry effect, consistent with a diathesis model. Objective: The aim of this study was to investigate whether high frequency rTMS over the right and left dorsolateral PFC interferes with a facial expression recognition task in healthy subjects who differ on "phobic" personality scores. Methods: Twenty healthy volunteers completed an emotional faces recognition task under baseline condition, sham rTMS and online 20Hz rTMS over the right and left PFC in randomized order. Reaction time and accuracy were measured. Mood state and personality style were assessed using the PANAS and the Personality Meaning Questionnaire. Results: A significant interaction between stimulation condition, emotion and personality was found. Subjects high on "phobic" personality scores showed a tendency to make more errors in recognizing fearful faces when rTMS was applied on the right PFC. An opposite tendency appeared for recognizing angry faces, with more errors during rTMS over the left PFC, without significant differences in subjective mood ratings. Conclusions: High frequency rTMS over the dorsolateral PFC can modulate the recognition of emotional faces. The effect of rTMS interference seems to be dependent on subjects' personality traits, showing a possible asymmetry in the processing of fearful and angry facial stimuli.

H13

MESOLIMBIC REGIONS ARE DIFFERENTIALLY SENSITIVE TO MAGNITUDE AND DELAY IN A DELAY-DISCOUNTING TASK *K. Ballard, Stanford University; B. Knutson, Stanford University* – "Delay discounting" refers to a phenomenon in which individuals discount the value of delayed gains relative to immediate gains. Prior functional magnetic resonance imaging (fMRI) studies have documented greater mesolimbic activation when people consider choices involving immediate gains versus delayed gains (McClure et al, 2004) and have also related mesolimbic activation to individuals' value of delayed gains (Kable & Glimcher, 2007). However, researchers have not yet determined how mesolimbic activation represents the magnitude and delay of gains, and whether this activation can be used to predict individuals' preferences for delayed versus immediate outcomes. We scanned 16 subjects (8 female) with FMRI (GE 1.5 T scanner, voxel size = 4 mm cubic, TR = 2000 msec, spiral in/out pulse sequence) as they engaged in a delay-discounting task. A novel temporally distributed task design separated presentation of information related to the immediate gain, magnitude of the delayed gain, delay of the delayed gain, and choice. Findings indicated that magnitude of the delayed gain elicited proportional activation in nucleus accumbens (NAcc), medial prefrontal cortex (MPFC), and anterior and posterior cingulate, while delay of the delayed gain elicited proportional activation in DLPFC, MPFC and cingulate. Logistic regression analyses further indicated that NAcc and vMPFC activation in response to magnitude and cingulate

activation in response to delay predicted choice of the delayed gain. These findings suggest that activation in ventral mesolimbic regions is sensitive to magnitude, while activation in dorsal regions is sensitive to delays during delay-discounting. Support Contributed By: NIH Grant AG024957-03

H14

NEURAL CORRELATES OF IMPAIRED EMOTIONAL INTROSPECTION: INCREASED ACC RESPONSE TO THE PERCEPTION OF FEARFUL BODILY EXPRESSIONS IN ALEXITHYMIA *Sylvie Berthoz, Department of Psychiatry for Adolescents and Young Adults, IMM; Lydia Pouga, UMR 742 INSERM 1 DÇpartement d'Etudes Cognitives; Beatrice de Gelder, Tilburg University Julie Gräzes, Department of Psychiatry for Adolescents and Young Adults, IMM* – There is a growing interest in the neural basis of emotional stimuli processing associated with alexithymia. Whereas previous studies assessed the neural corrrelates of emotional pictures or faces processing in alexithymia, none of them inspected whether the socioaffective impairments characteristic of alexithymia are associated with deficiencies in processing bodily expressed emotions. Here we used functional magnetic resonance imaging (fMRI) during the perception of neutral and fearful bodily expressions to compare the neural responses of two groups of men with high (n=14) versus low (n=12) Bermond-Vorst Alexithymia Questionnaire scores (selected from the responses of a pool of 201 men). Moreover, to assess the extent to which group differences would be related to differences on other affective dimensions, the participants scores on the Spielberger's State-Trait Anxiety Inventory, Beck Depression Inventory and Davis' Interpersonal Reactivity Index (IRI) were collected. In both groups, the contrast between fearful and neutral expressions revealed bilateral activations in the inferior frontal gyrus, the temporo-parietal junction, the superior temporal sulcus, the premotor cortex, the amygdala and the right temporal pole. Regarding the effect of group, the alexithymic showed significantly more activation in the right anterior cingulate cortex (ACC) and less activation in the precuneus than the non-alexithymic participants. Furthermore, ANCOVA analyses in SPM revealed that neither anxiety nor depression could account for the observed between-group differences. However, the IRI fantasy scale scores were related to the ACC activation. These results are discussed in line with the literature on the links between alexithymia, psychosocial functioning and a lack of empathy.

H15

ELECTROPHYSIOLOGICAL CORRELATES OF OWN-AGE BIAS IN FACE PROCESSING *Harlan M. Fichtenholtz, Yale University; Natalie C. Ebner, Yale University; Yi He, Yale University; Gregory McCarthy, Yale University; Marcia K. Johnson, Yale University* – Previous behavioural research in face recognition and person identification has shown that adults of different ages are more accurate and faster at identifying, recognizing, and remembering faces and persons of their own as opposed to other ages. This "own-age bias" suggests that the age of a face constitutes one important factor that influences how a face is processed. The present experiment is aimed at investigating the electrophysiological correlates of the own-age bias. In the context of a gender discrimination task, younger participants (age range: 18-29 yrs.) were presented with pictures of younger and older individuals' faces with neutral facial expressions. A comparison of the event-related potentials elicited by the younger and older faces revealed: (1) an enhanced positivity for older than younger faces over frontal and central scalp sites (FP1/FPz/FP2, F3/Fz/F4, FC3/FCz/FC4, C3/Cz/C4) peaking at 212 msec, (2) greater positivity over right parietal and temporal sites (CP4/P4, TP8/T6) peaking at 336 msec for older opposed to younger faces, and (3) a larger P3 over midline central and parietal sites (Cz/CPz/Pz; C4/CP4/P4) peaking at 444 msec for older compared to younger faces. In addition to the gender discrimination task, participants demonstrated a preference for pictures of younger adults on the Age IAT. The results are discussed in the context of the neural mechanisms underlying a processing advantage for own-age faces and the preference for young over old age and negative aging stereotypes as demonstrated by the Age IAT.

H16

THE SHORT SEROTONIN TRANSPORTER POLYMORPHISM AND PRONENESS TO DISTRESS IN INFANCY *Chie Yumoto, Harvard Medical School; Jean-Franáois Bureau, University of Ottawa; Zsofia Nemoda, Semmelweiss Uinversity; Maria Sasvari-Szekely, Semmelweiss University; Karlen Lyons-Ruth, Harvard Medical School* – The short allele of the serotonin transporter polymorphism (5HTTLPR) has been related to increased amygdala response to fearful stimuli (Hairiri & Holmes, 2006) and to decreased RNA transcriptional efficiency in vitro (Heils, Mossner, & Lesch, 1997). The short allele has also been related to increased separation responses in rhesus monkeys (Barr et al. 2003) and to depression and suicidality in human adults (Caspi et al, 2003). as well as temperament and response to novelty among human infants (Ebstein et al., 1998., Auerbach et al., 1999., Lakatos et al., 2003). The objective of the current study was to evaluate whether human infants carrying the short allele also show increased distress to separation, compared to those with other genotypes. We hypothesized that the short allele would predict distress observed during Strange Situation procedure (SS) (Ainsworth et al.1978) at age 12 and 18 months, independent of attachment security or disorganization. Participants were 39 parents and infants. Buccal epithelial cells were collected by swabs and genotyped as described by Nemoda et al. (2001). Infant behaviors during the SS, including avoidance, resistance to stranger, proximity-seeking, contact-maintaining, exploration, and crying were factor analyzed yielding a proneness to distress factor. As predicted, the short allele

was related to infants' proneness to distress, but was not related to standard assessments of attachment security or attachment disorganization. Both infant genotype and infant proneness to distress were unrelated to maternal interaction with the infant.

H17

VIEWPOINT SENSITIVITY OF VISUAL REPRESENTATIONS OF THE BODY IN EXTRASTRIATE CORTEX: AN FMRI ADAPTATION STUDY *J. Taylor, Bangor University; A. Wiggett, Bangor University; P. Downing, Bangor University* – During social interactions, the faces and bodies of other people convey socially-relevant information. Recent fMRI studies have identified several brain areas involved in visual analysis of the human body. We focus here on two body-selective areas in visual cortex: the extrastriate and fusiform body areas (EBA and FBA). We aimed to assess the viewpoint invariance of body representations in these areas using an event-related, pairwise adaptation fMRI design. On each trial, two images of a given individual (whole body, head obscured) were briefly presented sequentially, with a short intervening blank. The pose held in the second frame could be: 1) different from the first; 2) the same pose seen from the same angle; or 3) the same pose viewed from an angle differing from the first by 15_, 30_, 45_, or 60_. Right EBA revealed adaptation to the same-0_ condition (relative to a different pose), with gradually diminishing adaptation as a function of increasing viewpoint change. Adaptation was absent beyond 30_. In right FBA, adaptation as a function of viewpoint change was flatter, with some evidence of adaptation even for 60_ view changes. These results provide a new functional dissociation between EBA and FBA. They also (contrary to a proposal based on findings from TMS) suggest that EBA and FBA are sensitive to body posture and hence may contribute to action representations. Together with previous results, these findings suggest a division between a relatively part-based, view-specific body representation in EBA and a relatively holistic, view-independent representation in FBA.

H18

FRIEND OR FOE: NEURAL RESPONSES TO IMPLICIT TRUSTWORTHINESS JUDGMENTS INFLUENCES COOPERATION IN INTERACTIVE DECISION-MAKING *Mascha van 't Wout, University of Arizona; Alan G. Sanfey, University of Arizona* – The human face appears to play a key role in signaling social intentions and people form reliable and strong impressions on the basis of someone's facial appearance. Therefore, facial signals could have a substantial influence on how people behave towards another person in a social interaction, such as an interactive risky decision-making game. In particular, trustworthiness, a rapid, implicit assessment of the likelihood that a partner will reciprocate a generous gesture, might be an important social cue. Trustworthiness judgments are reliably associated with activity in emotional brain areas, in particular the amygdala. In this experiment, we tested the hypothesis that neural activation associated with the implicit processing of trustworthiness is related to the degree to which participants cooperate with a partner. Fifteen participants played a single-shot Trust Game while being scanned with fMRI. Participants played with 64 hypothetical partners who were previously rated on subjective trustworthiness. In each game, participants made a decision about how much to trust their partner, as measured by how much money they invested with that partner, with no guarantee of return. As predicted, people invested more money in partners who were subjectively rated as more trustworthy, despite no objective relationship between these factors. In addition, amygdala activation was higher for untrustworthy faces as compared to trustworthy faces or the control condition, i.e. slot machines. This amygdala activation also correlated with the amount of money entrusted to untrustworthy faces. These data indicate that the perception of trustworthiness and the associated neural responses influences social interactive decision-making.

H19

AUTISTIC TRAITS ARE UNIQUELY ASSOCIATED WITH SOCIAL ATTRIBUTION AND PSYCHOPATHIC TRAITS ARE UNIQUELY ASSOCIATED WITH EMOTION RECOGNITION IN THE CONTEXT OF TYPICAL DEVELOPMENT *Mark J. Celano, NIMH; April S. Timberlake, NIMH; Samantha L. White, NIMH; Nancy R. Lee, NIMH; Jay N. Giedd, NIMH; Gregory L. Wallace, NIMH* – Diminished social attribution has been shown in children and adults with autism spectrum disorders. Deficits in recognition of fearful and sad faces have been found among children with both high so-called 'psychopathic traits' and conduct problems. These associations have not been extended to typical development using a trait-based approach. 104 typically developing children (age range 7-22 years; 57% male; mean IQ=113 + 11) screened for neurological, psychiatric, and learning disorders completed the 'Triangles Playing Tricks' social attribution task and a morphing faces task assessing perceptual threshold to accurately identify sad and fearful faces versus faces depicting the remaining four of the six basic emotions. Parents of these children also completed questionnaires assessing autistic (Social Responsiveness Scale) and psychopathic (Antisocial Process Screening Device) traits. Though ratings of autistic and psychopathic traits were highly correlated with one another, each related uniquely to the social attribution and emotion recognition tasks, respectively. Specifically, hierarchical linear regression analyses revealed that autistic traits were uniquely and significantly predictive of social attribution performance after the effects of age and psychopathic traits were controlled, and conversely, psychopathic traits were uniquely and significantly predictive of recognition of fearful and sad faces after the effects of age and autistic traits were controlled. These findings suggest that not only traits associated with autism spectrum disorders and psychopathy but also

associated neurocognitive impairments are continuous and may therefore serve as relevant intermediate phenotypes for future investigations.

H20

THE NEURAL CORRELATES OF ACTION IDENTIFICATION *Abigail A. Marsh, NIMH; Megan N. Kozak, Roosevelt University; Maggie E. Reid, NIMH; Henry Yu, NIMH; Daniel M. Wegner, Harvard University; R.J.R. Blair, NIMH* – Background: Action identification is the process by which observers identify their own actions and others' actions at different levels, with lower levels focusing on the action's physical execution and higher levels focusing on the action's goals. High-level identifications indicate representation of the actor's mental processes. Although action identification overlaps conceptually with Theory of Mind, the neural correlates of action identification have not yet been identified. Methods: Fifteen healthy adult participants completed fMRI testing in a 3-run event-related task. Prior to each run, participants read a description of an actor that depicted him as likeable, neutral, or unlikable. During the scanned run, participants selected either high-level or low-level identifications for the actor's actions. Results: Replicating prior findings, the actions of liked actors were identified at higher levels than those of either neutral or disliked actors. The proportion of high-level relative to low-level identifications participants made was correlated with Autism Quotient scores. In addition, a 3 (actor) x 2 (action identification) ANOVA on fMRI data revealed that the amygdala and middle temporal gyrus are involved in high-level identifications of the actions of liked actors, whereas the insula/middle frontal gyrus is predominantly involved in high-level identifications of disliked actors. Conclusions: These are the first data to determine the neural correlates of action identification. They suggest a role for amygdala, insula, and temporal cortex in the mental representation of the actions of others and support the notion that action identification is related to Theory of Mind.

H21

MENTAL IMAGERY IN THE REGULATION OF EMOTIONAL *EXPERIENCE* *Joshua Ian Davis, Columbia University; James J Gross, Stanford University; Kevin N Ochsner, Columbia University* – Mental imagery is commonly associated with emotional experience. For example, when a person has gone through trauma they may repeatedly review the traumatic incident in their mind's eye, often distorting it as they do, making the more negative aspects most salient. We investigated whether manipulation of the mental imagery associated with a negative experience can change the emotional quality of the experience. All participants were shown pictures of both negative and neutral scenes, one at a time, and then were asked to imagine the scenes they saw either coming towards them and growing, remaining the same, or moving away from them and shrinking. All participants took part in all conditions, in a repeated measures design, and an average was obtained for each participant for each cell of the design (e.g. negative-move away). We found an interaction in which negative scenes became less negative when moving away and shrinking, and more negative when coming towards a person and growing. The same pattern did not appear for neutral scenes. When participants viewed movies of negative and neutral scenes that were analogous to what they were instructed to imagine (e.g. growing and coming towards them), the same pattern of results emerged, suggesting that participants were indeed engaging in imagination that was similar to what they would experience when actually perceiving a similar situation. These data suggest that addressing the mental imagery that is associated with a difficult emotional experience may be beneficial in terms of regulating that experience.

H22

FAMILIARITY BREEDS HELPING: PHYSIOLOGICAL CORRELATES OF EMPATHY AND ALTRUISM *Alicia J. Hofelich, University of Michigan; Stephanie D. Preston, University of Michigan* – The neuroscientific underpinnings of empathy have been intensively studied, but few of these studies have investigated the moderators of empathy. According to a Perception-Action Mechanism (PAM; Preston and de Waal, 2002), state-matching should be much greater when the observer has existing representations of the person or state through common past experience. To test this hypothesis, subjects with and without empathy-related careers (e.g. nurses versus administrative staff) watched videos of real hospital patients discussing their personal experiences with chronic and terminal illness. During the videos we collected heart rate (HR), skin conductance (SCR), facial electromyography, and respiration. After each video, participants reported feelings of empathic concern, personal distress, similarity, familiarity, and the amount of help they would offer the patient. Supporting the PAM and Batson's Empathy-Altruism Hypothesis, principal components analysis demonstrated that offers of help increased with overall levels of attention, emotion and empathic concern. Interestingly, the two principal factors in this study were not personal distress and empathic concern, but personal distress (associated with SCR and corrugator activation) and familiarity/similarity (associated with increased HR and zygomatic activation). Empathic concern was located midway between the two constructs, suggesting that empathy and helping require both a positive sense of sharing and familiarity as well as a sense of distress related to the other's need. The career of the subject interacted with the amount of help offered to specific patients, but not the amount of empathy or distress felt, indicating that experience may play a role in defining altruistic, but not empathetic, responses.

H23

QUANTITATIVE VOXEL BASED-MORPHOMETRY OF 5HT TRANSPORTER GENE; VARIATION IN HIPPOCAMPAL AND AMYGDALA STRUCTURE *M.*

Korczykowski, University of Pennsylvania; J.J. Wang, University of Pennsylvania; P. Yushkevich, University of Pennsylvania; J. Pluta, University of Pennsylvania; D.L. Minkoff, University of Pennsylvania; H. Rao, University of Pennsylvania; C. Webber-Deonauth, University of Pennsylvania; H. Dow, University of Pennsylvania; E. Brodkin, University of Pennsylvania, J. Detre, University of Pennsylvania – Gentic variation in the 5HT transporter allele, which has been linked to affective illness, may be associated with selective alterations in hippocampal and amygdala function. However, less is known about the extent to which genetic variation in the 5HT transporter allele may be associated with selective alterations in hippocampal and amygdala structure. This qVBM 'genomic neuroimaging' study will provide a a structural and volumetric bridge between genetic and functional activation paradigms, and will inform models of limbic system 'protective versus predispositional' interactions for stress and mood disorders. This study will extend previous findings of genetic variation in default brain function (Rao et al, 2007) and build a conceptual and methodological bridge to current models of psychological stress (Wang et al, 2005 & 2007) and affective illness.

H24

THE ROLE OF AGENCY IN MODULATING CONDITIONED AROUSAL *Catherine A. Hartley, New York University; Erica P. Meltzer, New York University; Rabia Salman, New York University; Janelle K. Szary, New York University; Elizabeth A. Phelps, New York University* – Previous research has demonstrated that instrumental control over an aversive stimulus can mitigate the arousal it evokes. In this study, we examined whether an increased sense of agency, in the absence of instrumental control, could alter conditioned arousal responses to anticipated aversive outcomes. Subjects participated in two fear-conditioning sessions that constituted the agency and no-agency conditions. In each session, two grey squares were presented on the screen concealing two distinct colored geometric shapes. One shape, the CS+, was paired with a shock on a subset of trials. The other, the CS-, was never paired with a shock. In the agency session trials, subjects were asked to choose one grey square and reveal the shape underneath. In the no-agency session, a square was chosen for them. Subjects were instructed that each shape had equal probability of being randomly placed under each square, making a learned instrumental avoidance response impossible. Actual placement of the stimuli was manipulated to enable yoked stimulus presentation across conditions. Subjects exhibited larger conditioned responses in the agency session than the no agency session. When subjects played a role in determining the outcome without any actual control over it, they showed more arousal than when they passively observed the same outcome without making any choice. This suggests that merely engaging in a decision making process confers a sense of responsibility for undesired outcomes that may result from that choice. Thus, unlike the mitigating effects of instrumental control, increased agency without actual control can make a bad experience worse.

H25

MINDREADING IN JAPAN AND THE U.S.: AN FMRI INVESTIGATION. *R.B. Adams Jr., Penn State; E. Wang, Tufts University; N. Rule, Tufts University; A. Schmid, Tufts University; R.G. Franklin Jr., Penn State; M.T. Stevenson, Penn State; S. Yoshikawa, Kyoto University; M. Nomura, Kyoto University; W. Sato, Kyoto University; N. Ambady, Tufts University* – Throughout history and across cultures, the eyes hold special prominence in human social interaction. Indeed, popular folk wisdom speculates that "the eyes are the window to our souls," a presumption that remains nearly axiomatic in contemporary social interaction. This begs two questions: Is there a language of the eyes? And, if so, to what extent is this language readily translatable across cultures? The ability to perceive others' thoughts, intentions, and feelings, (i.e., mind read) is regarded as a highly evolved human attribute (Brune & Brune-Cohrs, 2006; Allison, Puce, & McCarthy, 2000). Cross-cultural comparisons of mind reading, however, remain limited. To date preliminary evidence supports the presence of some biologically determined components of this ability (Avis & Harris, 1991; but see also Kobayashi, Glover, & Temple, 2006; 2007). Whether the ability to read minds varies as a function of whose mind is read, however, remains a virtually uncharted question on both the behavioral and neural levels and is the focus of the current examination. Herein we provide evidence for an intracultural advantage in the mind reading ability for both native Japanese and U.S. White participants. Using functional magnetic resonance imaging (fMRI), we examined the neural processes associated with this advantage, revealing greater bilateral superior temporal sulci (STS) recruitment for ingroup versus outgroup mind reading for both cultural groups. These findings support cultural consistency in the neurological architecture subserving high-level mind reading, as well its differential recruitment based on the cultural identity of the decoder in relation to who is being read.

H26

NEURAL CORRELATES OF PERSONAL AND EMPATHIC SOCIAL REJECTION IN ADOLESCENCE *Carrie L. Masten, UCLA; Naomi I. Eisenberger, UCLA; Mirella Dapretto, UCLA* – Developmental research has demonstrated that both personal and observed rejection experiences impact adolescent adjustment, yet research has focused primarily on personal experiences with rejection using behavioral methods. Our lab has previously identified neural networks, including the dACC and Insula, associated with experiences of social exclusion among adults (Eisenberger, Lieberman, and Williams, 2003), and in the current study we extend this work to an adolescent population in which sensitivity to peer rejection is particularly salient and examine both personal and empathic experiences with social rejection. During an fMRI scan, 26 adolescents (ages 12-13) were

excluded during a ball-tossing game in which they believed they were playing with two other adolescents, who were actually computer-controlled. During an additional run they observed another "participant" excluded from the same game. Participants completed behavioral measures of subjective rejection following each run, and empathic concern. Findings from the first 12 adolescents suggest that adolescents experience social exclusion at the neural level similarly to adults, including activation in the dACC and Insula, but also show activation in the amygdala during social distress, suggesting adolescents may experience rejection in unique ways. During empathic exclusion, adolescents who reported their own experience with exclusion to be more distressing also displayed more distress at the neural level when observing another victim of exclusion, as well as activity in the dmPFC, consistent with research examining mentalizing processes. Overall findings suggest that during adolescence both direct and empathic experiences with social rejection contribute to distress experiences at both subjective and neural levels.

H27

NEED FOR CLOSURE MODERATES NEURAL ACTIVITY DURING COGNITIVE *DISSONANCE*

Johanna M Jarcho, UCLA; Elliot A Berkman, UCLA; Matthew D Lieberman, UCLA – Hundreds of cognitive dissonance studies have established that difficult decisions between two equally-liked options lead to increased liking of the chosen option. Although the phenomenon of post-choice increase in liking is well-established, relatively little is known about the mental processes that occur in the moments that lead up to this change in attitude. One factor that may affect these mental processes is an aversion towards ambiguity known as need for closure (NFC). We conducted an fMRI study in which participants who completed a NFC assessment first rated how much they liked a series of individual stimuli, then while being scanned, chose which stimulus they preferred among pairs of similarly-liked stimuli, and finally re-rated each stimulus. While making attitude-altering decisions, individuals higher (compared to lower) in NFC showed greater activity in regions associated with inhibition and self-related processes such as, ventrolateral and dorsomedial prefrontal cortex, and decreased activity in areas associated with conflict and negative affect such as dorsal anterior cingulate gyrus and amygdale. Functional connectivity analyses revealed that the activity in ventrolateral and dorsomedial prefrontal cortex was negatively related to activity in dorsal anterior cingulate gyrus and amygdala, suggesting an inhibitory relationship among these systems. These results are consistent with a model of post-choice attitude change in which discomfort-inducing ambiguity is mitigated by effortful cognitive processes, which are employed to a greater degree when individuals are high in NFC.

H28

NEURAL ACTIVATION DURING COMPASSION, AWE, PRIDE AND REWARD: AN FMRI STUDY OF PRO-SOCIAL AND SELF-FOCUSED EMOTIONS

Emiliana Simon-Thomas, University of California Berkeley; Jake Godzik, University of California Berkeley; Dacher Keltner, University of California Berkeley – Neuroimaging studies of emotion generally focus on valence and arousal dimensions or the 'basic' emotions: anger, fear, disgust, sad, surprise, and happy (Phan, Wager et al. 2004). Less is known about positive states like pride (Tracy and Robins 2004), or emotions that motivate pro-social behavior like love, awe and compassion (Haidt 2003; Shiota, Campos et al. 2003; Gonzaga, Turner et al. 2006). Here, we investigate BOLD activity during 2 pro-social and 2 self-focused emotions: compassion, awe, pride and reward, respectively. FMRI was acquired while 14 healthy subjects viewed sequences of emotionally evocative pictures. Whole-brain analysis showed that each emotion was associated with distinct regional activation. Compassion activated the dorsal medial prefrontal cortex (mPFCd), which supports perspective taking, (D'Argembeau, Ruby et al. 2007) and mental state attribution (Ochsner, Beer et al. 2005; Mitchell, Macrae et al. 2006) as well as the amygdala, which signals emotional and social salience (LeDoux 2007). Left orbital frontal cortex (OFC) activation was observed during awe; this area has been implicated in stimulus-reward association (Hornak, O'Doherty et al. 2004), attachment-related love (Nitschke, Nelson et al. 2004), general approach orientation and positive emotionality (Davidson 2004). Pride elicited activation in the ventral medial prefrontal cortex (mPFCv), an area involved in self-referential thinking (Ochsner, Beer et al. 2005). Finally, consistent with existing research on reward, reward pictures engaged the nucleus accumbens (Knutson and Cooper 2005). Altogether, this data suggests that these pro-social and self-focused emotional states have distinct biological correlates that reflect their unique underlying themes and psychological processes.

H29

THE INFLUENCE OF IMPLICIT ASSOCIATIONS ON THE PERCEPTION OF FACES FROM DIFFERENT RACES: AN EVENT-RELATED POTENTIAL STUDY

Yi He, Yale University; Marcia K. Johnson, Yale University; Gregory McCarthy, Yale University – The neural correlates of the perception of faces from different races were investigated. Twenty-one Caucasian participants performed a gender identification task in which Asian, Black, and White faces were presented in random order while event-related potentials (ERPs) were recorded from 32 scalp electrodes. At the conclusion of the gender task, subjects were administered the implicit association test for Black (IAT-Black) and Asian (IAT-Asian). Black faces evoked a larger positive ERP over frontal scalp that peaked at 168ms after face onset than White faces, while White faces evoked a larger negative ERP that peaked at 244ms. These Black/White ERP differences significantly correlated with subject's scores on the IAT-Black. ERPs

also differentiated White from Asian faces and a significant correlation was obtained between the White-Asian ERP difference waves at ~500ms and the IAT-Asian. A positive ERP at 116ms differentiated all three races, but was not correlated with either IAT. In addition, a late positive component (around 592ms) was observed to be greater to the same-race than both other-races, which may suggest a deeper processing of the same-race faces. Together, the correlations observed for both other-races showed the influence of a racial evaluative process that may include early automatic and later controlled processes.

H30

THE ROLE OF EMOTIONAL NEURAL CIRCUITS IN ENHANCING MEMORY FOR SELF-RELEVANT INFORMATION *Lian T. Rameson, UCLA; Ajay B. Satpute, UCLA; Matthew D. Lieberman, UCLA* – Self-schemas are domain-specific generalizations about the self that are forged through experience and help guide future behavior (Markus, 1977). Interestingly, individuals who possess a self-schema in a particular domain tend to show enhanced recall for information within that domain. A previous investigation into the neural basis of self-schemas showed that making self-relevant decisions in one's schematic domain recruits brain regions that are involved in affective, motivational, and automatic responses, including the ventromedial prefrontal cortex, nucleus accumbens, and amygdala (Lieberman, Jarcho & Satpute, 2004). This finding is suggestive because these brain regions have been found to be involved in processing emotional material and in enhancing recall for emotional material, which tends to be better-remembered than neutral material (LaBar & Cabeza, 2006). Therefore, we hypothesized that the activation of this affective circuit during self-schematic processing may be responsible for the demonstrated relationship between self-schemas and enhanced recall. In this fMRI study, participants made self-relevant judgments in schematic and nonschematic domains to create both behavioral and neural indices of schematicity. To assess memory, participants viewed neutral images related to schematic and non-schematic domains and then underwent a surprise memory test. The results replicated previous work and provided evidence that affective brain regions underlie the relationship between self-schemas and enhanced recall. This suggests that being self-schematic in a domain may cause an individual to process information that is otherwise neutral in an emotionally valenced manner, which results in the material becoming more memorable for that individual.

H31

DISSOCIABLE EFFECTS OF PREFRONTAL AND ANTERIOR TEMPORAL CORTICAL LESIONS ON STEREOTYPICAL SOCIAL ATTITUDES *Marta Gozzi, National Institutes of Health, UniversitÖ di Milano Bicocca; Roland Zahn, National Institutes of Health, University of Manchester; Vanessa Raymont, National Institutes of Health, National Naval Medical Center; Jeffrey Solomon, Medical Numerics, Inc.; Jordan Grafman, National Institutes of Health* – This study examined the effects of ventromedial prefrontal (vmPFC), lateral orbitofrontal (lOFC), and anterior temporal (aTL) cortical lesions on stereotypical social attitudes in 154 patients with penetrating head injuries. In a previous study, patients with vmPFC lesions showed impaired representation of stereotypical social knowledge (Milne and Grafman, 2001). However, the number of patients studied was small, and lesions extended into the lOFC as well. Using a recently-developed lesion mapping technique and a large sample size, we were able to disentangle the role of these two brain regions and further probe the contribution of the aTL, recently shown to represent abstract social conceptual knowledge, in mediating gender stereotypes (as assessed by the Implicit Association Test). Linear regression models revealed the contribution of each brain region, while controlling for potential confounders. Our results showed dissociable effects of prefrontal and anterior temporal cortical lesions: lesions in the vmPFC and aTL were associated with stronger stereotypical attitudes, whereas damage to the lOFC was associated with weaker stereotypical attitudes. Based on these findings, we speculate that detailed knowledge of typical sequences of social actions (stored in the vmPFC) and of abstract conceptual social knowledge (represented in the aTL) is needed for differentiated social evaluation and may therefore be protective against the exaggeration of stereotypical social attitudes. The opposing effects of lesions in lOFC and vmPFC or aTL on stereotypical social attitudes point to dissociable neural systems for promotion and prevention of stereotypes, both of which may be critical to guide our everyday interpersonal evaluations.

H32

HOT CARS AND FAST WOMEN: THE NEURAL CORRELATES OF PREFERENCE JUDGMENTS *Malia F. Mason, Columbia Business School Michael I. Norton, Harvard Business School C. Neil Macrae, University of Aberdeen* – Among the multitude of decisions in which humans engage, the evaluation of the things that populate their surroundings is arguably the most fundamental: Do I like this or not? The sum of negative and positive aspects of these evaluations - traditionally referred to as the decision-maker's "utility" (by economists) or "attitude" (by psychologists) - determine how people interact with their environment. Despite evidence that people constantly evaluate the items in their surroundings, little is known about the nature of these judgments; in particular, whether all evaluations are identical or if the mechanisms employed to evaluate the item depend on the nature of the target and the potential implications it has for the perceiver. In the present article we seek to determine whether basic evaluative judgments are independent of the identity of the target or whether the mechanisms depend on the nature of the representation in question. Using fMRI we compare male participants' evaluations of biologically-relevant (females), culturally-relevant (cars),

and novel (abstract shapes) stimuli. Results indicate that whereas assessments of culturally-relevant and novel stimuli depend almost exclusively on visual processing areas (e.g., fusiform), judgments of biologically-relevant stimuli involve regions of the brain implicated in both reward processing (e.g., nucleus accumbens) and the rapid detection of targets with potential survival value (e.g., amygdala). These findings suggest that the accuracy with which behavioral scientists can calculate the valence and strength of a given attitude may be enhanced by an awareness of the neural components of that judgment.

H33

DIFFERENTIAL RESPONSIVENESS TO SOCIAL AND MONETARY INCENTIVES AS REFLECTED IN BRAIN AND *BEHAVIOR* *Gregor Kohls, University Hospital Aachen; Katja, University Hospital Aachen; Lena Rademacher, University Hospital Aachen; Sîren Krach, University Hospital Aachen; Tilo Kircher University Hospital Aachen; Gerhard GrÅnder, University Hospital Aachen; Beate Herpertz-Dahlmann, University Hospital Aachen; Kerstin Konrad, University Hospital Aachen* – Goal-directed human behavior is guided by both monetary and social incentives. Although fMRI research suggests that anticipating monetary reward activates the ventral striatum, data about the role of mesolimbic structures in social reward anticipation is still scarce. In two studies, we investigated to what extent social compared to non-social incentives differentially impact on response behaviour and brain responses in adults. Knutson's Monetary Incentive Delay Task, and a modified version of the task which social incentives (i.e., facial expressions) instead of money were applied in a behavioral (N=38, 19 females) as well as in an fMRI study (N=32, 16 females). In addition, the impact of personality traits (such as reward seeking and empathy) on reward responsiveness was assessed. Both social and monetary incentives improved behavioral task performance, although larger effects were detected for financial reward. Benefits from social incentives were strongly correlated with personality traits such as reward responsiveness and empathy, but only in males. By contrast, profit from monetary incentives was associated with harm avoidance tendencies in females. On the brain level we found, that the anticipation of financial reward activated the mesolimbic circuit (e.g., ventral striatum). By contrast, anticipated social reward induced less striatal activations, but additionally activated the ventral ACC, a region formerly shown as critical for valuing social feedback. Altogether, the data suggest that social incentives have a weaker reinforcing value than money, mirrored in reduced mesolimbic activations. However, different personality traits (and possibly gender) seem to determine to what extent an adult profit from different rewards.

H34

A RESTING-STATE FUNCTIONAL CONNECTIVITY APPROACH TO UNDERSTANDING *EMPATHY* *Lucina Q. Uddin, New York University Child Study Center; Zarrar Shehzad, New York University Child Study Center; Dylan G. Gee, New York University Child Study Center; Ben Gallagher, New York University Child Study Center; Jonathan S. Adelstein, New York University Child Study Center; A. M. Clare Kelly, New York University Child Study Center; Daniel S. Margulies, New York University Child Study Center; Phil Reiss New York University Child Study Center; F. Xavier Castellanos, New York University Child Study Center; Michael P. Milham, New York University Child Study Center*– Goal: Empathy is a multidimensional construct central to normal social interaction, and is defined as an emotional reaction to the experiences of others. The Interpersonal Reactivity Index (IRI) divides empathy into four sub-facets: perspective taking, fantasy, empathic concern, and personal distress (Davis, 1980). We present a novel approach for correlating empathic ability with connectivity of specific brain regions, employing resting-state functional connectivity (RS-FC) methods. Methods: Images were acquired from 42 subjects on a Siemens 3T scanner (TR = 2000ms; TE = 25ms; Flip angle = 90) during rest. For each, 197 EPI volumes and a T1-weighted anatomical image were acquired. Subjects completed the IRI questionnaire. We chose medial prefrontal cortex (mPFC) as a region-of-interest (ROI) based on previous literature, and extracted the average hemodynamic timeseries from each subject using masks defined by the Harvard-Oxford Cortical Structural Atlas. The timeseries were included in FSL's GLM along with nuisance covariates to produce maps of voxels in the brain positively correlated with mPFC. At the group level, individual scores on each of the IRI sub-facets were included, producing maps of regions that covaried in connectivity with the mPFC as a function of empathy score. Results: Subjects scoring higher on the fantasy subscale showed a greater positive correlation between mFPC and precuneus. Those scoring higher on the empathic subscale showed a greater positive correlation between mPFC and right insula. Conclusions: As demonstrated by these results regarding empathy, RS-FC is a useful new method for exploring relationships between brain connectivity and social cognition.

H35

DECIPHERING BRAIN SIGNALS RELATED TO PEOPLE WITH EMOTIONAL SIGNIFICANCE A NEUROPHYSIOLOGICAL STUDY. *Einat Ofek, University of Zurich, Technion Evoked Potentials Laboratory, Israel* – The current study addresses the neurophysiological basis of human interactions, past and present. Previous studies have been performed on brain response to familiar people (faces and first names). However, none of them evaluated the emotional significance of these people. This new study evaluates emotional significance in context of a broad spectrum of brain activity including brain response to familiar people significant to the subject. Brain activity and behavioral measures were taken while sixteen subjects heard first names. EEG was recorded and Event Related Potentials (ERPs) computed for each participant. A validated

questionnaire was performed after the experiment to evaluate the significance of the stimuli to each subject. Relevant relationship context data was also collected. The results of this new study indicate a specific, repeatable, and robust brain response to emotionally significant stimuli. ERP data yielded measurable information on topics including: past traumatic experience, hatred, longing, past and present romantic relationships, childhood experiences, and other topics. Additional studies will be performed with refined techniques to strengthen the significance of these findings and enhance the scope of the ERPs being measured. In addition to a broad spectrum of applications that could enhance medical care, the understanding and follow-up of these unique brain responses may improve psychotherapy and psychoanalysis in general. Initial finding suggest early applications of the techniques derived from this study may also improve treatment and diagnosis in clinical conditions such as Coma, Alzheimer and Autism. The data reported here prove precise neural correlations of emotional experience can be effectively measured. Acknowledgement: The data analyzed for this report were acquired in the Technion Evoked Potentials Laboratory.

H36

ARE YOU LYING TO ME? USING TEMPORAL CUES FOR DECEPTION *DETECTION* *Marilyn Boltz, Haverford College; Rebecca Dyer, Haverford College; Anna Miller, Haverford College* – One skill that sets humans apart from other primates is their ability to manipulate the mental states of others, in part through deception. The purpose of the present research was to extend the previous literature by investigating which cues perceivers use to assess deceit. Given the relative unreliability of visual cues, the present study focuses on temporal cues, exploring whether variations in speech rate and response latency provide cues for deception. Participants listened to a conversation between a male/female couple containing responses to questions that varied in timing characteristics and potential type of lie (self-oriented versus other-oriented). A logistic regression analysis revealed significant differences in participants' perceptions of deceit that depended on speech timing characteristics, as well as the gender of the speaker. Relative to early and on-time latencies, which yield a higher proportion of perceived truths, late latencies are consistently perceived as less honest. The perceived frequency of truths vs. lies is generally comparable across speech rates. The one exception involves the male speaker responding to self-oriented questions. Relative to conditions where both speakers use the same speech rate, the perceived frequency of lies increases when early latencies occur at a faster speech rate. In addition, whereas the female speaker was perceived as most often lying for someone else's benefit, the male speaker was perceived as lying for his own benefit. Results suggest the potential relevance of various other contextual factors, including the nature of the speakers' relationship, the topic of discussion, and the surrounding social context.

H37

PERCEIVING FEAR AND ANGER FROM DYNAMIC FACES AND BODIES AN FMRI *STUDY* *M.E. Kret, University of Tilburg; J. Grezes, UMR 742 INSERM 1 DÇpartement d'Etudes Cognitives, INSERM-Ecole Normale SupÇrieure; S. Pichon, UMR 742 INSERM 1 DÇpartement d'Etudes Cognitives, INSERM-Ecole Normale SupÇrieure; B. de Gelder, University of Tilburg; Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School* – We express and communicate our emotional states and the associated action tendencies with our bodies of which facial expressions are an integral part. It is presently unclear to what extent our perception of whole body expressions use a neurofunctional network that partly overlaps with the network dedicated to processing facial expressions. To clarify these issues, and to compare activations attributable to emotional body stimuli with activations triggered by isolated facial expressions, we conducted two event-related functional magnetic resonance imaging (fMRI) experiments. Our goal was to compare face and body triggered activity and relate it to the specific emotion represented, fear or anger. In the first experiment, short video fragments of facial and bodily expressions (anger vs. neutral) were used. The second experiment compared neutral expressions with face and body expressions of fear. Each experiment contained 352 trials of which 80 scrambled videos and 16 oddballs. Our results indicate that viewing facial as well as whole body expressions of anger and fear activate the extrastriate body area and the superior temporal sulcus. Viewing body expressions compared to facial expressions is associated with the fusiform gyrus, the temporo-parietal junction and the intraparietal sulcus. Moreover, fearful expressions modulate activity within the fusiform gyrus. Finally, the premotor cortex was found to be specifically involved in processing angry body expressions, as revealed by the interaction. Taken together, our results plead in favour of taking into account the specific emotion expressed when comparing the neurofunctional basis of emotions shown by the face and the whole body.

H38

PSYCHOPATHIC TENDENCIES: REDUCED EMOTIONAL RESPONSIVENESS OR ANOMALOUS ATTENTIONAL CONTROL? *Julia C. Schechter, NIMH; Abigail A. Marsh, NIMH; Katie A. Fowler, NIMH; Stephen Sinclair, Daniel S. Pine, NIMH; R.J.R. Blair NIMH* – Background: There have been suggestions that the reduced emotional responsiveness seen in psychopathy reflects the primary pathology (Blair et al., 2005) or that it is secondary to atypical attentional control such that emotional stimuli are not processed when task demands direct attention to task relevant stimuli (Newman et al., 2002). The current study examined BOLD responses using fMRI of children with psychopathic tendencies and comparison children when performing a task examining the impact of attentional load on the amygdala's response to emotional cues. Methods: This was an event related

fMRI paradigm involving children with psychopathic tendencies and comparison children. Participants viewed neutral and fearful faces that were spatially flanked by bars varying in orientation (cf. Pessoa et al., 2005). Across trials, the bars were either parallel to one another or differing in orientation by 12 (high attentional load), 24, or 90 (low attentional load) degrees. Participants responded as to whether the bars were parallel or not. Results: Children with psychopathic tendencies showed appropriate recruitment of regions implicated in attentional control with increasing attentional load. In contrast, at levels of low task relevant attentional load, children with psychopathic tendencies showed reduced amygdala responses to fearful distracters. Conclusions: These data are consistent with suggestions that psychopathy reflects a primary pathology in emotional responsiveness.

H39

NEURAL BASES OF SELF AND CLOSE OTHER PROCESSING IN ADULTS AND CHILDREN *R.D. Ray , Vanderbilt University; A. Shelton, Johns Hopkins; N.G. Hollon, NIH; B. Mischel, Harvard University; J.J Gross , Stanford University; J.D.E. Gabrieli, MIT* – Recent research has demonstrated that midline structures such as the MPFC and PCC are recruited to process information about one's self. However, this research has been mixed as to whether processing information about close others relies upon the same regions. Furthermore, only one study has examined the neural bases of self-referential processing in children. To address these gaps in the literature, the present studies use behavioral and fMRI methods to look at the relationship of self and close other referential processing in both adults and children. Study 1 demonstrates that when adults engage in self- and close other-referential processing there is substantial overlap in regions of MPFC, anterior cingulate (ACC) and posterior cingulate; however, a region of rostral ACC/MPFC shows significantly greater activation when processing information about one's self. Study 2 shows that younger children recall more close other, mother words, whereas older children recall more self encoded words. Study 3 demonstrates that neurally, this difference in young versus older children is associated with activations in regions of the rostral ACC such that children who remember more mother words activate more rostral anterior cingulate when processing mother words. Older children activate this same region more when processing words encoded with the self. These studies suggest that accessing representations of self and crucial close others such as one's mother in involves many common brain regions, however, the representation that is most able to capture attention and memory resources is the representation that is most emotionally salient at each developmental period.

H40

THE DIFFERENTIAL EFFECT OF POSITIVE SOCIAL EMOTIONS ON MORAL DECISIONS *Nina Strohminger, University of Michigan; Rick Lewis, University of Michigan; Dave Meyer, University of Michigan* – It has become commonplace to assume that the positive social emotions—such as pride, gratitude, elevation, and mirth—are relatively indistinct in their cognitive-behavioral effects, and that their impact is always positive. However, recent evidence from the moral decision-making literature calls this view into question. Valdesolo & DeSteno (2006) found that mirth (humor) causes subjects to make more utilitarian but less empathetic choices in trolleycar-type moral dilemmas. In order to determine whether this effect was the result of the general influence of positive emotions or whether it was due to the specific attributes of humor, we replicated this study with an additional positive social emotion, elevation (associated with moral beauty). We also measured performance on personality scales relating to moral behavior and used eye-tracking to see whether eye gaze and pupil dilation were predictive of these decisions. We predicted that elevation would stir deontic moral principles and lower moral permissiveness, and that mirth's higher permissiveness ratings would reflect reduced empathy rather than clear-headed utilitarianism. We also predicted that mirth would make participants more willing to make personal violations when the victim was an authority figure, in keeping with theories claiming that humor plays a role in hierarchy regulation (e.g. Fessler & Haley, 2003). Our results suggest that the decisional effects of mirth and elevation are distinctive and reflect their respective social functions. This study sheds light on several bigger-picture questions, such as the ramifications of using positive emotions to induce "positive affect," the evolutionary function of two poorly understood social emotions, the link between emotion and moral deliberation, and the usefulness of eyetracking in social cognition research.

H41

SEX-RELATED DEVELOPMENTAL DIFFERENCES IN NEURAL RESPONSE TO ANTICIPATED PEER EVALUATION *Amanda E. Guyer, NIMH; Erin B. McClure-Tone, Georgia State University; Daniel S. Pine, NIMH; Eric E. Nelson, NIMH* – Behaviorally-based studies have demonstrated that peer interaction undergoes changes in adolescence that can differ by sex and age. The present study used functional magnetic resonance imaging (fMRI) to assess brain responses to peers in this age group. Given the increased self-focus and concern about social evaluation on patterns of affect in adolescence, the current study focused on self-appraisal in an evaluative context and assessed age- and sex-related changes in 36 psychiatrically healthy 9 to 17 year olds. The "Chatroom Task," consisted of two phases. In phase one, participants were led to believe they were participating in a study of internet-based communication and would chat online with another teenager from a collaborating institution.

Subjects viewed photographs of alleged "participants" and rated their interest in interacting with them. Subjects were then photographed and told they would be similarly evaluated by the other "participants." In phase two, subjects underwent neuroimaging while reviewing the photographs they had rated previously and were asked to evaluate how interested they thought each depicted peer would be in interacting with them. We compared brain activity while participants performed this assessment on peers in whom the subject previously expressed high vs. low interest. Differential age- and sex-related activation patterns emerged in the nucleus accumbens, hippocampus, hypothalamus, and insula. Activation was most robust in older relative to younger females, but showed no association with age in males. Relating these neural response patterns to changes in adolescent social-cognition enriches theories of adolescent social development through enhanced neurobiological understanding of social behavior.

H42

PHYSIOLOGICAL SUBSTRATES OF EMPATHIC ACCURACY *Jamil Zaki, Columbia University; Niall Bolger, Columbia University; Kevin Ochsner, Columbia University* – Perceivers whose autonomic activity covaries with that of social targets (physiological linkage) are more accurate about negative affect reported by these targets (empathic accuracy, or EA). This finding has been used to argue that social cognition relies on perceivers' experience of internal states similar to those of targets. However, the utility of sharing internal states with targets may not hold in all situations. For example, the role physiological linkage in facilitating EA assumes that targets' arousal matches their affective experience (affective coherence), which is not consistently the case. The current work investigated how target coherence affects EA, and its relationship to physiological linkage. Targets were videotaped while talking about emotional autobiographical events, and their skin conductance response (SCR) were measured concurrently. Targets watched the videos they had made and continuously rated how positive or negative they had felt while talking. Perceivers watched these videos and made continuous ratings of how positive or negative they thought targets were feeling; their SCR was concurrently recorded. Timecourse correlations were used to calculate EA, physiological linkage, and targets' emotional coherence. We replicated the finding that physiological linkage predicts EA only for negative affect, and further found that a target's affective coherence predicts EA across valences. For negative emotions, target coherence also predicted physiological linkage, and its effect on EA was partially mediated through physiological linkage. These findings suggest that sharing arousal levels of targets is related to understanding their emotions, and that coherent targets cause more arousal sharing than less coherent targets.

H43

DIFFERENTIAL ACTIVATION TO CLEAR VERSUS AMBIGUOUS FACIAL EXPRESSIONS OF THREAT: AN ERP INVESTIGATION *Michael T. Stevenson, The Pennsylvania State University; Reginald B. Adams Jr., The Pennsylvania State University; Robert G. Franklin, The Pennsylvania State University; Nalini Ambady, Tufts University* – Previously, direct and averted gaze have been shown to differentially enhance perceived intensity, recognition accuracy, and processing efficiency of anger and fear expressions, respectively (Adams and Kleck, 2003, 2005). We examined responses to these clear and ambiguous threat/gaze pairings in facial expressions of emotion using ERP. Of particular interest were two early components in the visual stream known to be involved in both face processing (Bentin et al., 1996; Rossion et al, 2000) and emotion perception (Jeffreys, 1996; Batty and Taylor, 2003): the Vertex Positive Potential (VPP) and the N200 response. Recent evidence demonstrates that the VPP component reflects early, bottom-up processing, unsusceptible to top-down influences (Rossion et al, 1999; Campanella, et al., 2002), whereas the slightly later N200 response appears susceptible to conscious, top-down influences (Rossion et al, 1999; Jemel, et al., 2003). Based on these findings, we examined whether VPP and N200 potentials would differ in response to ambiguous versus clear threat. Participants viewed pictures of faces expressing anger or fear with either direct or averted (left or right) eyegaze while EEG was recorded. They were asked to indicate the gender of each stimulus. The VPP response, which is generally thought to reflect purely bottom-up processing, was preferentially responsive to clear threat cues, whereas the slightly later N200 response, known to be influenced by top-down modulation, was preferentially responsive to ambiguous threat cues. Particularly striking is how closely aligned these responses are in time, thereby offering further evidence that these processing streams are dissociable and operate in parallel.

H44

MIRRORING AND SOCIAL COGNITION: EEG AND TMS EVIDENCE FOR DISSOCIABLE SUBCOMPONENTS OF THEORY OF *MIND* *J.A. Pineda, UCSD; E. Hecht, Emory University; D. Brang, UCSD; E. Agmon, UCSD; H.A. Elfenbein, UCSD; J.B. Davis, UCSD* – A distinction is made between social-perceptive components of theory of mind (ToM), involving judgments of mental state based on facial and bodily expressions, and social-cognitive components, which are more representation-based and linked to language. This is similar to the distinction between representing the mental state of another as if it were one's own (simulation theory), requiring involvement of the mirror neuron system (MNS), and explicit reasoning about mental states (theory theory), which does not. The MNS, located in part in the pars opercularis of the inferior frontal gyrus (IFG), is thought to be involved in producing shared neural representations about the self and others, including ToM. Furthermore,

evidence that mu rhythms over sensorimotor cortex are suppressed during MNS function allowed testing of this componential view of ToM. In Study 1, participants performed an emotion recognition task, assumed to engage the social-perceptual component, while a cartoons task was assumed to engage the social-cognitive component. In Study 2, a 1 Hz repetitive transcranial magnetic stimulation (rTMS) pulse was applied to the left IFG for 5 minutes prior to task performance. In Study 1, mu suppression was positively correlated with accuracy on the social-perceptual but not the social-cognitive task. In Study 2, rTMS inhibited mu suppression. Furthermore, it had little effect on performance on the social-cognitive task, while significantly decreasing accuracy and increasing response latency on the social-perceptual task. These results are consistent with a componential view of ToM and suggest that other mechanisms are necessary for mental attributions of beliefs and intentions.

H45

TAKING ANOTHER'S PERSPECTIVE INCREASES SELF-REFERENTIAL NEURAL PROCESSING *Daniel L. Ames, Harvard University; Adrianna C. Jenkins, Harvard University; Mahzarin R. Banaji, Harvard University; Jason P. Mitchell, Harvard University* – Perspective-taking has been linked to many prosocial effects, such as increased empathy, increased altruism, and decreased stereotyping. One explanation for these effects holds that, in taking another's perspective, one comes to view the target in a more "self-like" way. Recent neuroimaging findings have demonstrated that a region of ventromedial prefrontal cortex (vMPFC) is preferentially engaged by self-referential thought. Thus, to the extent that perspective-taking leads to greater overlap in the cognitive processes engaged by the consideration of self and other, vMPFC activity should differentiate less between self and a person whose perspective has recently been adopted than one encountered from a more distal vantage. To test this hypothesis, participants were scanned while judging both their own preferences and the preferences of two individuals who differed in whether participants had earlier taken their perspective or described them in a closely-matched control task. Consistent with predictions, vMPFC activity was found to be greater (more similar to self) for perspective-taking targets than for non-perspective-taking targets. This dissociation was replicated in an alternative vMPFC region of interest defined by an independent self-reference task. These results suggest that conscious attempts to adopt another's perspective may prompt perceivers to consider other people via cognitive processes typically reserved for introspection about the self-supporting the proposition that the prosocial effects of perspective taking may arise through a blurring of the cognitive distinction between self and other.

H46

THE NEURAL SUBSTRATES INVOLVED IN EVALUATION OF SELF-GENERATED STIMULI *Ingrid R. Johnsen, Ohio State University Kenneth G. DeMarree, Ohio State University William A. Cunningham, Ohio State University* – Previous research on the social neuroscience of evaluation has shown that different regions of the brain are involved in the evaluation of positive versus negative stimuli. Many of these studies were conducted by observing participants' reactions to presented stimuli, such as faces or emotionally evocative images. However, it is somewhat unclear whether these same regions would be involved in the evaluation of self-generated attitude objects. During functional magnetic resonance imaging (fMRI), participants were asked to imagine objects that they either liked or disliked. Results showed that areas of medial OFC and nucleus accumbens were correlated with the imagination of liked objects (relative to disliked), while an area of lateral OFC was correlated with the imagination of disliked objects (relative to liked). Additional analyses suggested that activation in these regions may vary as a function of individual differences. These results build on prior findings showing that many of the same regions of the brain involved in the evaluation of positive and negative information are also implicated in the evaluation of internally-generated liked and disliked objects. That is, some of the same evaluative circuits utilized in stimulus driven evaluation are also utilized during top-down generation of evaluatively-laden information.

H47

A DISTANCE PRINCIPLE OF ORGANIZATION OF THE VENTRAL VISUAL STREAM *Elinor Amit, New York University; Yaacov Trope, New York University; Galit Yovel, Tel Aviv University* – Perceiving the distance of an object from the self is a fundamental feature of the visual system. Here we used fMRI to test the hypothesis that the ventral visual stream represents distance-related information in discrete cortical regions. In particular, object-related regions (Lateral Occipital Complex - LOC) are biased towards proximal stimuli, whereas scene-related regions (Parahipocampal Place Area - PPA) are biased towards distant stimuli. Participants were presented with Ponzo lines, which create an illusion of depth. In one condition, the stimuli (pictures of objects or houses) appeared in the perceived proximal position. In the second condition, the stimuli appeared in the perceived distal position. In addition, we ran a localizer, which included scenes, objects and scrambled images of objects. We defined for each subject the PPA (Scenes > Objects, $p < 10\text{-}4$, uncorrected) and the LOC (Objects > Scrambled Objects, $p < 10\text{-}4$, uncorrected). Consistent with our hypothesis, we found a double dissociation such that object areas showed a higher response to perceived proximal stimuli than perceived distal stimuli, whereas scene-related regions showed a higher response to perceived distal objects than perceived proximal objects. Importantly, this effect was found for both objects and houses. This outcome suggests the plausibility of a distance principle of organization of the ventral visual stream.

H48

DEFICITS AND ASSETS ACROSS NEURO-COGNITIVE DOMAINS IN ANOREXIA NERVOSA AND AUTISM: DEFINING A TRANSDIAGNOSTIC FRAMEWORK *Nancy Zucker, DUMC; Rhonda Merwin, DUMC; Ashley Moskovich, DUMC; Molly Losh, UNC-CH; Cynthia Bulik, UNC-CH; Steven Green, Duke University; Joseph Piven, UNC-CH; Kevin LaBar, Duke University* – Characterizing social cognitive deficits and assets across psychiatric conditions can help define relevant symptom dimensions that cross arbitrary diagnostic boundaries. Individuals with anorexia nervosa (AN) who exhibit a chronic illness course exhibit elevated features of autism spectrum disorders (ASD) and have first degree relatives with elevated rates of ASD, disorders notable for profound impairment in reciprocal social interaction. We compare neurocognitive deficits and assets in 22 adult, weight-restored females with AN relative to an age and sex-matched sample with ASD using a battery that assesses competencies at multiple levels of analysis: 1) neuropsychological functioning (verbal/performance ratio; set-shifting; visual organization; visual memory); 2) social perception (emotion and body language identification; integration of context into interpretation of emotional state); 3) perceptual processes (visual scan paths; central coherence); and 4) interpersonal competence (parent and participant reports). We hypothesized that while both groups exhibit similar behavioral deficits in social reciprocity and overlap in information processing styles, there would be differences in the motivational salience of visual inputs. Preliminary results support this hypothesis and indicate that whereas individuals with ASD tend to avoid salient features of the face, individuals with AN exhibit a pattern of hyperscanning; scanning and subsequently avoiding the eye-region but with fixation on body language as a compensatory strategy for deciphering affect. These perceptual processing styles combined with deficits in the ability to integrate complex social affective information result in similar deficits but with different mechanisms. A model will be presented to explain divergence in developmental trajectories of social perception.

H49

THE NEURAL MECHANISMS OF IRRITABILITY IN PEDIATRIC BIPOLAR DISORDER: A MAGNETO-ENCEPHALOGRAPHY (MEG) STUDY *Brendan A. Rich, NIMH; Laura Onelio, NIMH; Tom Holroyd, NIMH; Frederick Carver, NIMH; Daniel Pine, NIMH; Richard Coppola, NIMH; Ellen Leibenluft, NIMH* – Goals: Pediatric bipolar disorder (BD) is one of the most debilitating childhood psychopathologies. Of its many impairing symptoms, irritability is thought to be both highly prevalent and incapacitating. We used magnetoencephalography (MEG) to examine the neural mechanisms of irritability in pediatric BD and begin to elucidate the pathophysiology of the disorder. Methods: We compared 20 BD (14.92+2.03 years; 45% male) and 20 healthy control (CON) (14.72+1.69 years; 45% male) subjects. BD subjects met strict DSM-IV criteria for bipolar disorder. CON subjects had no psychiatric history. Subjects completed the affective Posner task, a modified version of the standard Posner attention paradigm that includes rigged negative feedback to induce frustration and irritability. Neuromagnetic data were collected using a whole-head 275-channel MEG system. We compared neural activation in the BD vs. CON subjects following rigged feedback. Analyses were across the whole-brain with significance set at $p < .01$. Results: During the frustrating task, pediatric BD subjects, compared to CON subjects, had significantly greater activation of the amygdala, inferior parietal lobule, putamen, and insula (all beta band desynchronization), and inferior and superior frontal gyri (alpha desynchronization). BD subjects also had significantly lower activation of the anterior cingulate cortex (ACC) and middle frontal gyrus (alpha desynchronization), precuneus (bets desynchronization), and superior temporal gyrus (gamma synchronization). Conclusions: When frustrated, BD youths displayed aberrant activation of key neural regions responsible for affective and behavioral regulation and attention modulation. In particular, frustration in bipolar youths may be associated with increased amygdala activity and decreased ACC activity.

H50

CONFLICT DETECTION DURING ATTENUATION OF RACIAL *BIAS* *Jennifer Kubota, University of Colorado Boulder; Jordan Wood, University of Colorado Boulder; Tiffany A. Ito, University of Colorado Boulder* – Past research demonstrates that there is greater recruitment of conflict detection for errors indicative of racial bias. Using a sequential priming task, these previous studies find larger ERNs (error-related negativity) when people erroneously respond gun instead of tool following a Black compared with a White neutral prime. Because of the stereotypic link between African Americans and violence, it is thought that participants must recruit conflict detection processes on Black-tool trials to avoid racially biased errors (i.e. responding gun rather than tool). Subsequent behavioral research indicates that emotional expression can succeed in attenuating racial bias on this same task. When primes are angry we observe error bias, or faster and more accurate responding to guns following Black faces than White faces. When primes are happy this effect is eliminated. One possible explanation for this attenuation might be in the recruitment of cognitive control. Using the same sequential priming task, participants viewed pictures of Black and White faces posing angry and happy expressions that primed guns or tools. Participants showed race bias both in errors and ERNs to Black compared with White faces when primes were angry, but there was no bias in errors or ERNs when primes were happy. Participants instead recruit these mechanisms similarly for both Black and White targets. These results suggest that cues integral to a target can modify the recruitment of conflict detection and additionally

demonstrate that a feature present in many everyday encounters (a smile) can succeed in attenuating racial bias.

H51

TRUE OR FALSE: THE RTPJ RESPONDS TO TASK-RELEVANT BELIEFS. *Jonathan Scholz, MIT; Hyowon Gweon, MIT; Steven R Green, Duke University; Kevin Pelphrey, CMU; Rebecca Saxe, MIT* – Reasoning about other people's minds recruits distinct brain regions, including predominantly right temporal-parietal junction (rTPJ). Most neuroimaging experiments have identified these regions using false belief tasks, leading to disagreement over whether activation in these brain areas reflect belief reasoning generally, or some process specific to false beliefs. In particular, Sommer et al. (2007) have argued that rTPJ is involved only in reasoning about false beliefs. In a standard false belief task, however, false belief trials have multiple confounded properties: falseness per se, subjects' need to inhibit their own true knowledge, and the relevance of the belief information for successful task performance. In this fMRI study, we used a novel, non-verbal task that required subjects to use the belief of an agent, presented as a thought-bubble, to answer a question about reality. On False-Belief trials, the subjects knew the reality, and the false belief content was potentially detrimental to task performance. On Belief-Only trials, the subjects did not themselves know the reality, and thus had to rely on the agent's true belief to answer the question. We found a selective response in the rTPJ at the time the thought-bubble appeared, only on Belief-Only trials. These results provide evidence that rTPJ is reliably recruited by a nonverbal belief-attribution task, and more importantly, that activation in the rTPJ is not specifically related to false beliefs; it is observed whenever representing beliefs of others is task-relevant, independent of the veracity of their contents.

H52

MORAL REASONING IN HIGH-FUNCTIONING AUTISM *Joe M. Moran, MIT; Liane Young, MIT; Su Mei Lee, MIT; John D.E. Gabrieli, MIT; Rebecca Saxe, MIT* – In the legal system, crimes in which harm is intended (either actual or attempted murder) are punished most severely. Conversely, crimes of accidental harm (manslaughter) incur lesser punishment. Investigations of moral reasoning suggest that typically developed individuals judge attempted harm much more severely than accidental harm. Indeed, developmental evidence suggests that mature moral judgments depend on the processes responsible for representing and integrating information about beliefs and outcomes; Accordingly, brain regions associated with mentalising are activated during moral reasoning. Specifically, greater engagement of the right temporoparietal junction during reasoning about accidental harm is linearly associated with increased ratings of moral permissibility. Since subjects with autism (ASD) are known to be impaired at belief/desire reasoning and show decreased rTPJ activity during theory of mind paradigms, we hypothesized that they would show decreased ratings of permissibility for accidental harm. We used a 2 (outcome: neutral/negative) X 2 (belief: neutral/negative) design to investigate moral reasoning in ASD and control subjects. Results revealed a three-way interaction, such that ASD participants rated accidental harm as less morally permissible than did controls, while ratings of actions in the other three conditions did not differentiate groups. Thus, ASD subjects do not seem as sensitive to differences between accidental and attempted harm. Reasons for this disparity will be discussed.